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PROCEEDINGS BOOK

6th INTERNATIONAL
LATIN AMERICAN SCIENTIFIC RESEARCH
CONGRESS

EDITORS

German Martinez Prats
Francisca Silva Hernandez
Jesus Manuel Argaez De Los Santos
Jesus Antonio Piña Gutierrez





6th INTERNATIONAL LATIN AMERICAN SCIENTIFIC RESEARCH CONGRESS

February 1-3, 2024
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Edited by

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Latin American Scientific Research Programmes

CONGRESS ID

6th INTERNATIONAL

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DATE-PLACE

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All applications have undergone a double-blind peer review process

TOTAL NUMBER OF PAPERS: 140

THE NUMBER OF PAPERS FROM TÜRKİYE: 54

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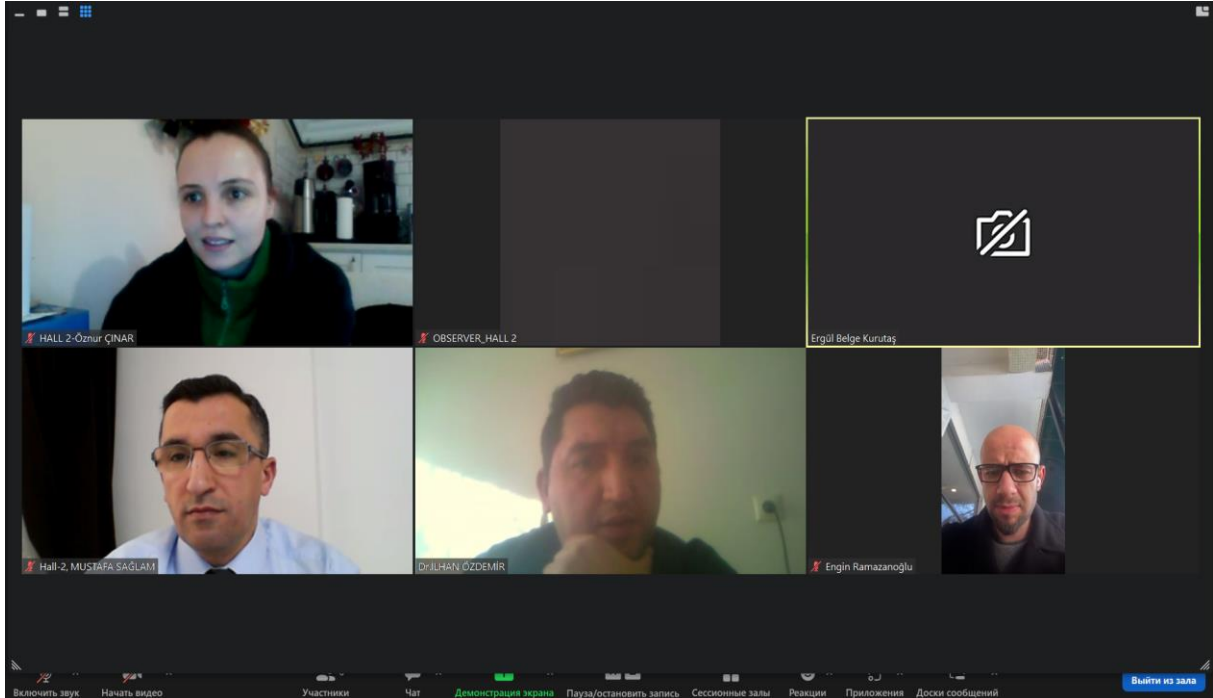
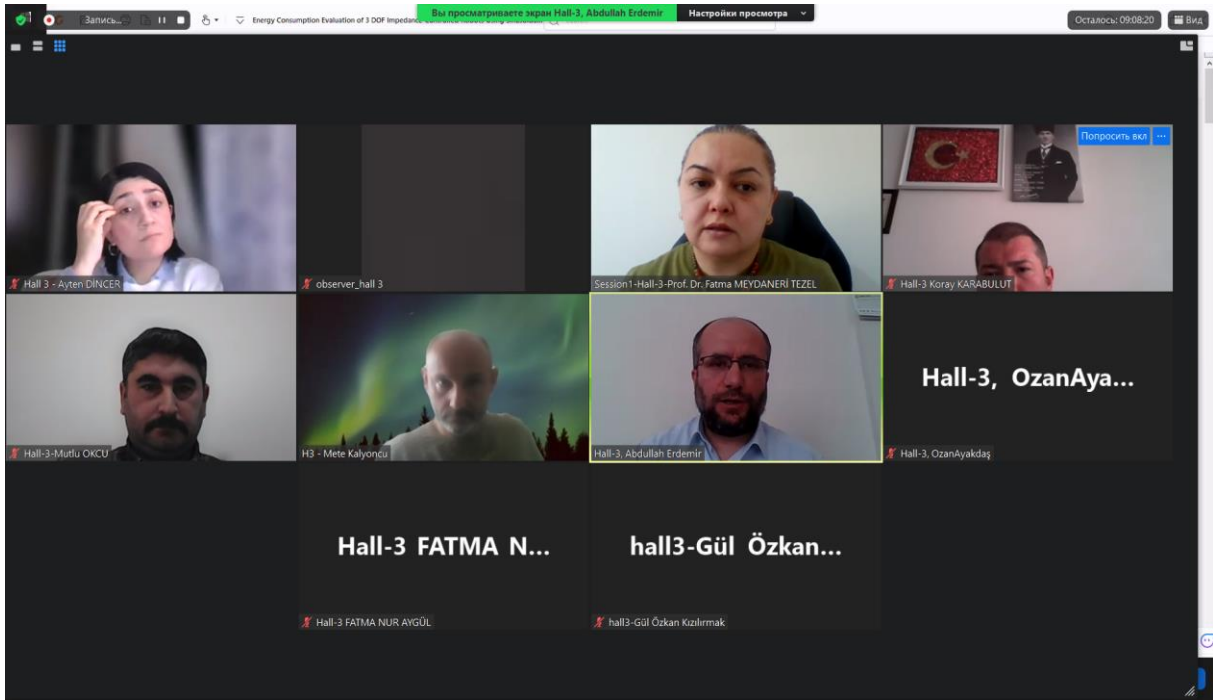
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Kaydediliyor... Hall 1 Ferdi ÖZBİLGİN ekranını görüntüyorsunuz Seçenekleri Görüntüle

Giriş yapın Kalan: 09:50:12 Görüntüle

Göç Kavramı / Concept Of Migration

Göçler, toplumlara oluşturan birçok yapıyı değiştirmektedir. Başta demografik yapıyı etkileyerek birtakım dengesizliklere neden olabilmektedir. Ekonomik açıdan, iş gücü piyasasını olumlu yönde etkileyerek zenginleştirebildiği gibi, mevcut kaynakların kullanımında eşitsizliklere yol açabilmektedir. Öte yandan farklı kültürleri bir araya getirerek kültür çeşitliliğine ortam sağlamaktadır.

Sonuç olarak, göç, toplumlar arasında etkileşim, kültürel alışveriş ve ekonomik büyümeyi teşvik eden bir süreçtir. Fakat bu sürecin birtakım olumsuzluklara neden olabileceği göz önüne alınarak dikkatlice yönetilmesi gereklidir.



Migrations alter many structures that constitute them; they can disrupt the demographic structure, imbalances. Economically, while they can positively enrich the market by enriching it, they can also lead to the inefficient utilization of existing resources. On the other hand, they can increase cultural diversity by bringing different cultures together.

In conclusion, migration is a process that promotes cultural exchange, and economic growth among nations, but considering that this process can lead to certain negative effects, it should be carefully managed.

Observer H-1

Observer H-1

Hall 1 Ferdi ÖZBİLGİN

Hall 1 HAZAL OYMAN

Sesi aç Videoyu Başlat Katılımcılar Sohbet Ekranı paylaş Kaydı Duraklat/Durdur Ara Odalar Reaksiyonlar Uygulamalar Beyaz Tahtalar Odadan Çık

Zoom Toplantısı



Observer Hall... Moderator: G...

Kaydediliyor... Kalan: 09:40:19

Katılımcılar (5)

- OH Obser... (Ortak oturum sahibi, ben)
- GM Gulnara Mamedova
- Gubakhanim Hajizade
- Gulnara Aleva
- MG Moderator: Gultakin Javadova

Vitiligo lesions are often combined with one or more halonevus (pigmented nevus with a depigmented halo). In patients with fair skin (skin types I, II according to T. B. Fitzpatrick's classification), examination of the skin under a Wood's lamp is recommended for clear visualization of depigmented lesions.



Tümünü Sessize Al Daha fazla



Latin American Scientific Research Programmes

Zoom Toplantı - HALL 5

S1 H 5 Gheorghe Giurgiu ekranı görüntüleniyoruz

Seçenekleri Görüntüle

Observer Hall 5

S1 H 5 Gheorgh...
Observer Hall 5
S1 H 5 Gheorghe Giurgiu
Gulnara Mamedova
Oluwakemi Apata

Katılımcılar (4)

- OH O... (Ortak oturum sahibi, ben)
- SH S1 H 5 Gheorghe Giurgiu
- GM Gulnara Mamedova
- Oluwakemi Apata

Kaydediliyor...

Giriş yapın

Kalan: 09:54:29

**FOOD ADDITIVES:
IMPACT ON THE GUT MICROBIOME, INCREASE ANXIETY**

Major Gheorghe Giurgiu¹, Prof Dr Med Manole Cojocaru²

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6th International Latin American Scientific Research Congress February 1-3, 2024 Havana, Cuba

Sesize al Videoyu Başlat Katılımcılar Sohbet Ekranı paylaş Kaydı Duraklat/Durdur Ara Odalar Reaksiyonlar Uygulamalar Beyaz Tahtalar Odadan Çık

Tümünü Sessize Al

14:59 3.02.2024

Müzisyenler için Orjinal Ses: Kapatı Kaydediliyor...

Giriş yapın

Kalan: 09:49:30

Görüntüle

Hiçbir şey duymuyor musunuz? Ses düzeyini artır

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Research Question: What challenges do Pakistani universities encounter when shifting from traditional teaching methods to eLearning, and what recommendations can overcome these challenges?

III. Research Question

Katılımcılar (3)

- H6 H... (Ortak oturum sahibi, ben)
- Zohaib Hassan Sain - S(1), H...
- H6 Hall 6 Session 1 furkan gümüş

Hall 6- Observer

Hall 6- Observer

Hall 6 Session 1 furkan gü...

Sesi aç Videoyu Başlat Katılımcılar Sohbet Ekranı paylaş Reaksiyonlar Uygulamalar Beyaz Tahtalar Daha fazla Odadan Çık

Tümünü Sessize Al



Latin American Scientific Research Programmes

Zoom Toplantısı

Observer Hall 1

Heidy Kristhel

Kalan: 09:32:52

CONCLUSIONES Y LÍNEAS FUTURAS

Teniendo en consideración dos de los hallazgos anteriores, resulta interesante analizar el comportamiento de aquellos modelos, que teniendo un alcance de planificación operativo toman decisiones referentes a producción (Plantar-Cosechar-Almacenar) y distribución a la vez.

Al hacer el recuento la cantidad de artículos que abordan esta temática es solamente el 10%, lo que pone en alerta la necesidad de desarrollar modelos integrados que permitan manejar de la mejor forma la corta vida de los productos perecederos y lograr no bajar la calidad de los mismos.

Se hace urgente integrar estos modelos no sólo por el beneficio que pueda lograr la industria agroalimentaria, sino también por ofrecer un producto de calidad al consumidor final.

Katılımcılar (3)

- OH Observer... (Ortak oturum sahibi, ben)
- NP Natacha Pino Acuña
- HK Heidy Kristhel

Tümünü Sessize Al Daha fazla

Zoom Toplantısı - HALL 4

Kaydediliyor...

Hiçbir şey duymuyor musunuz? Ses düzeyini artır

Giriş yapın Kalan: 09:48:48 Görüntüle

Observer Hall 4

Moderator: Hall 4 - Nezihe OTAY LÜLE

Observer Hall 4

Atakan KOÇ

Hall-4 MELİKE TATAR

Hall4 Müberra Durmaz

Nuray Güzeler hall4

Hall4 Müberra Durmaz

Katılımcılar (6)

- OH O... (Ortak oturum sahibi, ben)
- MH Moderator: Hall 4 - Nezihe OTAY...
- AK Atakan KOÇ
- HM Hall-4 MELİKE TATAR
- HM Hall4 Müberra Durmaz
- NG Nuray Güzeler hall4

Sesli aç Videoyu Başlat Katılımcılar Sohbet Ekranı paylaş Kaydı Duraklat/Durdur Ara Odalar Reaksiyonlar Uygulamalar Beyaz Tahtalar

Otdan Çık Tümünü Sessize Al

15:03 2.02.2024



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Kaydediliyor... Giriş yapın Kalan: 09:26:40 Görüntüle

Observer H-1

F.Öül Koçsoy Observer H-1 Hall-1, Saniye TAŞKIN BALADURA Hall 1, Dilek SAY Ph.D. Mujan Memmedzade Dilsat Deniz ÖLEKLİ Hasan Fehmi Ulus Funda Demirel Nargiz Karimova H-1-Leyla DİLEK Nevra Kıpana

Sesi aç Videoyu Başlat Katılımcılar 11 Sohbet Ekranı paylaş Kaydı Duraklat/Durdur Ara Odalar Reaksiyonlar Uygulamalar Beyaz Tahtalar Odadan Çık

Kaydediliyor... Hall 1 Ferdi ÖZBİLGİN ekranını görüntüleyorsunuz Seçenekleri Görüntüle Giriş yapın Kalan: 09:50:12 Görüntüle

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In conclusion, migration is a process that promotes cultural exchange, and economic growth among societies. However, considering that this process can lead to certain negative effects, it should be carefully managed.

Observer H-1 Observer H-1 Hall 1 Ferdi ÖZBİLGİN Hall 1 HAZAL OYMAN

Sesi aç Videoyu Başlat Katılımcılar 6 Sohbet Ekranı paylaş Kaydı Duraklat/Durdur Ara Odalar Reaksiyonlar Uygulamalar Beyaz Tahtalar Odadan Çık



Latin American Scientific Research Programmes

**6th INTERNATIONAL
LATIN AMERICAN SCIENTIFIC
RESEARCH CONGRESS**

**February 1-3, 2024
Havana, Cuba**

PROGRAM

<https://us02web.zoom.us/j/86215283413?pwd=UURkNjRTaExPMmFTTnJKNnd4UTdWUT09>

**Meeting ID: 862 1528 3413
Passcode: 030405**

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FACE TO FACE**01.02.2024****Moderator: Dra. Aransazu Avalos Diaz
Dr. Arturo Martinez De Escobar Fernandez****Dr. William Baldemar Lopez Rodriguez****Mtra. Veronica Vazquez Vidal****Address: UJAT Tabasco Mexic****Mexico Local Time: 15:00 – 17:00**

TITLE	AUTHOR(S)	AFFILIATION
EFFECTOS NEGATIVOS EN LA SALUD HUMANA RELACIONADOS CON LA EXPOSICIÓN A LOS CONTAMINANTES ATMOSFÉRICOS	Liliana Medina Medina Candelaria Vázquez Ramos Elizabeth García Moreno Aransazú Avalos Díaz	Universidad Juárez Autónoma de Tabasco
FACTIBILIDAD DE LAS COOPERATIVAS ACUÍCOLAS EN TABASCO	Lic. Lucerito Arias De Los Santos Dr. Tomas Francisco Morales Guzmán Dr. German Martínez Prats Dra. Candelaria Guzmán Fernández	Universidad de Aysén Universidad Politécnica de Valencia
¿SABES QUE ES EL FOBAPROA? EFECTOS EN LA ECONOMÍA MEXICANA DESPUÉS DE 29 AÑOS DE SU ACTIVACIÓN	Camilo León Pérez Dra. Aransazú Ávalos Díaz Dra. Fabiola Itzel Ortiz Martínez Dr. Abraham G. Pérez Sandoval	Universidad Juárez Autónoma de Tabasco
IMPACTO ECONÓMICO AMBIENTAL DEL PROGRAMA SEMBRANDO VIDA EN TABASCO	Darwin Vázquez Balboa Dr. Carlos Mauricio Tosca Vidal Dra. Mariela Adriana Rodríguez Ocaña Dra. Aransazú Avalos Diaz	Universidad Juárez Autónoma de Tabasco
IMPACTO ECONÓMICO DEL NEARSHORING EN EL SURESTE DE MÉXICO	Ricardo Arturo Soberano Gutiérrez Dra. Aransazú Avalos Díaz Dr. Andrés Guzmán Sala Dra. Candelaria Vázquez Ramos	Universidad Juárez Autónoma de Tabasco
MÉXICO Y TRATADO DE LIBRE COMERCIO DE AMÉRICA DEL NORTE (TLCAN). EL IMPACTO EN LA ECONOMÍA MEXICANA DE LA MICROEMPRESA	Camilo León Pérez Dra. Aransazú Ávalos Díaz Dra. Fabiola Itzel Ortiz Martínez Dr. Abraham G. Pérez Sandoval	Universidad Juárez Autónoma de Tabasco
CONOCIMIENTO SOBRE UMBRALES DE IDENTIFICACIÓN DE LAVADO DE DINERO	Ana Marina López Hernández Francisca Silva Hernandez Gladys Hernandez Romero Germán Martínez Prats	Universidad Juárez Autónoma de Tabasco
MEDIDAS DE ACCIÓN DE UNA EMPRESA ANTE UMBRALES DE IDENTIFICACIÓN DE LAVADO DE DINERO	Ana Marina López Hernández Francisca Silva Hernandez Gladys Hernandez Romero Germán Martínez Prats	Universidad Juárez Autónoma de Tabasco
PARTICIPACIÓN DE LAS PYMES EN EL COMERCIO EXTERIOR, UNA APORTACIÓN A LA ECONOMÍA INCLUSIVA	Itzel Dallan Vázquez García Candelaria Guzmán Fernández Tomás Francisco Morales Cárdenas Germán Martínez Prats	Universidad Juárez Autónoma de Tabasco
USO DEL BLOCKCHAIN EN LA CONTABILIDAD COMO HERRAMIENTA PARA LA PREVENCIÓN Y DISMINUCIÓN DEL FRAUDE	Itzel Dallan Vázquez García Candelaria Guzmán Fernández Tomás Francisco Morales Cárdenas Germán Martínez Prats,	Universidad Juárez Autónoma de Tabasco

Session -1 / Hall-1**02.02.2024****Moderator: Assoc. Prof. Dr. F.Gül KOÇSOY****Meeting ID: 862 1528 3413 / Passcode: 030405****Havana Local Time: 07:00 – 09:00****Ankara Local Time: 15:00 – 17:00**

TITLE	AUTHOR(S)	AFFILIATION
ILHAM ALIYEV AND THE NATIONAL ECONOMIC DEVELOPMENT MODEL	Ph.D Mujkan MEMMEDZADE	Azerbaijan State Academy of Physical Education and Sports, Baku, Azerbaijan.
SEMANTIC DIMENSION ANALYSIS OF THE ART OF TENASÜP IN GAGAUZ POETRY PLANE	Leyla DİLEK	Siirt University
IRONY AND 'AMOR FATI' IN O. HENRY'S "THE CACTUS" AND JOHN CHEEVER'S "THE HARTLEYS"	F.Gül KOÇSOY	Fırat University
A PHILOSOPHICAL VIEW OF MUSTAFA NECATİ, ONE OF THE LEADERS OF THE FOUNDATION PERIOD OF THE REPUBLIC OF TÜRKİYE	Funda DEMİREL	Ankara University
A LOOK AT THE WORD DIALOGUE IN THE LIGHT OF RELEVANT VERSES IN THE QUR'AN	Hasan Fehmi Ulus	Kırklareli University
REUSE OF VILLAGES IN THE LOWER EUPHRATES BASIN UNDER THE WATERS OF BİRECİK DAM WITH RURAL TOURISM	Dilşat Deniz ÖLEKLİ Ayten ERDEM	Hasan Kalyoncu University Yıldız Teknik University
TIME MANAGEMENT AND IMPORTANCE OF THE TIME MANAGEMENT IN NURSING	Saniye TAŞKIN BALADURA Yeter KİTİŞ	Trakya University Gazi University
THE IMPORTANCE OF WOMEN'S COOPERATIVES IN FOOD VALORIZATION: AN EVALUATION IN ADANA PROVINCE	Nuray GÜZELER Dilek SAY	Çukurova University
MEDIA TEXT AS A DISCRETE UNIT OF MASS MEDIA DISCOURSE	Nargiz Kerimova Elchin	Mingachevir State University, Azerbaijan Khazar University

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Session -1 / Hall-2**02.02.2024****Moderator: Prof. Dr. Ergul Belge KURUTAS****Meeting ID: 862 1528 3413 / Passcode: 030405****Havana Local Time: 07:00 – 09:00****Ankara Local Time: 15:00 – 17:00**

TITLE	AUTHOR(S)	AFFILIATION
EFFECTS OF FRESH AND FROZEN OOCYTES ON FERTILIZATION	Zeynep KAMALAK İlhan Özdemir Şamil ÖZTÜRK	Kamalak Clinic Erzurum,Turkey Private Buhara Hospital,Erzurum,Turkey Çanakkale Onsekiz Mart University, Çanakkale, Turkey
THE IMPORTANCE OF SPERM MORPHOLOGY IN EMBRYO DEVELOPMENT IN IVF	Fırat AŞIR Şamil ÖZTÜRK	Dicle University,Diyarbakır, Turkey. Çanakkale Onsekiz Mart University, Çanakkale, Turkey.
TUBERCULOUS MENINGITIDIS CASES IN A UNIVERSITY HOSPITAL	Mustafa SAĞLAM Deniz GAZEL	Gaziantep University
DIAGNOSTIC PERFORMANCE OF INCREASED BETA ARRESTIN-2 LEVEL IN PATIENTS WITH SCHIZOPHRENIA	Ayşe KURUTAS Ergul Belge KURUTAS Onur HURSI TOĞLU	Medipol University Kahramanmaraş Sutcu Imam University
PLASMA OMENTIN-1 LEVELS IN DRUG-FREE PATIENTS WITH BIPOLAR DISORDER	Ayşe KURUTAS Ergul Belge KURUTAS	Medipol University Kahramanmaraş Sutcu Imam University
THE EFFECT OF AEROBIC AND HIGH-INTENSITY INTERVAL TRAINING ON DAYTIME SLEEPINESS AND SELECTIVE ATTENTION IN OBSTRUCTIVE SLEEP APNEA	Engin RAMAZANOĞLU Burcu TALU Hilal ERMIŞ	İnönü University
MONITORING INTEREST OF INDIVIDUALS IN KANDİLLİ OBSERVATORY EARTHQUAKE RESEARCH INSTITUTE (KRDAE) AND DISASTER AND EMERGENCY MANAGEMENT DIRECTORATE (AFAD) LATEST EARTHQUAKES SITES AFTER KAHRAMANMARAŞ EARTHQUAKES: GOOGLE TREND ANALYSIS	Öznur ÇINAR	Bayburt University
MENTAL DISORDERS SEEN IN EMERGENCIES AND DISASTER	Öznur ÇINAR	Bayburt University

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Session -1 / Hall-3**02.02.2024****Moderator: Dr. İsmail Hakkı TEKİNER****Meeting ID: 862 1528 3413 / Passcode: 030405****Havana Local Time: 07:00 – 09:00****Ankara Local Time: 15:00 – 17:00**

TITLE	AUTHOR(S)	AFFILIATION
INACTIVATION OF FOODBORNE PATHOGENS BY COLD ATMOSPHERIC PLASMA	Berat Cinar ACAR Zehranur YUKSEKDAG	Gazi University, Faculty of Science, Department of Biology
THE ROLE OF MICROALGAE AS AN INNOVATIVE APPROACH IN THE SUSTAINABLE AND ECO-FRIENDLY SYNTHESIS OF CARBON DOTS	Dilek YALÇIN İsmail Hakkı TEKİNER Marwa TAINSA	Başkent University Istanbul Sabahattin Zaim University Saad Dahleb University
THE EFFECT OF PURSE SEINE FISHING ON SEAFOOD NUTRITION IN TURKEY	Fatih HERDEM	Isparta Uygulamalı Bilimler Üniversitesi
ENVIRONMENTAL CHALLENGES AND SUSTAINABLE NUTRITION INTERVENTIONS	Mehmet Arif FADİLOĞLU Mustafa Anıl ERBAĞCI Yasemin BEYHAN	Hasan Kalyoncu Üniversitesi
THE ECOLOGICAL SIGNIFICANCE OF THE WIDE-SPREAD HAWTHORN (GENUS CRATAEGUS) PLANT IN THE GREAT CAUCASUS REGION	Ulviyya Mammadova Gulchohra Huseynova	Ministry of Science and Education of Azerbaijan
MICROBIOTA OF PLANTS USED IN GREENING IN BAKU AND GANJA	Natella Sultanova Hasankhan Garayeva Amalya Gasim	Sumgayit State University, Azerbaijan
DETERMINATION OF MAJOR PROTEINS IN ROYAL JELLY PRODUCED FROM AEGEAN ECOTYPE COLONIES OF ANATOLIAN BEE AND CAUCACIAN CROSSBREED	Emine ASLAN UZGÖREN Aytül UÇAK KOÇ	Aydın Adnan Menderes Üniversitesi
AN EXAMINATION IN SEED STANDS OF ANATOLIAN BLACK PINE	Nebi BİLİR Nilüfer YAZICI	Isparta University of Applied Sciences
SEEDLING MORPHOLOGY AND QUALITY IN ARIZONA CYPRESS AND MEDITERRANEAN CYPRESS	Ayşe ÖYE Nebi BİLİR	Isparta University of Applied Sciences

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Session -1 / Hall-4**02.02.2024****Moderator: Assist. Prof. Dr. Nezihe OTAY LULE****Meeting ID: 862 1528 3413 / Passcode: 030405****Havana Local Time: 07:00 – 09:00****Ankara Local Time: 15:00 – 17:00**

TITLE	AUTHOR(S)	AFFILIATION
EFFECTS OF MILK SOMATIC CELL COUNT ON YIELD, CONSTITUENTS AND FATTY ACID PROFILE OF DROMEDARY CAMEL RAISED UNDER MEDITERRANEAN CLIMATIC CONDITIONS	Atakan KOÇ Selda BULCA	Aydın Adnan Menderes University, Aydın, Türkiye
APPRAISAL OF MILK YIELD, QUALITY, TEAT END HYPERKERATOSIS AND BODY DIRTINESS SCORE OF HOLSTEIN-FRIESIAN AND RED-HOLSTEIN COWS RAISED UNDER MEDITERRANEAN CLIMATE CONDITIONS	Atakan KOÇ Frederic NDIHOKUBWAYO	Aydın Adnan Menderes University, Aydın, Türkiye
HYPNOBREASTFEEDING	Müberra DURMAZ Nezihe OTAY LULE	Hasan Kalyoncu University Gaziantep University
PROBIOTIC USE IN CHILDREN	Melike TATAR Nezihe OTAY LÜLE	Hasan Kalyoncu University Gaziantep University
EFFECT OF <i>Spirulina platensis</i> ON LACTIC ACID BACTERIA USED AS STARTER CULTURE IN YOGURT PRODUCTION	Işıl VAR Nuray GÜZELER Büşra AL OMAR	Çukurova University, Türkiye

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Session -1 / Hall-5**02.02.2024****Moderator: PhD Irina-Ana DROBOT****Meeting ID: 862 1528 3413 / Passcode: 030405****Havana Local Time: 07:00 – 09:00****Ankara Local Time: 15:00 – 17:00**

TITLE	AUTHOR(S)	AFFILIATION
EXECUTION OF INFORMATION EXAMINATION IN PAKISTAN BY HRIMS FRAMEWORK INTO SIMULATED INTELLIGENCE INFORMATION INVESTIGATION COMPONENT	Muhammad FAISAL	UNIMAS University Malaysia
UNVEILING THE CULTURAL PERSPECTIVE: FACULTY ENGAGEMENT IN RESEARCH AT CENTRAL LUZON COLLEGE OF SCIENCE AND TECHNOLOGY (CELTECH)	Froilan D. Mobo	Bicol University Open University
WHY DO WE FEEL RELAXED WHEN WATCHING FISH IN AQUARIUMS OR IN PONDS?	PhD Irina-Ana DROBOT	Technical University of Civil Engineering Bucharest, Bucharest, Romania
COMPARING THE PRESERVATION OF 19TH-CENTURY ARCHITECTURAL HERITAGE IN ISTANBUL AND IN SALVADOR, BRAZIL: STRATEGIES, CHALLENGES, AND IMPACTS	Lais SOUTO NOVAES Mevlûde KAPTI	Mimar Sinan Fine Art University
THE IMPACT OF FOREIGN DIRECT INVESTMENT ON ECONOMIC DEVELOPMENT IN IRAQ FOR THE PERIOD 2004–2022	Sundus Jasim Shaaibith	University of Al-Qadisiyah, Iraq
IMPACT OF MANGROVES RECOVERY ON THE LIVELIHOOD OF PEOPLE LIVING AROUND THE MANGROVE FOREST OF SINDH	Muhammad Zafar Wassan Faiz Muhammad Shaikh	SZABAC-Dokri-Larkana-Sindh
PROMOTING THE USE OF AUGMENTED REALITY FOR EDUCATION AMONG STUDENTS WITH HEARING IMPAIRED: A SYSTEMATIC REVIEW	Fr. Baiju Thomas	Ramakrishna Mission Vivekananda Educational and Research Institute
EFFICIENCY GAINS IN AI-MANAGED POWER GENERATION	Ibrahim Ali Khudiyev Pietro Lio	Cambridge University and Mazer Institute

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Session -2 / Hall-1**02.02.2024****Moderator: Prof. Dr. Mariane Camargo Priesnitz****Meeting ID: 862 1528 3413 / Passcode: 030405****Havana Local Time: 09:30 – 11:30****Ankara Local Time: 17:30 – 19:30**

TITLE	AUTHOR(S)	AFFILIATION
ANÁLISIS COMPARATIVO ENTRE PROGRAMAS DE INGENIERÍA INDUSTRIAL Y AFINES EN ZONAS INDUSTRIALIZADAS DE MÉXICO Y LOS PROGRAMAS PERTENECIENTES AL REDIN-NODO ANTIOQUIA: CASO DE ESTUDIO	Alvaro Dominguez Vazquez Yenny Alejandra Aguirre Alvarez Mario Alberto Gaviria Giraldo	Universidad Tecnológica de la Mixteca Universidad de Antioquia
IMPACTO AMBIENTAL Y VIABILIDAD ECONÓMICA: NEUTRALIZACIÓN Y REUTILIZACIÓN DE AGUAS ÁCIDAS EN LA INDUSTRIA SIDERÚRGICA	Marlon Javier ALEGRE JARA Alison Jazmín ZEÑAS ALEGRE	Universidad Nacional del Santa
KNOWLEDGE CONVERSION CAPACITY, TECHNOLOGICAL INNOVATION AND PERFORMANCE: AN APPLICATION TO UNIVERSITY STUDENTS	Prof. Dr. Mariane Camargo Priesnitz Prof. Dr. Maria Emilia Camargo Prof. Dr. Walter Priesnitz Filho Prof. Dr. Marta Elisete Ventura da Motta Prof. Ms. Aprígio Teles Mascarenhas Neto	Federal University of Santa Maria, Brazil
THE INCLUSION OF HEARING-IMPAIRED PEOPLE IN THE LABOR MARKET: A BIBLIOMETRIC ANALYSIS	Prof. Dr. Mariane Camargo Priesnitz Prof. Dr. Walter Priesnitz Filho Prof. Ms. Tiane Camargo Prof. Dr. Angela Isabel dos Santos Dullius	Federal University of Santa Maria, Brazil
PROCEDIMIENTO ADMINISTRATIVO MIGRATORIO DE NIÑAS, NIÑOS Y ADOLESCENTES ACOMPAÑADOS Y SOLOS EN CONDICIÓN DE ESTANCIA IRREGULAR	Juan Carlos de León Pérez	Universidad Juárez Autónoma de Tabasco
TIPOLOGÍAS DE PROBLEMAS DE MODELADO, PARA LA CONFIGURACIÓN DE CADENAS DE SUMINISTRO HORTÍCOLAS	Dr(c). Natacha PINO-ACUÑA Dr. Ángel ORTÍZ	Universidad de Aysén Universidad Politécnica de Valencia
LA VIOLENCIA DE GÉNERO	Gloria Auristela Hernández Pérez Dra. Francisca Silva Hernandez Yazmín Isolda Álvarez García	Universidad Juárez Autonoma de Tabasco

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Session -2 / Hall-2**02.02.2024****Moderator: Dra. Biella Castellanos Yángulova****Meeting ID: 862 1528 3413 / Passcode: 030405****Havana Local Time: 09:30 – 11:30****Ankara Local Time: 17:30 – 19:30**

TITLE	AUTHOR(S)	AFFILIATION
TRANSPARENCIA DE LOS ESTADOS FINANCIEROS DICTAMINADOS EN LOS ORGANISMOS PÚBLICOS DESCENTRALIZADOS DE SALUD EN MÉXICO: ANÁLISIS DEL CUMPLIMIENTO NORMATIVO	M. Noé DEL-REAL Dr. Jesús CRUZ	Universidad Autónoma de Nuevo León
TRANSPARENCIA DE LOS ESTADOS FINANCIEROS DICTAMINADOS EN LOS ORGANISMOS PÚBLICOS DESCENTRALIZADOS DE SALUD EN MÉXICO: ANÁLISIS DEL CUMPLIMIENTO NORMATIVO	M. Noé DEL-REAL Dr. Jesús CRUZ	Universidad Autónoma de Nuevo León
LOS DESAFÍOS DE LA REPARACIÓN DEL DAÑO EN CASOS DE VIOLENCIA DE GÉNERO: PERSPECTIVA JURÍDICA Y DE DERECHOS HUMANOS.	Dra. Biella Castellanos Yángulova	Universidad Juárez Autónoma de Tabasco
LOS DESAFÍOS DE LA REPARACIÓN DEL DAÑO EN CASOS DE VIOLENCIA DE GÉNERO: PERSPECTIVA JURÍDICA Y DE DERECHOS HUMANOS	Dra. Biella Castellanos Yángulova	Universidad Juárez Autónoma de Tabasco
FIRST JUDGMENT OF THE INTERNATIONAL CRIMINAL COURT ON REPARATION TO VICTIMS: THE PROSECUTOR C. THOMAS LUBANGA DYILO CASE, AUGUST 7, 2012	Ivonne Adriana Gaytán Bertruy	Universidad Juárez Autónoma de Tabasco
¿CÓMO ROMPER EL CICLO DEL MALTRATO INFANTIL? ESTRATEGIAS PARA PROTEGER A LOS NIÑOS Y PROMOVER SU BIENESTAR	Xchel Montejo González Fernanda Paola Torres Trinidad Valentina Álvarez López Gloria Auristela Hernández Pérez	Universidad Juárez Autónoma de Tabasco
EL ACTO PASIVO DEL SERVIDOR PÚBLICO, IDENTIDAD EN LAS POLÍTICAS DE ANTICORRUPCIÓN, GENERALIDADES TEÓRICAS PRÁCTICAS	Dr. Rolando Castillo Santiago	Universidad Juárez Autónoma de Tabasco

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Session -2 / Hall-3**02.02.2024****Moderator: Dra. Biella Castellanos Yángulova****Meeting ID: 862 1528 3413 / Passcode: 030405****Havana Local Time: 09:30 – 11:30****Ankara Local Time: 17:30 – 19:30**

TITLE	AUTHOR(S)	AFFILIATION
LA FIGURA DEL NOTARIO PUBLICO COMO DOCENTE: RETOS Y DESAFÍOS	Dra. Enma Estela Hernández Domínguez	Universidad Juárez Autónoma de Tabasco
EL MATRIMONIO INFANTIL EN MÉXICO	Gloria Auristela Hernández Pérez	Universidad Juárez Autónoma de Tabasco
EL AUTOAPRENDIZAJE PARA APRENDER A LO LARGO DE LA VIDA	América Paulina Sánchez del Valle Deisy María Jerónimo Jiménez William Baldemar López Rodríguez	Universidad Juárez Autónoma de Tabasco
APRENDIZAJE HÍBRIDO COMO PARTE DE LA EDUCACIÓN DEL FUTURO	Jazmín Alejandra Méndez Jiménez Deisy María Jerónimo Jiménez William Baldemar López Rodríguez	Universidad Juárez Autónoma de Tabasco
VIOLENCIA CONTRA LA MUJER: SUMATORIA DE OTRAS VIOLENCIAS ASOCIADAS	Viviana Castellanos Suárez Yazmín Isolda Álvarez García	Universidad Juárez Autónoma de Tabasco
LA TECNOLOGÍA E INNOVACIÓN COMO COMPONENTE CLAVE AL DESARROLLO SOSTENIBLE EN EL 2023	Candelaria Vázquez Ramos	Universidad Juárez Autónoma de Tabasco
LA INNOVACIÓN Y LAS NUEVAS TECNOLOGÍAS A NIVEL SOCIAL Y ECONÓMICO EN EL 2023	Candelaria Vázquez Ramos	U.J.A.T.
PERCEPCIÓN UNIVERSITARIA SOBRE LAS EMPRESAS SOCIALMENTE RESPONSABLES	Deisy María Jerónimo Jiménez William Baldemar López Rodríguez María del Carmen Ancona Alcocer	Universidad Juárez Autónoma de Tabasco
CONSIDERACIONES COMERCIALES PARA DISTRIBUCIÓN Y VENTA DE UN PRODUCTO ORGÁNICO Y ARTESANAL: UN ESTUDIO DE CASO	Mtra. Lilibeth Ocaña Jiménez Dra. María Cruz Cuevas Álvarez	Esc. Prim. Luis F Enríquez de la Fuente Universidad Juárez Autónoma de Tabasco

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Session -1 / Hall-1**03.02.2024****Moderator: Celal ALAGÖZ****Meeting ID: 862 1528 3413 / Passcode: 030405****Havana Local Time: 07:00 – 09:00****Ankara Local Time: 15:00 – 17:00**

TITLE	AUTHOR(S)	AFFILIATION
MIGRATION TRENDS IN TÜRKİYE: SPATIAL ANALYSIS USING GIS AND FUTURE FORECASTS WITH ARTIFICIAL NEURAL NETWORK	Nihal GENÇ Ferdi ÖZBİLGİN Volkan BAŞER	Giresun University
DIFFERENTIATION OF AN EIGENFUNCTION EXPANSION	Murat ŞAT Esen TAŞDEMİR	Erzincan Binali Yıldırım University
PAST, PRESENT AND FUTURE OF FERTILITY RATE IN TÜRKİYE: SPATIAL ANALYSIS AND FORECASTING WITH ARTIFICIAL NEURAL NETWORK	Ferdi ÖZBİLGİN Nihal GENÇ Volkan BAŞER	Giresun University
ARTIFICIAL HEART APPLICATIONS IN BIOTECHNOLOGY	Pınar BOZBEYOĞLU Hazal OYMAN Yasin TAŞ	Gümüşhane University
CANONICAL TIME SERIES CHARACTERISTICS (CATCH22) FEATURES FOR ATRIAL FIBRILLATION DETECTION AND DIFFERENTIATION: ANALYSIS USING RANDOM FOREST CLASSIFICATION AND ABLATION STUDY	Celal ALAGÖZ	Kırıkkale, Türkiye
COMPARATIVE ANALYSIS OF DIVISIVE HIERARCHICAL CLUSTERING APPROACHES IN AUTOMATED HIERARCHY GENERATION FOR HIERARCHICAL CLASSIFICATION	Celal ALAGÖZ	Kırıkkale, Türkiye
THE UTILIZATION OF MACHINE LEARNING ALGORITHMS FOR THE CATEGORIZATION OF IRIS FLOWER SPECIES: AN EXTENSIVE INVESTIGATION OF THE IRIS FLOWER DATASET	Nijat TAGHIZADE Pietro LIO	Cambridge University and Maxer Institute
USING A COMBINATION OF CNN AND LSTM NEURAL NETWORKS TO DETECT CYBERBULLYING AGAINST CHILDREN AND TEENAGERS IN SOCIAL NETWORKS	Reza Fayand Younes Fayand	Azad University of Tabriz, Tabriz, Iran
AUTONOMOUS UNMANNED AERIAL VEHICLE WITH DEEP LEARNING-BASED IMAGE PROCESSING TECHNOLOGY	Ertuğrul Kırac	İstanbul Gedik University
AUTONOMOUS UNMANNED AERIAL VEHICLE WITH DEEP LEARNING-BASED AUDIO PROCESSING TECHNOLOGY	Ertuğrul Kırac	İstanbul Gedik University

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Session -1 / Hall-2**03.02.2024****Moderator: Assoc. Prof. Dr. Nazile ABDULLAZADE****Meeting ID: 862 1528 3413 / Passcode: 030405****Havana Local Time: 07:00 – 09:00****Ankara Local Time: 15:00 – 17:00**

TITLE	AUTHOR(S)	AFFILIATION
RESEARCH ON MIGRATION EXPERIENCES OF THE INTERNATIONAL STUDENTS IN ISTANBUL AND THEIR INTEGRATION TO THE CITY	Ebru YILMAZ	Ankara Sosyal Bilimler University
ÜNİVERSİTE ÖĞRENCİLERİNDE TOPLUMSAL CİNSİYET ALGI DÜZEYİ DEĞERLENDİRİLMESİ	İzzettin KAHRAMAN Rabia SOHBET	Gaziantep University
FORMATIVE AND EDUCATIONAL INFLUENCE OF MUSIC ON PERSONALITY	Bağirova Tamilla Əli qızı	Azerbaijan State Pedagogical University
ORGANIZATION OF GAME ACTIVITY IN PRESCHOOL PERIOD	Sevinc KARIMOVA	Sumgayit State University
A COMPARATIVE STUDY ON THE MUSIC EDUCATION SYSTEMS OF CUBA AND TURKIYE	Cihan ÖZKAN M. Nevra KÜPANA	Sakarya University
BIBLIOMETRIC ANALYSIS OF STUDIES ON HEALTH NEWS	Fatma AY Yusuf Ziya AY	Istanbul University – Cerrahpaşa, Türkiye Istanbul University, Türkiye
SPEECH CULTURE AS A MAIN FACTOR OF HIGHER PEDAGOGICAL EDUCATION IN THE GLOBALIZED WORLD	Nazile ABDULLAZADE Ulviyya HAJIYEVA	Azerbaijan State Pedagogical University
THE ROLE OF VILLAGE INSTITUTES IN THE NATIONAL CULTURAL REVOLUTION IN EDUCATION, AS ADVOCATED BY ISMAIL HAKKI TONGUÇ	Şengül BÜYÜKBOYACI Betül DEMİR ZEYNEL	Süleyman Demirel University Yenişarbademli ÇPAL
REVISITING GEORGI LOZANOV'S UNDERSTANDING OF EDUCATION	Seçil TÜRKÖZ	Bolu Abant İzzet Baysal University
PUBLIC SPACE AND LOCAL POLITICS	Ezgi BUZLU Vehbi BAŞER	Kocaeli University

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Session -1 / Hall-3**03.02.2024****Moderator: Prof. Dr. Fatma MEYDANERİ TEZEL****Meeting ID: 862 1528 3413 / Passcode: 030405****Havana Local Time: 07:00 – 09:00****Ankara Local Time: 15:00 – 17:00**

TITLE	AUTHOR(S)	AFFILIATION
EFFECT OF TDF LENGTHS ON GAIN AND NOISE FIGURE OF TWO-STAGE FOUR-PASS TDFA	Murat YÜCEL Ayten DİNCER	Gazi University
EFFECT OF INPUT POWER AND PUMP POWERS ON GAIN AND NOISE FIGURE OF TWO-STAGE FOUR-PASS TDFA	Murat YÜCEL Ayten DİNCER	Gazi University
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THE OPTIMUM DESIGN OF MULTIPHASE NATURAL/SYNTHETIC CNT-FIBER REINFORCED NANOCOMPOSITE PLATE UNDER DIFFERENT LOADING CASES FOR MAXIMUM CRITICAL BUCKLING LOAD CAPACITY	Ozan AYAKDAŞ H. Seçil ARTEM Melih SAVRAN Levent AYDIN	İzmir Institute of Technology İzmir Katip Çelebi University
APPLICATION OF GRAPHS TO INTEGER SEQUENCES	Fatma Nur AYGÜL Gül ÖZKAN KIZILIRMAK	Gazi University
OPTIMAL PATH SYNTHESIS OF A DUAL-ARM SCARA ROBOT USING THE GREY WOLF OPTIMIZER	Mustafa ER Mehmet Nuri ER Mete KALYONCU	Memak Plastik Gıda Makina Sanayi Ticaret A.Ş. Konya Teknik Üniversitesi

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Session -1 / Hall-4**03.02.2024****Moderator: Gultekin Javadova****Meeting ID: 862 1528 3413 / Passcode: 030405****Havana Local Time: 07:00 – 09:00****Ankara Local Time: 15:00 – 17:00**

TITLE	AUTHOR(S)	AFFILIATION
PERIOPERATIVE PAIN MANAGEMENT FOR A CAESAREAN SECTION	Gultekin Javadova, Gubakhanim Hajizade, Shahla Askerova, Aytan Rzayeva	Azerbaijan Medical University
INFLUENCE OF CAVITY DESIGN ON CALCIUM HYDROXIDE REMOVAL FROM ROOT CANAL IRREGULARITIES	Sevda Alesgerova, Shahla Yusubova	Azerbaijan Medical University
THE EFFECT OF OXIDATIVE STRESS ON CATARACT ETIOPATHOGENESIS	Aybeniz Abdullayeva, Vafa Nasirova, Vafa Mammadova	Azerbaijan Medical University
VITILIGO DEFINITION	Mammadova Gulnara, Mammadkhanova Irada, Ahmed Nasibov, Fikriyye Balakishieva	Azerbaijan Medical University
PATHOPHYSIOLOGY OF DENTAL CARIES	Gulnara Aliyeva, Shahla Yusubova	Azerbaijan Medical University
PATHOPHYSIOLOGY OF ASTHMA	Ulviyya Ahmedzade	Azerbaijan Medical University
ANALYTICAL SIGNIFICANCE OF SPHERICAL REGULARIZED MACROCYCLIC SCHIFF BASES	Ismayilova Shahnaz Yusif, Mammadova Khayala Rajab, Huseynova Nazila Sadig, Gafarova Dostu Sahib, Zeynalova Gulnar Rashid	

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Session -1 / Hall-5**03.02.2024****Moderator: Major Gheorghe GIURGIU****Meeting ID: 862 1528 3413 / Passcode: 030405****Havana Local Time: 07:00 – 09:00****Ankara Local Time: 15:00 – 17:00**

TITLE	AUTHOR(S)	AFFILIATION
FOOD ADDITIVES: IMPACT ON THE GUT MICROBIOME, INCREASE ANXIETY	Major Gheorghe GIURGIU, Prof. dr. Manole COJOCARU	Deniplant-Aide Sante Medical Center, Biomedicine, Bucharest, Romania Titu Maiorescu University, Faculty of Medicine, Bucharest, Romania
INVESTIGATING THE FACTORS CONTRIBUTING TO THE PERSISTENCE OF HOSPITAL-ACQUIRED INFECTIONS (HAIS) AT MULAGO NATIONAL REFERRAL HOSPITAL, UGANDA	Kugonza Grace, Amos Ronald Kalukusu	King Ceasor University, Uganda College of Medicine, Health & Life Sciences
EXPLORING THE GERMLINE ALTERATION AFFECTING TEP1(MMAC1) GENE IN MOROCCAN PATIENTS CARRYING PROSTATE CANCER	Ms. Kawtar Aboulalaa	University Hassan II of Casablanca, Casablanca, Morocco
PROXIMATE AND ORGANOLEPTIC ANALYSIS OF PLANTAIN-BASED SNACK (PLANTAIN MOSA) AND PUFF-PUFF	Dr. Oluwakemi C. Apata, Miss Suliyat O. Fashina	University of Ibadan, Nigeria.

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Session -1 / Hall-6**03.02.2024****Moderator: Zohaib Hassan Sain****Meeting ID: 862 1528 3413 / Passcode: 030405****Havana Local Time: 07:00 – 09:00****Ankara Local Time: 15:00 – 17:00**

TITLE	AUTHOR(S)	AFFILIATION
NAVIGATING THE CHATGPT FRONTIER: BALANCING INNOVATION AND TRADITION IN EDUCATION	Zohaib Hassan Sain	Superior University, Pakistan
REVIEWING THE ACADEMIC LANDSCAPE: THE IMPLEMENTATION OF ELEARNING INITIATIVES IN HIGHER EDUCATION	Zohaib Hassan Sain	Superior University, Pakistan
DISTANCE AND LENGTH UNITS IN THE KAZAKH LANGUAGE	Amanzhol Rauana Bolatkyzy	School-gymnasium No15 named after M. Zhumabaevev
AN EXPERIENCE OF DIDACTIC MATERIAL FOR THE LEARNING OF ECONOMIC HISTORY IN STUDENTS OF A PERUVIAN UNIVERSITY	Dr. Raúl Eleazar Arias Sánchez	Universidad Nacional de Huancavelica, Perú
THE FLIPPED INCLUSION MODEL. A STATISTICAL ANALYSIS OF THE VALUES AND SWB OF IN-SERVICE SUPPORT TEACHERS	Dr. Annalisa Ianniello	University of Salerno, Italy
EXPLORING 20TH CENTURY ANGLOPHONE ARAB FICTION: NARRATIVES, THEMES, AND CULTURAL SIGNIFICANCE	Mohd Sualh Mohd Omar Fazal Khan	Aligarh Muslim University (INDIA)
APPLICATION OF HEART METHOD IN AIS SYSTEM ON SHIPS WITHIN THE SCOPE OF HUMAN RELIABILITY ANALYSIS	Furkan GUMUS Ozcan ARSLAN	Istanbul Technical University

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Ulviyya Mammadova

THE ECOLOGICAL AND HEALTH SIGNIFICANCE OF THE WIDE-SPREAD HAWTHORN (GENUS CRATAEGUS) PLANT IN THE GREAT CAUCASUS REGION

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EXECUTION OF INFORMATION EXAMINATION IN PAKISTAN BY HRIMS FRAMEWORK INTO SIMULATED INTELLIGENCE INFORMATION INVESTIGATION COMPONENT

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ABSTRACT

Dr Faisal has been fostered the HRIMS module in Pakistan now the fundamental prerequisite has been found Executing information examination in Pakistan, or some other nation, requires cautious preparation and thought of a few key variables. Guarantee that top notch information is accessible for examination. Information ought to be spotless, exact, and pertinent to the particular objectives of your information investigation drive. At times, information might should be gathered or collected from different sources. Consistence with information protection guidelines is basic. Guarantee that you have systems set up to safeguard delicate data, like by and by recognizable information, and that you comply to Pakistan's information assurance regulations. Put resources into the important equipment and programming foundation to help information examination. This might incorporate information stockpiling, processing power, and information examination apparatuses or stages. Building a group with the right abilities in information examination, including information researchers, information designers, and experts, is fundamental. Preparing and advancement projects can help upskill your current labor force. Lay out information administration approaches and systems to make due, safeguard, and guarantee the nature of information all through its lifecycle. This incorporates information assortment, capacity, handling, and sharing. Characterize clear targets for your information investigation projects. Recognize explicit use situations where information investigation can give experiences or tackle issues. This could be in regions like medical care, horticulture, money, or policy management. Acquire support from key partners, including government offices, industry accomplices, and neighborhood networks. Viable correspondence and cooperation are crucial for the outcome of information investigation drives. Comprehend and comply with important guidelines and principles in Pakistan, particularly in areas like money, medical services, and media communications, where information examination can have huge ramifications. Guarantee that information from different sources can be gotten to and incorporated for examination. This might include defeating interoperability challenges and teaming up with various information suppliers. Plan for adaptability to oblige developing information volumes and advancing examination needs. Guarantee that your framework and frameworks can adjust to evolving prerequisites. Foster information perception and revealing instruments to convey bits of knowledge actually to partners, making the data open and noteworthy. Address moral issues connected with information examination, like predispositions in calculations or the potential for unseen side-effects. Foster rules and moral systems for dependable information use. Designate a financial plan for information investigation projects, including starting arrangement costs, continuous support, and staff compensations. Think about the profit from venture (return for capital invested) of your information examination drives. Give preparing and limit building projects to guarantee that your group has the right stuff and information to successfully utilize information investigation apparatuses and methods. Carry out a framework for checking the presentation and effect of information investigation projects. Consistently survey whether your drives are meeting their targets. Investigate open doors for coordinated effort with scholastic establishments, research associations, and different partners to use ability and assets. Carrying out information examination in Pakistan can have a huge positive effect across different areas, from medical services and farming to government and



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industry. By tending to these key elements, you can improve the probability of fruitful information examination drives that add to the nation's turn of events and progress. Redesign the HRIMS framework that can be give the improved outcome for execution.

Keywords: cautious, spotless, pertinent, gathered, Redesign.



NAVIGATING THE CHATGPT FRONTIER: BALANCING INNOVATION AND TRADITION IN EDUCATION

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ABSTRACT

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

Keywords: Artificial Intelligence, Chatbot, Chat-GPT, OpenAI.



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

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ABSTRACT

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

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



İSTANBUL'DAKİ ULUSLARARASI ÖĞRENCİLERİN GÖÇ DENEYİMLERİ ve KENTE ENTEGRASYONU ARAŞTIRMASI

RESEARCH ON MIGRATION EXPERIENCES OF THE INTERNATIONAL STUDENTS IN ISTANBUL AND THEIR INTEGRATION TO THE CITY

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ÖZET

Göç olgusu, sadece göçe dahil olan bireylerin değil yanı sıra göçün gerçekleştiği yerleşim alanında yaşayan bireylerin de yaşamını biçimlendiren bir süreçtir. Gelişen dünyada çeşitlenen iletişim ve ulaşım ağları, bireylerin hem göç deneyimlerini çeşitlendirmekte hem de sunmuş olduğu sosyal ağlar sayesinde bireylerin göç sürecini daha güvenli bir şekilde tamamlamalarını sağlamaktadır. Bu bağlamda sosyal ağlar ise göç eden bireylerin göç deneyimlerindeki olumsuz ihtimallerle mücadele konusunda etkili birer strateji alanı olarak işlev görmektedir. İletişim ve ulaşım alanındaki gelişmelerin yanı sıra hükümetlerin teşvik ve politikaları da göç olgusunu biçimlendiren faktörlerdendir. Bu kapsamda İstanbul'daki uluslararası öğrencilerin göç olgusunda da bahsi geçen tüm faktörler etkili olmaktadır. Böylelikle eğitim kurumları, kültürel çeşitliğe ev sahipliği yapan alanlara dönüşmektedir. Sosyo-kültürel olarak farklı grupların ortak alanları paylaşımları kimi zaman sosyal uyum ile sonuçlanırken kimi zaman da gruplar arası ayrışma ve ötekileştirilmelere neden olmaktadır. Mevcut çalışmada İstanbul'daki uluslararası öğrencilerin göç deneyimlerini, entegrasyon süreçlerini ve sosyal ağların bu süreçlere etkisini incelemek amacıyla İstanbul'da öğrenim gören uluslararası 10 öğrenci ile derinlemesine görüşmeler gerçekleştirilmiştir. Çalışmanın sonucunda ise uluslararası öğrenciler ve Türkiye vatandaşları arasındaki en temel problemin dil olduğu ve iletişim kısıtlılıklarının iki grup arasındaki mesafeyi açtığı tespit edilmiştir. Bunun yanı sıra demografik özellikler, etnisite, sosyal ağlar ve öğrenime devam edilen eğitim kurum gibi etkenlerin de göç sonrası yaşama uyum sağlama konusunda belirleyici etkilere sahip olduğu görülmüştür.

Anahtar Kelimeler: Uluslararası öğrenciler, sosyal ağlar, uyum ve ayrışma.

ABSTRACT

Migration is a process that forms the lives of individuals who are involved in migration and the lives of the people who live in the settlements where migration takes place. The variation of communication and transportation networks, diversify the migration experiences of individuals and enable individuals to complete the migration process safely with the benefits of the social networks offer. Furthermore, social network is an important strategy tool for migrant individuals to fight the negative effects of migration. In addition to the developments in communication and transportation, the incentives and policies of the governments offer are also among the factors that shape migration notion. Within this scope, these factors also have a role in the migration of international students in Istanbul. Hereby, educational institutions become areas that host cultural diversity. Different socio-cultural groups sharing the common areas sometimes results in social cohesion and sometimes it causes intergroup separation and marginalization. Therefore, in this study it is aimed to examine the migration experiences, integration processes of international students, and the impact of social networks on these processes with in-depth interviews conducted with 10 international students studying in Istanbul. As a result, it was determined that the most basic problem between international students and Turkish citizens is language and communication limitations that open the distance between the two groups. In addition, it has been



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identified that the demographic characteristics, ethnicity, social networks, and educational institutions also have decisive effects on adaptation to life after migration.

Keywords: International students, Social networks, Cohesion and segregation.



BİR ÖZ FONKSİYON AÇILIMININ TÜREVLENMESİ DIFFERENTIATION OF AN EIGENFUNCTION EXPANSION

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ÖZET

Lineer operatörlerin spektral teorisi, asıl başlangıç noktasını bir taraftan lineer cebir -ikinci dereceden formların kareler toplamına indirgenmesine ilişkin daha kesin teoremler- ve diğer taraftan da salınım (titreşimli tel, membranlar. vb.) teorisindeki problemlerden alır.

Görünen o ki lineer cebir problemleri ile salınım teorisi arasındaki paralellik, uzun zaman önce fark edilmişti. Fakat, integral denklemler teorisi hakkındaki önemli çalışmasında bu paralellikten sistematik olarak faydalanmaya başlayan sadece D. Hilbert oldu. Bu çalışmanın bir sonucu, Hilbert uzayı l_2 ve daha sonra da genel Hilbert uzayının ortaya çıkmasıydı.

l_2 uzayının ve soyut Hilbert uzayının matematiğine girişi, Hilbert uzayında lineer kendine eş operatörler spektral teorisinin yoğun şekilde gelişimine neden oldu. Son yıllarda, bir dizi önde gelen matematikçinin çabalarıyla, bu teori yüksek derecede eksiksiz hale getirildi ve hatta belki de tamamlandı.

Başlangıçta, soyut spektral teorisinin çeşitli özel durumları tamamen kapsadığı ve prensipte tüm problemlere cevap verdiği ortaya konuldu.

Fakat, yavaş yavaş bunun durumdan uzak olduğu anlaşıldı. Soyut spektral teorisinin ya hiç cevap vermediği ya da çok yetersiz cevaplar verdiği birçok çok önemli soru vardır. Örneğin, özdeğerlerin ve özfonksiyonların ve diğer spektral niceliklerin asimptotik davranışına dair sorularla ilgili durum tam da böyledir. Üstelik, tüm teorisinin esas teoremlerinden biri olan operatörün spektral ayrışımına ilişkin teorem, bu ayrışımı özdeşliğin sözde çözümünü yoluyla soyut terimlerle tanımlar. Somut operatörler açısından (diferansiyel veya sonlu farklar operatörleri), spektral ayrışım genellikle uygun bir denklemin çözümü olarak tanımlanabilir. Özdeşliğin çözümünün özel tanımıyla ilgili sorularda, genel spektral kuramın çok az yardımı olur. Bu, muhtemelen, kendine eş operatörlerin soyut spektral teorisinin fiilen tamamlanmasından birkaç yıl sonra, çeşitli ülkelerde kendine eş diferansiyel operatörlere dair spektral teorisi üzerine yoğun çalışmaların başlaması hakkındaki paradoksal gerçeğini açıklamaktadır. Bu çalışma, özellikle kısmi diferansiyel operatörler üzerinde günümüze kadar devam etmiştir.

Bu kitap, kendine eş adi diferansiyel denklemlerin modern spektral teorideki bir dizi temel konunun, özellikle de bir ikinci dereceden denklemin ve iki birinci dereceden denklem sisteminin (Dirac olarak adlandırılan sistemler özel bir durumdur) sistematik açıklamasına yöneliktir. İkinci dereceden operatörlere göre çok daha az ayrıntılı olsa da n 'inci dereceden diferansiyel operatörlere dair spektral teorideki bazı konuları da ele almaktayız. Bu nedenle, bu kitabın n 'inci derece operatörlerle ilgili bölümleri, şu anda zaten çok geniş kapsamlı hale gelmiş olan bu alana basit bir giriş işlevi görebilir.

Birisi regüler/normal ve tekil diferansiyel operatörler arasında ayırım yapmaya neden olur. Değişken tanım alanı sonlu ve katsayıları sürekli olan bir diferansiyel operatörün regüler olduğu söylenir. Eğer tanım alanı sonsuz veya katsayılar (tümü veya bir kısmı) toplanır (veya her ikisi) değilse, bu durumda diferansiyel operatörün tekil olduğu söylenir.



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Regüler ikinci dereceden operatörlerin temel spektral teorisi, çalışmaları bu soruların derinlemesine incelenmesini başlatan iki önemli matematikçinin onuruna adlandırılan Sturm-Liouville teorisinin kapsamaktadır. İki birinci dereceden denklemlere dair regüler sistemler, ciddi anlamda daha sonra incelenmeye başlandı.

Bu kitapta regüler problemlere oldukça fazla yer verilmesi rağmen, bu problemler, tekil operatörlerin spektral teorisi olan temel içeriği oluşturmazlar. Bu teorisin temelleri H. Weyl tarafından yazılan makalelere dayanmaktadır. Bu makaleler, klasik moment problemine ek olarak, F. Riesz, J. von Neumann ve diğer matematikçilerin çabalarıyla, simetrik ve kendine eş operatörlere dair genel spektral teorisinin kurulmasında olağanüstü bir rol oynadı. Weyl'in limit çemberi ve limit noktası üzerine önemli teoreminin, simetrik bir ikinci dereceden diferansiyel operatör açısından, kendine eş tüm uzantıların tam bir tanımını verdiğini göz önünde bulunduruyoruz. Simetrik bir operatörün tüm kendine eş uzantılarını tanımlamaya yönelik genel problem, daha sonra von Neumann tarafından büyük ölçüde çözülmüştür.

Matematikçilerin dikkatini diferansiyel operatörler spektral teorisine çekme konusundaki büyük rol, E. C. Titchmarsh'ın [1,2] tekil ikinci dereceden operatörler teorisine yeni bir yaklaşım kazandırdığı ve yeni problemlerin tüm serisini çözdüğü ve (kısmen kuantum mekaniğindeki problemlerden etkilenecek) ifade ettiği monografilerine (tek konu üzerine yazılan metin) aitti.

Bu ülkede yayınlanan bir monografide, tekil ikinci dereceden operatörler için spektral teoriye yönelik ilk tartışma, bu teoriyi oluşturmak için yeni bir yöntem sunan yazarlardan biri (B. M. Levitan [1]) tarafından sunuldu. Bu yöntemin arkasındaki fikir çok basittir ve tekil bir operatör açısından temel spektral ilişkilerin, normal durumda karşılık gelen ilişkilerden limite geçiş yoluyla elde edilmesini kapsamaktadır. Bu yöntem ve daha önce bahsedilen monografin sonuçları bu kitapta yaygın olarak kullanılmaktadır. Fakat bu kitap hiçbir şekilde diğerinin revizyonu olarak değerlendirilemez. Değişiklikler ve eklemeler o kadar büyük çaptadır ki bu, kesinlikle yeni bir kitaptır.

Bu kitapta, 1950 monografisinde bulunmayan iki birinci dereceden denklemin tekil sistemlerine de çok yer verilmiştir. Bu sonuçların nispeten yeni olduğunu ve her halükârda, 1950'den sonra elde edildiğini belirtmek istiyoruz. Genel spektral teori açısından, bu kitaptaki birçok temel teorem, bazı çok genel teoremlere yönelik özel durumlarıdır.

Soyut spektral teoriye aşina olmayan okuyucuya kolaylık sağlayabilmek için, bu teoriyi kısa ve öz bir şekilde ve ispatsız olarak tartıştığımız ve diferansiyel operatörlerin spektral teorisi ile çeşitli bağlantıları gösterdiğimiz bir bölüm ekledik.

Yazarların talebi üzerine, V. A. Sadovnicii 1. Bölümün §17 Maddesini ve A. G. Kostjucenko ise 7. Bölümün §8 Maddesini ve 12. Bölümün §8 Maddesini yazdılar. A.G. Kostjucenko ve M.V. Fedorjuk tüm taslak metni dikkatlice okudular ve bize yararlandığımız çok değerli tavsiyeler verdiler.

Bu tez bir derlemedir. (Translations of Mathematical Monographs 39) B. M. Levitan, I. S. Sargsjan - Introduction to Spectral Theory_ Selfadjoint Ordinary Differential Operators-American Mathematical Society (1975) (1) kitabının Spectral Theory konusunu çevirisi yapılarak oluşturulmuştur.

Bilime böyle bir şekilde katkıda bulunacağı düşünülmektedir.

Anahtar Kelimeler: İntegral denklem, özdeğer, özfonksiyon, Sturm- Liouville Operatörü.

ABSTRACT

The spectral theory of linear operators takes its starting point from problems in linear algebra - the more precise theorems on the reduction of quadratic forms to the sum of squares - on the one hand, and oscillation theory (vibrating wire, membranes, etc.) on the other.

It seems that the parallelism between the problems of linear algebra and the theory of oscillations was recognized long ago. However, it was only D. Hilbert who began to systematically exploit this parallelism in his important work on the theory of integral equations. One result of this work was the emergence of the Hilbert space l_2 and later the general Hilbert space.



The introduction of the l_2 space and the abstract Hilbert space into mathematics led to the intensive development of the spectral theory of linear self-adjoint operators in Hilbert space. In recent years, through the efforts of a number of leading mathematicians, this theory has been made highly complete and perhaps even complete.

Initially, it was shown that the abstract spectral theory completely covers various special cases and in principle answers all problems.

However, it gradually became clear that this was far from the case. There are many very important questions to which abstract spectral theory gives either no answers or very inadequate answers. For example, this is exactly the case with questions concerning the asymptotic behavior of eigenvalues and eigenfunctions and other spectral quantities. Moreover, one of the fundamental theorems of the whole theory, the theorem about the spectral decomposition of the operator, defines this decomposition in abstract terms via the pseudo-solution of the identity. In terms of concrete operators (differential or finite difference operators), the spectral decomposition can often be defined as the solution of a suitable equation. In questions concerning the specific definition of the solution of the identity, general spectral theory is of little help. This probably explains the paradoxical fact that several years after the actual completion of the abstract spectral theory of self-dual operators, intensive work on the spectral theory of self-dual differential operators began in various countries. This work has continued to the present day, especially on partial differential operators.

This book is a systematic exposition of a number of fundamental issues in the modern spectral theory of self-adjoint differential equations, in particular one quadratic equation and two systems of first-order equations (the so-called Dirac systems are a special case). We also cover some topics in spectral theory concerning n th-order differential operators, although in much less detail than for second-order operators. Therefore, the chapters of this book on n th order operators can serve as a simple introduction to this field, which is now already very extensive.

One is led to distinguish between regular/normal and singular differential operators. A differential operator whose variable domain is finite and whose coefficients are continuous is said to be regular. If the domain is not infinite or the coefficients (all or some) are not additive (or both), then the differential operator is said to be singular.

The basic spectral theory of regular quadratic operators encompasses the Sturm-Liouville theory, named in honor of two important mathematicians whose work initiated the in-depth study of these questions. Regular systems of two first-order equations began to be studied in earnest much later.

Although regular problems are given a lot of space in this book, they do not constitute the basic content, which is the spectral theory of singular operators. The foundations of this theory are based on papers written by H. Weyl. These papers, in addition to the classical moment problem, played an outstanding role in establishing, through the efforts of F. Riesz, J. von Neumann and other mathematicians, the general spectral theory of symmetric and self-adjoint operators. We note that Weyl's important theorem on the limit circle and limit point gives a complete description of all self-adjoint extensions in terms of a symmetric quadratic differential operator. The general problem of defining all self-adjoint extensions of a symmetric operator was later largely solved by von Neumann.

A major role in drawing the attention of mathematicians to the spectral theory of differential operators belonged to the monographs (text on a single subject) of E. C. Titchmarsh [1,2], in which he gave a new approach to the theory of singular quadratic operators and solved a whole series of new problems (partly influenced by problems in quantum mechanics).

In a monograph published in this country, the first discussion of the spectral theory for singular quadratic operators was presented by one of the authors (B. M. Levitan [1]), who presented a new method for constructing this theory. The idea behind this method is very simple, and is that the fundamental spectral relations in terms of a singular operator are the spectral relations corresponding to the normal case.

Keywords: Integral equation, eigenvalue, eigenfunction, Sturm-Liouville Operator..



ANÁLISIS COMPARATIVO ENTRE PROGRAMAS DE INGENIERÍA INDUSTRIAL Y AFINES EN ZONAS INDUSTRIALIZADAS DE MÉXICO Y LOS PROGRAMAS PERTENECIENTES AL REDIN-NODO ANTIOQUIA: CASO DE ESTUDIO

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RESUMEN

La creación y modificación de los programas de ingeniería industrial y afines en México se ve influenciada en cierta parte del contexto y necesidades que se presentan en sus regiones, esta afirmación se da en consideración de fuentes como bases de datos de empresas de más de 100 empleados, y la caracterización de 22 programas educativos, provenientes en su mayoría de IES públicas en modalidad presencial. Para poder generar un ejercicio reflexivo y que se noten los puntos fuertes y débiles de este grupo de programas de estudio se hace necesaria una comparación, con el uso de la información de 16 programas de Ingeniería Industrial de IES pertenecientes al REDIN en el departamento de Antioquia, Colombia. Como resultados destacables se obtiene que para los programas de México en comparación con los de Colombia, las líneas de especialización no son una fortaleza, la asignación horaria para los estudiantes es mucho mayor. Ambos países consideran el mejoramiento de procesos por medio del diseño e innovación como parte importante del contenido curricular y la preparación para el campo de acción. Finalmente, México presenta una muy marcada inclinación hacia la investigación y docencia, mientras que Colombia se inclina hacia los procesos de servicio y manufactura en general.

Palabras clave: Perfil de ingreso, crédito académico, plan de estudios, perfil de egreso y competencias, ingeniería industrial.



DISTANCE AND LENGTH UNITS IN THE KAZAKH LANGUAGE

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Annotation

In this article, the attention of the Kazakh great and changes in its ethnocultural aspect is considered.

The material and spiritual culture of each people has been created and developed over the centuries. The traditional knowledge of our people, which has passed the scales of centuries, is combined with the intuition of nature. Some idioms in the Kazakh language appeared in connection with Customs, Customs and consciousness in the past. One of them is folk measurements. There are so many folk sizes in our language. The basis for their formation as a traditional dimension and as a phrase was a solid image of phenomena summarized in human thought.

In the course of historical development, elements of spiritual culture become obsolete. They, in turn, are replaced by new ones. Such units of measurement, which are one of the elements of the spiritual culture of the Kazakh people, were used in their time, and then replaced with new ones in accordance with the Times and the requirements of life. The renewal of cultural heritage is caused by the fact that the old ones are abandoned.

It is known that the Kazakh people migrated to long time and experienced the era of nomadism. "How did they measure time, distance and volume when they moved in summer, winter, autumn? the legal question "why?" is born. In those days, there was a time when our people were not yet so accustomed and accustomed to measuring time hours, volume and weight on scales, length and space in meters. Perhaps, at that time, there was no such thing as a nomadic life of these dimensions. However, the fact that the way of life of that time had its own dimensions can be recognized by a huge number of words and phrases that express the concept of dimension in the language [2.111].

The population used distance and length measurements for household and economic purposes. For example: length dimensions: "eli, tutam, suyem, karys, kulash, kol sozim, sala kulash, etc". Distance dimensions: "adim, tayak tastam, aydem zher, kilometers, kozi kosh zher, thai shaptyrym, eye tip, kundan shaptyrym, arkan boie, etc". [3.5].

The "qashqytk" criteria include not the names of any objects and phenomena in the language, but the names of objects and phenomena that are directly related to the economy, livelihood, life, and main occupation of the peoples using the language. In other words, people in ancient times did not have technical equipment, so there were simple dimensions that were born out of the need for life. The history of the origin of these dimensions began very far and developed in parallel with the people of the primitive community. For this reason, the names of remote dimensions are diverse and multifaceted [3.5].

Of the gauges, what man had invented before was time, length, and distance. They were born mainly due to the measurement of the distance of the hunting ground, the ore content of the pasture land and the quality of the pasture. And then, when he built a structure, measured the earth, he learned different geometric lines and developed different methods.

In the process of nomadic life, the Kazakh people drove the flock of sheep, separated from their mother-in-law, to dilapidated pastures, taking into account the need not to tire them. Since moving healthy people reach about 20-25 kilometers without getting tired or tired, they called it "bir kosh zher", and a month-old goat reached a distance of 12-15 kilometers without getting sick, they called it "Kozy kosh zher". The Kazakh people's feasts were not without horse races. The competition was attended by horse,



kunan, thai. The horse race was held at a distance of 30-40 kilometers, the Kunan race was held at a distance of 20-25 kilometers, and the Thai race was held at a distance of about 10-15 kilometers. The names of measurements of spatial distances in the Kazakh country are different. For example, the meaning of the words: "koz korim zher", "dayis zheter zher", "ara konip baratyn zher" is that a person who leaves his village goes to his destination or village every day, after the sun comes down, and freely reaches the next day. This is a distance of about 100-120 kilometers [3.5]

Very distant places: under the seven facets, on the back of the dog, the land where the dog died, the land of Moonlight, the land where the eyes do not see, the land where the ears do not hear, the land of forty days, the land where the horse does not reach, the far edge, the far edge, the

There are so many size phrases denoting such distant, remote places. It was also called "zhakyn", about places: "iek artpa, taman, tap-tayau, tarmas, teip-tur, tamau, yigiz boui, kadam, karga adim zher, karys zher, kol sezim zher, kulash-sozim zher, kuryk-siltem zher, ok atym zher, bugalyk tastam zher, tustik zher, shylybyr tastam zher, audem zher (100 M), tayak tastam zher, koyan-koltuk zher, etc".

The distance was measured in places "kulak shalaturday auilunday (400, koz korim (4 km), koz korim (m), ittin uygeni estigendey, boldak koy auilunday (about 1-5 km), kozi orisindey (about 5-16 km)". The "zhol sapari bir lau zher (about 30 km), tustik zher (40-50 km), bir kun sapar (about 90-100 km), atpen sapar (about 200-230 km), ayylyk zher (about 2500-3000 km), six months, etc".

In addition to long distances, the human race also used measures of length used in everyday life. In this sense, he tried to make the most of his daily life and the characteristics he had.

Hand and finger measurements in nomadic Kazakh society:

Oymak gana - the size of a carapace.

Eli (one, two, three, four) - horizontal thickness of the finger, width the joint space between your thumb and Middle hand.

Suyem (18 cm) – the distance between the thumb and forefinger.

Arshyn is a size equal to 1 meter.

Kulash is the interval between the ends of two arms extended at shoulder level.

Adim is the interval between two legs when walking.

Alshai-keep a distance between the legs with a tassel.

There are enough analogies that arise in nomadic life. In particular, there are "kashamsinin sbinbay (short), kuryk boui (5-6 m), arkan boui (15 m), kom arkan boui (6-8 m), arkan boui (18-25 m), the length of the door and the cage, the length of the rope, the length of the chain, the length of the horse rope (30-50 meters), ularaktay (very small)".

The fact that the above criteria arose from the colloquial language among the people can be evidenced by the following proverbs and sayings.

Since the time of the Cossack people, for many centuries, the dimensions of "kashykyk" and "longyk", which were inherited from generation to generation, are also used in the Kazakhs. However, these dimensions are forgotten and becoming obsolete.

The study of the dimensions of distance and length found in the history of language is of great importance for the science of language. These dimensions are still a question that needs to be studied more deeply.



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KAMUSAL ALAN VE YEREL SİYASET PUBLIC SPACE AND LOCAL POLITICS

Ezgi BUZLU

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ÖZET

Metin, Jürgen Habermas'ın "Kamusallığın Yapısal Dönüşümü" kitabıyla başlayan kamusal ve özel alan ayrımının tartışıldığı birçok görüşü değerlendirir. Metinde, kamusal alanın tanımı, özel alanla olan ilişkisi ve farklı düşünce akımlarının perspektifleri üzerinde durulur. Hannah Arendt'in agonistik kamusal alan modeli ile politikanın yurttaşların varlıklarını anlamlı kıldığı bir alandaki eksiklikleri eleştirilir. John Rawls ve Bruce Ackerman'ın liberal modelleri, haklar ve adalet ilkelerine odaklanarak farklı iyi anlayışlarına sahip bireylerin bir arada yaşayabileceği bir toplumu tasvir eder. Jürgen Habermas'ın kamusal alan modeli ise geniş kapsamlı kamusal müzakerelerde eşitlik ve özgürlük ilkesine vurgu yaparak derinleştirilmiş bir demokrasi arayışını ifade eder. Metin, aynı zamanda proleter kamusal alan modelini de ele alarak işçi sınıfının burjuva kamusal alanını ele geçirme hedefini ve sınıfsız, kamusal-özel ayrımının olmadığı bir toplum ideali üzerine odaklanmasını tartışır. Bu çeşitli modellerin getirdiği avantajlar ve sınırlamaları değerlendirirken, politika, hukuk ve sosyoekonomik bağlamlarda farklı bakış açılarını ele alır. Ayrıca metin, kamusal alanın tanımındaki çeşitliliği kişisel dünya görüşüne bağlar ve günümüz demokrasi tartışmaları içinde kamusal alanın önemine vurgu yapar. Kamusal alanın neo-liberal dalga sonrası demokrasi tartışmalarında nasıl bir rol oynadığı ve kamusal alanın meşruiyet zemini olarak nasıl geliştirilebileceği üzerinde durur.

Metinde ayrıca liberal düşüncenin, devletin tarafsızlığı ilkesine dayandığı ve kamusal alandaki çeşitli sorunları bireysel haklar ve özgürlükler çerçevesinde çözmeye odaklandığı ifade ediliyor. Kamusal alanda katılımın teşvik edilmesi, temsili demokrasinin güçlendirilmesi ve bireylerin politik süreçlere aktif katılımının önemi vurgulanıyor.

Habermas toplumsal dönüşüm açısından değerlendirmeye iten bir perspektife taşımıştır. Bu çerçevede, Habermas'ın kamusal alan modeli, demokrasi, özgürlük, eşitlik gibi temel kavramları sorgulayarak modern toplumun dinamiklerini anlamaya çalışır.

Habermas'ın modeli eleştirilere de maruz kalmıştır. Özellikle, kamusal alanın idealize edilmiş bir formunu öne sürmesi ve günümüzdeki kompleks medya ve iletişim yapısını yeterince hesaba katmaması eleştirilmiştir. Bu bağlamda, modelin pratik uygulanabilirliği ve günümüz koşullarına uygunluğu konularında tartışmalar devam etmektedir.

Anahtar Kelimeler: Kamusal alan, özel alan, demokrasi, katılım, temsili demokrasi

ABSTRACT

The text evaluates various perspectives on the distinction between the public and private spheres, starting with Jürgen Habermas' book "The Structural Transformation of the Public Sphere." It delves into the definition of the public sphere, its relationship with the private sphere, and the perspectives of different ideological currents. The text critiques Hannah Arendt's agonistic public sphere model, pointing out deficiencies in the area where politics gives meaning to citizens' existence.

Liberal models, such as those proposed by John Rawls and Bruce Ackerman, are discussed, depicting a society where individuals with different conceptions of the good can coexist by focusing on rights and



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principles of justice. Jürgen Habermas' public sphere model expresses a quest for deepened democracy, emphasizing equality and freedom principles in extensive public deliberations. The text also discusses the proletarian public sphere model, exploring the working class's goal of seizing the bourgeois public sphere and focusing on an ideal society without class-based public-private distinctions.

While evaluating the advantages and limitations brought by these various models in the contexts of politics, law, and socio-economic aspects, the text considers different perspectives. It also links the diversity in defining the public sphere to personal worldviews and underscores the importance of the public sphere in contemporary democracy debates. The text explores the role of the public sphere in post-neoliberal democracy discussions and how it can be developed as a legitimacy foundation.

Additionally, the text notes that liberal thought is based on the principle of the state's neutrality and focuses on solving various issues in the public sphere within the framework of individual rights and freedoms. It emphasizes the importance of encouraging participation in the public sphere, strengthening representative democracy, and highlighting the active involvement of individuals in political processes.

Habermas has offered a perspective that encourages evaluation from the standpoint of social transformation. In this framework, Habermas' public sphere model questions fundamental concepts such as democracy, freedom, and equality to understand the dynamics of modern society.

However, Habermas' model has faced criticisms, particularly for idealizing a specific form of the public sphere and not adequately accounting for the complex media and communication structures of today. In this context, debates continue regarding the practical applicability and relevance of the model in contemporary conditions.

Keywords: Public sphere, private sphere, democracy, participation, representative democracy



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UNVEILING THE CULTURAL PERSPECTIVE: FACULTY ENGAGEMENT IN RESEARCH AT CENTRAL LUZON COLLEGE OF SCIENCE AND TECHNOLOGY (CELTECH)

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ABSTRACT

The mission of the Commission for Higher Education (CHED) is to assist in the development of a quality community that can address the social, political, economic, cultural, and ethical problems that impede the nation's human growth and ability to compete internationally. Additionally, it adopts a vertical typology within each horizontal type as well as a horizontal typology based on the functional differentiation of HEIs about service to the nation. The study was conducted at the Central Luzon College of Science and Technology, Philippines during the 1st Semester of Academic Year, 2023-2024. The respondents of the study were 80 full-time and part-time faculty. Quantitative research design will be utilized achieving objectivity, control, and precise measurement. The last suggested researchable issue regarding this work is the association between faculty members' participation in study publications and their level of research readiness and capabilities.

Keywords: Unveiling, Cultural Perspective, Faculty Engagement, Research



İLHAM ƏLİYEV VƏ MİLLİ İQTİSADI İNKİŞAF MODELİ

ILHAM ALIYEV AND THE NATIONAL ECONOMIC DEVELOPMENT MODEL

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XÜLASƏ

Prezident İlham Əliyevin Azərbaycana rəhbərlik etdiyi 20 il ərzində ölkə iqtisadiyyatı böyük inkişaf yolu keçib. Təmali Ümummilli lider Heydər Əliyev tərəfindən qoyulmuş, dövlət başçısı İlham Əliyevin inamla davam etdirdiyi sosial-iqtisadi inkişaf strategiyası ölkəmizdə taleyüklü məsələlərin həllini mümkün edib.

Cənab Əliyevin 20 illik prezidentliyi dövründə bütün sferalarda çevik islahatlar aparılıb, dövlət proqramları qəbul olunub. Düşünülmüş iqtisadi siyasət nəticəsində beynəlxalq qurumlarla səmərəli əlaqələr qurulub, vacib olan neft strategiyası davam etdirilib.

İlham Əliyev birinci dəfə Azərbaycan Prezidenti seçilərkən beynəlxalq səviyyədə tanınmış sərhədlər çərçivəsində dövlətimizin ərazi bütövlüyünün və suverenliyinin tam və şərtsiz bərpasını öz siyasi proqramının ali məqsədi olaraq bəyan etmişdi. Bu gün bu siyasi proqram artıq reallaşmışdır. Tarixi əhəmiyyətli Zəfərin əldə olunması həm də ölkəmizin əsas iqtisadi inkişaf proqramlarının yerinə yetirilməsi sayəsində mümkün olub.

Bu inkişaf və tərəqqi Qələbəmizin təməlini təşkil edib, ona zəruri maliyyə və maddi resurslar yaradıb.

Azərbaycanın 2030-cu ilədək Milli Prioritetlərində və 2022-2026-cı illər üzrə sosial-iqtisadi inkişaf Strategiyasında hədəflənən nəticələrə və sağlam prinsiplərə əsaslanmaqla gələcəkdə qeyri-neft iqtisadiyyatını daha da inkişaf etdirmək, insan kapitalının inkişafı nəticəsində dünya iqtisadiyyatında ölkənin mövqeyini gücləndirmək, daha yuxarı gəlirli ölkələr qrupuna daxil olmaq hədəflənir.

Transmilli enerji və nəqliyyat-kommunikasiya dəhlizləri sahəsində uğurlu siyasət sosial-iqtisadi inkişaf göstəricilərini yüksəldib. Ölkəmiz Avropanın enerji təminatında strateji və etibarlı tərəfdaşa çevrilib. 2006-cı ildə istismara verilən Bakı-Tbilisi-Ceyhan boru kəməri, 2018-ci ildə rəsmi açılışı olan Cənub Qaz Dəhlizi bu baxımdan xüsusi qeyd edilməlidir. Enerji əməkdaşlığının yeni mərhələsi üçün 2022-ci ildə Avropa və digər tərəfdaş ölkələrlə energetika sahəsində strateji əməkdaşlığa dair Memorandum və Saziş imzalanıb. Həmin sənədlər qaz nəqlinin artırılmasını, bərpa olunan mənbələrdən elektrik enerjisinin və maye hidrogenin Avropaya ixracını, habelə ötürmə üçün infrastrukturun qurulmasını nəzərdə tutur. Ölkəmiz global enerji keçidi çağırışlarına uyğun olaraq, xarici investorlarla əməkdaşlıq çərçivəsində bərpa olunan enerji mənbələrinin səmərəli istehsalını təşkil edir. Birləşmiş Ərəb Əmirliklərinin "Masdar" və Səudiyyə Ərəbistanı Krallığının "Acwa Power" şirkətləri ilə külək və günəş enerjisinin istehsalı layihələri uğurla icra edilir. Bununla yanaşı, BP şirkəti ilə birlikdə 240 meqavatlıq günəş elektrik stansiyasının tikintisi planlaşdırılır. Digər bir sıra enerji şirkətləri ilə birgə həm quruda, həm də dənizdə günəş və külək enerjisi istehsalı layihələrinin icrası nəzərdə tutulur.

Açar sözlər: iqtisadiyyat, sosial-iqtisadi inkişaf strategiyası, strateji valyuta ehtiyatları, innovativ yanaşmalar

ABSTRACT

During the 20 years that President Ilham Aliyev led Azerbaijan, the country's economy has made great progress. The socio-economic development strategy established by the national leader Heydar Aliyev



and confidently continued by the head of state Ilham Aliyev made it possible to solve the fateful issues in our country.

During the 20-year presidency of Mr. Aliyev, flexible reforms were carried out in all spheres and state programs were adopted. Effective relations with international organizations were established as a result of the considered economic policy, and the important oil strategy was continued.

When Ilham Aliyev was elected the President of Azerbaijan for the first time, he declared the complete and unconditional restoration of the territorial integrity and sovereignty of our state within the borders recognized at the international level as the supreme goal of his political program. Today, this political program has already been realized. Achieving the historically significant Victory was also possible thanks to the implementation of the main economic development programs of our country.

This development and progress formed the foundation of our Victory and created the necessary financial and material resources for it.

Based on the results and sound principles targeted in the National Priorities of Azerbaijan until 2030 and the socio-economic development strategy for 2022-2026, to further develop the non-oil economy in the future, to strengthen the country's position in the world economy as a result of the development of human capital, countries with higher incomes aiming to enter the group.

A successful policy in the field of transnational energy and transport-communication corridors has increased socio-economic development indicators. Our country has become a strategic and reliable partner in Europe's energy supply. The Baku-Tbilisi-Ceyhan pipeline, which was put into operation in 2006, and the Southern Gas Corridor, which was officially opened in 2018, should be specially mentioned in this regard. For the new phase of energy cooperation, a Memorandum and Agreement on strategic cooperation in the field of energy was signed with Europe and other partner countries in 2022. Those documents envisage the increase of gas transportation, the export of electricity from renewable sources and liquid hydrogen to Europe, as well as the construction of infrastructure for transmission. In accordance with the challenges of the global energy transition, our country organizes the efficient production of renewable energy sources in cooperation with foreign investors. Wind and solar energy production projects are being successfully implemented with the companies "Masdar" of the United Arab Emirates and "Acwa Power" of the Kingdom of Saudi Arabia. In addition, it is planned to build a 240 megawatt solar power plant together with BP. In cooperation with a number of other energy companies, it is planned to implement both onshore and offshore solar and wind energy production projects.

Keywords: economy, socio-economic development strategy, strategic currency reserves, innovative approaches

GİRİŞ

Siyasi liderin və onun rəhbərlik etdiyi partiya, yaxud hərəkətin effektiv hakimiyyətinin ən mühüm göstəricisi hər an seçicisi qarşısında hesabat verməyə hazır olmasıdır. Hesabat qarşıya qoyulmuş məqsəd və vəzifələrin icra olunduğu təqdirdə verilir. Hesabatdan yayınmaq siyasətçi və siyasi qüvvə üçün bu statusda fəaliyyətin, mövcudluğun sonu anlamında qəbul olunmalıdır. Xalqdan güc alan, xalqa arxalanan lider hər an hesabat verməyə hazırdır və bunu özünə şərəf bilir. Təbii ki, dünya siyasət tarixində icra olunan vədlər və layihələr yarımçıq qalmış, yaxud iflasa uğramış proqramlarla müqayisədə azdır. Bu baxımdan, demokratik cəmiyyətlər siyasi liderdən xalq qarşısında gördüyü işlərə görə hesabat vermək üçün həm də cəsarət tələb edir.

Prezident cənab İlham Əliyevin xalqın etimadına arxalanan 20 illik hakimiyyəti bu yolun başlanğıcında – 2003-cü ildə elan edilmiş vədlərin mərhələli və planlı şəkildə icrasını əhatə edir. Dövlət başçısının Azərbaycan xalqına əsas sözü – işğal altında olan torpaqların azad olunması və məcburi köçkün düşmüş soydaşlarımızın doğma yurdlarına qayıtmasının təmin edilməsi bu vədlərdən ən taleyüklüsü olub. Çünki bu, tək vəd deyil, ideya kimi bizim bir xalq olaraq gələcəkdə də mövcud ola biləcəyimizin kodudur,



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açarıdır. Məhz bu səbəbdən xalqımız Prezident İlham Əliyevə bu 20 ilin hər anında dəstək durub və etimad göstərib, torpaqlarımızın azadlığı uğrunda başladığımız müqəddəs savaşımda isə liderinin ətrafında misilsiz həmrəylik göstərərək son iki əsrin başlıca problemi – tarixi ədalətsizliyin öhdəsindən gəlməyə və ədaləti bərpa etməyə müvəffəq olub.

ARAŞDIRMA

Prezident İlham Əliyevin tək Qarabağın geri qaytarılması deyil, istisnasız olaraq bütün vədləri Azərbaycan xalqının milli maraqları, mövcudluq və gələcək inkişaf fəlsəfəsindən irəli gəlib. İqtisadi yüksəliş və sosial rifah olmadan güclü ordu qurmaq, sistemli təlim-tərbiyyə prosesini təşkil etmədən, təhsilsiz həmrəylik, birlik və milli vətənpərvərliyə nail olmaq, məcmu halda bunlar olmadan isə qələbə qazanmaq mümkün deyil. Prezident İlham Əliyevin rəhbərliyi ilə dövlətimiz qeyd olunan hər bir sferaya proqram xarakterli yanaşma nümayiş etdirib. Hökumətin əldə etdiyi iqtisadi nailiyyətlərlə yanaşı, qazandığımız mənəvi hədəf - həyata keçirilmiş çoxşaxəli islahatların bir istiqaməti olan kadr bazasının yenilənməsi ilə tətbiq edilmiş effektiv və müasir idarəçilik, yüksək milli ruh, döyüşkən və mübariz gənc nəslin yetişməsi bizi müqəddəs amala - Zəfər günü və bayrağımızın ölkəmizin hər bir güşəsində dalğalanmasına aparan yolun ayrılmaz tərkib hissələridir.

Dövlət başçısının hakimiyyət illərinin ən uca anı təbii ki, Xankəndi şəhərində üçrəngli bayrağımızın yüksəlməsi və hərbi paradın keçirilməsi oldu. Bizim bundan öncə də qürur dolu anlarımız olub, məsələn, mədəniyyət paytaxtımız, Qarabağın tacı olan Şuşanın azad edildiyi gün. Ancaq 30 il ərzində separatizmin kök saldığı əsas mərkəz məhz Xankəndidə yerləşdiyindən, bu cinayətkar hərbi-kriminal xuntanın da sonu məhz bu şəhərimizə nəzarətin geri qaytarılması ilə asosiasiya olunurdu. Cəsur hərbiçilərimizin şəhər üzərində nəzarəti bərqərar etmələri və Müzəffər Ali Baş Komandanın Xankəndidə müqəddəs bayrağımızı dalğalandırması ilə xalqımız qarşısında verilmiş ən önəmli sözün – işğal altında olan bütün ərazilərimizin geri qaytarılması reallığa çevrildi. İllər boyu xalqımıza fiziki və mənəvi əziyyət verən, bizə qarşı soyqırımını törətmiş, bizə Xocalı zülmü vermiş işğalçıya məhz Xankəndidə son verildi.

NƏTİCƏ

Bu gün Qarabağ və Şərqi Zəngəzuru qarış-qarış gəzən, dağıntıları yerində izləyən, torpaqlarımızın dirçəlməsi, əhalimizin firavan yaşayışı üçün infrastruktur layihələrinə start verən dövlət başçısı xalqımızın və dövlətimizin qarşısındakı illər üçün inkişaf konturlarını müəyyən edir. Ötən 20 ildə biz bir xalq olaraq liderimizlə birlikdə qarşımda duran ölüm-dirim mübarizəsindən qalib, üzüağ çıxdıq. İndi bir xalq kimi yeni yüksəliş mərhələsinə qədəm qoyuruq – işğaldan azad edilmiş torpaqlarımızın Vətənimizə reintegrasiya prosesini həyata keçirmək. Bu yol da təbii ki, hamar olmayacaq. Biz müxtəlif çətinliklərlə qarşılaşacağıq, çünki 300-dən çox yaşayış məskənimizi özümüz, öz vəsaitimizlə, öz gücümüzə bərpa edəcəyik. Ancaq Prezident İlham Əliyevin rəhbərliyi ilə onların da öhdəsindən gələcəyik. Əsas bilirsiniz nədir? Əsas odur ki, xalqımız bir daha şəhid verməyəcək. Dövlət başçısının müdrik siyasəti, qətiyyətli addımları, əzmi və iradəsi ilə müharibədən qalib çıxan Azərbaycan xalqı bir daha itki, qurban nədir bilməyəcək və görməyəcək. Övladlarımız əmin-amanlıq şəraitində böyüyüb boya-başa çatacaq, xalqımız daima yaşayıb-yaradacaq.

ƏDƏBİYYAT

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FOOD ADDITIVES: IMPACT ON THE GUT MICROBIOME, INCREASE ANXIETY

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Background Studies have shown that our gut health and the health of our gut bacteria can have a substantial influence on our mental well-being. A number of important functions performed by the gut microbiome are well recognized including the digestion of polysaccharides, biosynthesis of vitamins and nutrients, colonization resistance, and immune system modulation

Objectives The functional profiles in the gut microbiome can be perturbed by additives. The role of additives in gut microbiome toxicity still remains underappreciated. With our expertise we've evaluated Antistress Tea, examined how diet and anxiety reciprocally interact with the gut microbiota and inflammation and reviewed different interventions that can modulate microbiota and could modulate the anxiety according to the underlying mechanisms whereby the gut-brain axis influences anxiety.

Materials and methods The human gut microbiome can be easily disturbed upon exposure to a range of additives. In fact, the gut bacteria play an important role in the biotransformation of additives. Food additives can cause worsening intestinal inflammation.

Results Environmentally induced perturbation in the gut microbiome is strongly associated with human disease risk. These additives induced perturbations are potentially linked to elevated disease risks. Inflammatory bowel disease (IBD), obesity, diabetes, cardiovascular disease, liver disease, colorectal cancer, and neurological disorders can be at least in part attributed to undesirable functional alterations in the gut microbiome

Conclusion The human gut microbiome has received unprecedented attention over the past decade. The exposure to various additives leads to functional perturbation in the gut microbiome. Healthier diets can reduce the risk of anxiety.

Keywords: gut microbiome, additives, anxiety, Antistress Tea



TÜRKİYE CUMHURİYETİ'NİN KURULUŞ DÖNEMİ ÖNDERLERİNDEN MUSTAFA NECATİ'YE FELSEFİ BAKIŞ

A PHILOSOPHICAL VIEW OF MUSTAFA NECATİ, ONE OF THE LEADERS OF THE FOUNDATION PERIOD OF THE REPUBLIC OF TÜRKİYE

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ÖZET

Ulusal Kurtuluş ve Bağımsızlık savaşının zaferle sonuçlanmasının ardından kurulan yeni cumhuriyetin büyük mücadele vermesi gereken bir alan daha vardır. Akla ve bilime dayalı demokratik ve çağdaş uygarlık seviyesini yakalayabilmek amacıyla Türkiye Cumhuriyeti'nin kurucusu Atatürk'ün devrimlerinin en hızlı biçimde toplumun her kesimine yayılması gerekmektedir. Bu mücadele ise yalnızca eğitim yoluyla sürdürülebilir. Fakat savaştan yeni çıkmış ülkede öğretmen gereksinimi hem köylerde hem şehir merkezlerinde had safhadadır. Milli kültürün gelecek nesillere aktarılması bakımından öğretmenlerin eğitim alanında verilecek mücadeledeki yeri yadsınamaz. Nitekim Cumhuriyet tarihinde öğretmenliği meslek haline getiren kişi dönemin Maarif Vekili Mustafa Necati (1892-1929)'dir. Görev yaptığı süre boyunca öğretmenlik mesleğine verdiği değer, Maarif Teşkilatı yapısındaki düzenlemeleri, yeni Türk alfabesinin yaygınlaşması için çalışmaları ve bu anlamda Millet Mekteplerinin kuruluşu Türk Eğitim Tarihinde gerçekleşen muazzam atılımlara birer örnektir. Çalışmanın amacı, Türkiye Cumhuriyeti'nin kuruluş döneminde eğitim alanında gerçekleştirdiği devrim niteliğindeki başarılı atılımlarla Türk Eğitim Tarihinin unutulmaz eğitim bakanları arasında yer alan Mustafa Necati'nin devrimci kişiliğini ve eylemlerinin düşünsel yönlerini felsefi bakış açısıyla değerlendirilmeye çalışmaktır. Çalışmada ayrıca M. Necati'nin düşünceleri çerçevesinde gerçekleşen Cumhuriyet dönemi eğitim sistemindeki değişim ve dönüşümler, dönemin toplumsal, ekonomik ve kültürel koşulları dikkate alınarak incelenmeye çalışılmıştır. Değerlendirme yapılırken M. Necati hakkında yapılan bilimsel çalışmalar, döneme ilişkin arşiv kaynakları, süreli yayınlar, tetkik eserler, makaleler, tezler, kitaplar ve resmi belgelerden yararlanılmış. Kaynaklar doküman incelemesi yöntemiyle ele alınarak içerik analizine tabi tutulmuştur.

Anahtar Kelimeler: Mustafa Necati, Felsefe, Eğitim, Türk Eğitim Tarihi

ABSTRACT

There was another area in which the new republic founded following the victory of national liberation and independence must struggle greatly. In order to achieve the desired level of democratic and modern civilization based on reason and science, it was necessary to spread the revolutions of Atatürk, the founder of Turkish Republic, to all segments of society as quickly as possible. And this struggle could only be sustained by means of education. However, in the country which had just emerged from the war, the need for teachers was at extreme level both in villages and cities. It is undeniable that teachers have a great role in the struggle to transfer national culture to future generations. Indeed, it was Mustafa Necati (1892- 1929), the Minister of Education at the time, who made teaching a profession in the history of the Republic. The value he gave to the profession of teaching during his term in the Ministry, the regulations he performed in the structure of education organization, his efforts to popularize the new Turkish alphabet and establishments of nationals schools are the examples of great achievements in the history of Turkish Education. The objective of the study is, from a philosophical view, to try to evaluate the revolutionary personality and intellectual aspects of the actions by Mustafa Necati, who was among the unforgettable ministers of Education in the history with his revolutionary breakthroughs in the field



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of education during the founding period of the Republic of Turkey. In addition, the changes and transformations in the education system of the Republican period, which took place within the framework of Mustafa Necati's thoughts, were also tried to be analyzed by considering the social, economic and cultural conditions of the period. In the process of analysis and evaluation, scientific studies about Mustafa Necati, archive resources of the period, periodicals, research works, articles, theses, books and official documents were utilized. The sources were examined using the method of document review and subjected to content analysis.

Key Words: Mustafa Necati, Philosophy, Education, Turkish Education History



EL AUTOAPRENDIZAJE PARA APRENDER A LO LARGO DE LA VIDA

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RESUMEN

El autoaprendizaje es una habilidad que los estudiantes deben desarrollar lo largo de su formación académica y de esa forma puedan continuar aprendiendo después de concluir sus estudios. Sobre lo anterior, Pearson (2023) señala que el autoaprendizaje es un requisito básico en la vida universitaria, por eso es importante desarrollar habilidades que permitan a los jóvenes aprender y adquirir conocimientos de forma autónoma. Por lo que en este trabajo se pretende mostrar las habilidades que requiere un estudiante de administración para lograr el autoaprendizaje. Para dar respuesta a dicho objetivo se aplicó un instrumento de 10 preguntas a estudiantes de la Licenciatura en Administración, en las que se les preguntó sobre habilidades requeridas para el autoaprendizaje, concluyendo que el 94% de los encuestados conocen las habilidades que deben tener como organización, hacer mapas mentales entre otras, sin embargo, no aplican estas habilidades para autoaprender como es llevar cursos o talleres por decisión propia.

Palabras clave. Vida profesional. Autoaprender. Formación Académica.



APRENDIZAJE HÍBRIDO COMO PARTE DE LA EDUCACIÓN DEL FUTURO

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RESUMEN

El aprendizaje híbrido después del covid-19, vino a quedarse, hoy es una realidad, enseñar y aprender de manera virtual o en línea, utilizando el internet como uno de los principales medios comunicación e información. Además, Soto (2023) añade que los teléfonos móviles, las tabletas y computadoras portátiles forman parte de este; esto se debe a que son las herramientas tecnológicas que permiten acceder a través del internet a materiales educativos y cursos online, además de permitir la comunicación. El objetivo de este trabajo fue analizar la percepción que tienen alumnos de la licenciatura en administración sobre el aprendizaje híbrido, por lo que se realizó una encuesta, encontrando que este tipo de modalidad educativa les hace ser responsables de su propio aprendizaje, ya que les permite ser autónomos además de ayudarles en su crecimiento profesional.

Palabras clave. Vida profesional. Aprendizaje online. Aprendizaje autónomo.



INACTIVATION OF FOODBORNE PATHOGENS BY COLD ATMOSPHERIC PLASMA

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ABSTRACT

Cold atmospheric plasma (CAP) is a novel technology used to inactivate many types of microorganisms using the discharge of an ionized gas, which releases charged particles that interact with biological matter and contribute to the lethal action against microorganisms. CAP is a promising new technology that can help to improve food safety, quality, and environmental sustainability. In this study, the bactericidal effect of CAP on the pathogenic microorganisms *Staphylococcus aureus* ATCC 25923, *Salmonella typhimurium* CCM 5445, and *Salmonella enteritidis* ATCC 13076 was investigated. Plasma treatment can be applied in two ways: direct (CAP) and indirect (plasma-activated water- PAW). In the direct method; microorganisms were exposed to plasma at different flow power (100 W, 150 W, and 200 W) and durations (30 sec., 1, 3, and 5 min.). In the indirect method, the distilled water was treated with the same time and flow power by cold plasma. CAP process was applied to pathogenic microorganisms, and the number of viable microorganisms was determined by incubating the samples at 37°C for 24 hours. According to the analysis results, it was determined that the direct CAP application method inhibited approximately 45-57% of the pathogens in the 1st minute and all of them in the 3rd and 5th minutes. In the PAW application, it was determined that there was a decrease of approximately 33-66% in the viability of pathogens at the end of the five-minute application period (the longest applied period). Both methods were found to be effective in inhibiting the growth of foodborne pathogens.

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Keywords: Cold atmospheric plasma, plasma-activated water, *Staphylococcus aureus*, *Salmonella typhimurium*, *Salmonella enteritidis*.



KARBON NOKTALARININ SÜRDÜRÜLEBİLİR VE ÇEVRE DOSTU SENTEZİNDE YENİLİKÇİ BİR YAKLAŞIM OLARAK MİKROALGLERİN ROLÜ

THE ROLE OF MICROALGAE AS AN INNOVATIVE APPROACH IN THE SUSTAINABLE AND ECO-FRIENDLY SYNTHESIS OF CARBON DOTS

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ÖZET

Karbon noktaları (CDs), 1-10 nanometre çap aralığında, küresel veya yuvarlak şekillerde, karbon bazlı nanomalzemelerin yeni ve heyecan verici bir türüdür. Nanometre ölçeğindeki boyutları yüzey alanı ile hacim oranını artırarak bu materyallerin yüzey etkinliğini yükseltmektedir. Karbon noktalarının güçlü fotoluminesans özellikleri uyarıldığında farklı dalga boylarında ışık yaymalarını sağlar. Bu materyaller, yüksek mekanik dayanıklılığa ve istikrara sahiptir. Karbon noktaların yüzeyi, fonksiyonel gruplarla (örneğin hidroksil, karboksil, amin grupları) modifiye edilebilir. Bu modifikasyonlar, noktaların su ve diğer çözücülerle uyumluluğunu artırabilir ve spesifik kimyasal bağlar oluşturabilir.

Karbon noktaları, benzersiz fiziksel ve kimyasal özellikleri sayesinde çok çeşitli uygulama alanlarında kullanılmaktadır. Bu alanlar, biyomedikal uygulamalar (biyolojik görüntüleme, ilaç taşıma ve salınımı) çevresel uygulamalar (sensörler ve su arıtma), enerji uygulamaları (fotovoltaik cihazlar, enerji depolama ve dönüşüm sistemleri), optoelektronik uygulamalar (led'ler ve ekran teknolojileri) ve katalizörlerdir. Karbon noktalarının bu geniş uygulama yelpazesi, onların nanoteknoloji, malzeme bilimi, çevre mühendisliği ve biyoteknoloji gibi alanlarda araştırma ve geliştirme çalışmalarında önemli bir yer tutmasına neden olmaktadır.

Karbon noktalarının üretim yöntemleri, ileri düzey nanoteknoloji uygulamalarının bir parçası olarak, çeşitli ve sofistike süreçler aracılığıyla gerçekleştirilmektedir. "Top-Down" Yöntemler büyük karbon içerikli materyallerin küçük karbon noktalarına parçalanması sürecini içerir. Bottom-Up Yöntemler daha küçük moleküllerin veya atomların bir araya gelerek karbon noktalarını oluşturduğu sentez yöntemleridir. Yeşil sentez yöntemleri, karbon noktalarının sürdürülebilir üretimine olanak tanır. Bu yöntemlerle üretilen karbon noktaları genellikle daha az toksik ve biyoyumlu olup, özellikle biyomedikal ve çevresel uygulamalar için uygun olabilir. Son zamanlarda yeşil sentez için yenilenebilir kaynaklardan, bitki özütlerinden ve bakteri, mantar ve mikroalg gibi mikroorganizmalardan yararlanılmaktadır.

Mikroalgler, fotosentez yoluyla karbon dioksiti oksijene dönüştüren ve genellikle su ortamlarında yaşayan mikroskobik boyutlu canlılardır. Çeşitli biyokimyasal bileşenleri (lipitler, proteinler, karbonhidratlar) içermeleri ve hızlı büyüme kapasiteleri sayesinde, biyoyakıt üretimi, biyomedikal uygulamalar ve çevresel iyileştirme alanlarında değerli kaynaklar olarak kabul edilirler. Mikroalgler, karbon noktalarının sentezinde çevre dostu ve enerji verimli alternatifler sunarak uygun bir yaklaşımı temsil ederler. Mikroalglerin alginat, selüloz, karbonhidratlar ve diğer organik bileşenler içeren



biyokütlesi, karbon noktalarının üretimi için bir karbon kaynağı olarak kullanılabilir. Bunun yanında mikroalglerin içerdiği pigmentlerin karbon noktalarının optik özelliklerini etkileyebileceği ve karbon noktalarının sentezinde kullanılabileceği düşünülmektedir. Mikroalglerin fotosentez yoluyla karbon dioksiti biyokütle olarak sabitleme süreçleri karbon noktalarının sentezinde kullanılabilir. Bu çalışmanın amacı, karbon noktalarının özellikleri, çeşitli uygulama alanları ve üretim yöntemlerini anlatmakla birlikte, özellikle mikroalglerin bu süreçte nasıl sürdürülebilir ve çevre dostu bir alternatif olarak kullanılabileceğini vurgulamaktır. Bu, hem karbon emisyonlarını azaltma hem de yenilenebilir kaynaklardan yüksek verimli nanomalzemeler üretme potansiyelini ortaya koymaktadır.

Anahtar Kelimeler: Karbon Noktaları, Mikroalgler, Sürdürülebilirlik, Yeşil Sentez, Nanoteknoloji

ABSTRACT

Carbon dots (CD), ranging from 1-10 nanometers in diameter and typically spherical or round in shape, represent a novel and exciting type of carbon-based nanomaterials. Their nanoscale dimensions increase the surface area to volume ratio, enhancing the surface reactivity of these materials. Carbon dots exhibit strong photoluminescence properties, emitting light at various wavelengths when excited. These materials possess high mechanical strength and stability. The surface of carbon dots can be modified with functional groups (such as hydroxyl, carboxyl, and amino groups), which can enhance their compatibility with water and other solvents and create specific chemical bonds.

Due to their unique physical and chemical properties, carbon dots are utilized in a wide range of application areas. These include biomedical applications (biological imaging, drug delivery and release), environmental applications (sensors and water treatment), energy applications (photovoltaic devices, energy storage and conversion systems), optoelectronic applications (LEDs and display technologies), and catalysts. The broad spectrum of applications places carbon dots at a significant position in research and development within nanotechnology, materials science, environmental engineering, and biotechnology.

The production methods for carbon dots, integral to advanced nanotechnology applications, involve various sophisticated processes. “Top-down” methods entail breaking down large carbon-containing materials into smaller carbon dots, while “Bottom-Up” methods involve synthesizing carbon dots from smaller molecules or atoms. Green synthesis methods facilitate the sustainable production of carbon dots. Carbon dots produced via these methods are generally less toxic and more biocompatible, making them suitable especially for biomedical and environmental applications. Recent advances in green synthesis exploit renewable resources, plant extracts, and microorganisms such as bacteria, fungi, and microalgae.

Microalgae, microscopic organisms that convert carbon dioxide into oxygen through photosynthesis and commonly inhabit aquatic environments, are valuable resources for biofuel production, biomedical applications, and environmental remediation due to their diverse biochemical components (lipids, proteins, carbohydrates) and rapid growth capabilities. Microalgae offer environmentally friendly and energy-efficient alternatives in the synthesis of carbon dots. The biomass of microalgae, containing alginate, cellulose, carbohydrates, and other organic components, can serve as a carbon source for producing carbon dots. Additionally, the pigments in microalgae may influence the optical properties of carbon dots and can be utilized in their synthesis. Carbon sequestration through photosynthesis by microalgae can be employed in synthesizing carbon dots, reducing carbon emissions and generating sustainable carbon sources.

This study aims to delineate the characteristics of carbon dots, their diverse application areas, and production methods while emphasizing the potential role of microalgae in this process as a sustainable and eco-friendly alternative. This highlights the potential for reducing carbon emissions and producing high-efficiency nanomaterials from renewable resources.

Keywords: Carbon Dots, Microalgae, Sustainability, Green Synthesis, Nanotechnology



UNA EXPERIENCIA DE MATERIAL DIDÁCTICO PARA EL APRENDIZAJE DE LA HISTORIA ECONÓMICA EN ESTUDIANTES DE UNA UNIVERSIDAD PERUANA AN EXPERIENCE OF DIDACTIC MATERIAL FOR THE LEARNING OF ECONOMIC HISTORY IN STUDENTS OF A PERUVIAN UNIVERSITY

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RESUMEN

Esta investigación tuvo por objetivo determinar el nivel de efectividad de la aplicación de un material didáctico para el aprendizaje de la historia del pensamiento económico en los estudiantes de una universidad pública peruana. El tipo de investigación fue aplicado, de nivel experimental y diseño cuasiexperimental. Se tuvo una población de 41 estudiantes quienes fueron divididos en dos equipos de trabajo, uno control y otro experimental. El tipo de muestreo fue no probabilístico e intencionado. Para recoger la información se empleó una prueba pedagógica la cual se validó mediante un juicio de expertos y una prueba de normalidad de test-retest. Los datos obtenidos fueron procesados con el paquete estadístico SPSS en su última versión y Microsoft Excel 2019. Por otro lado, los resultados y determinaron que la media y desviación típica obtenida en la posprueba fue menor que la media y desviación típica de la preprueba en el grupo control, y que, la media y desviación típica obtenida en la posprueba fue mayor que la media y desviación típica de la preprueba en el grupo experimental. De igual forma, el análisis diff-in-diff evidenció un impacto favorable cuando se emplea el material didáctico en mención. Finalmente, se concluyó que la aplicación del material didáctico motivo de nuestra investigación tuvo un nivel de efectividad alto para el aprendizaje en estudiantes universitarios.

Palabras clave: Aprendizaje, historia económica, universidad, juego de simulación

ABSTRACT

This research aimed to determine the level of effectiveness of the application of didactic material for learning the history of economic thought in students of a Peruvian public university. The type of research was applied, experimental level and quasi-experimental design. There was a population of 41 students who were divided into two work teams, one control and the other experimental. The type of sampling was non-probabilistic and intentional. To collect the information, a pedagogical test was used, which was validated through expert judgment and a test-retest normality test. The data obtained were processed with the SPSS statistical package in its latest version and Microsoft Excel 2019. On the other hand, the results determined that the mean and standard deviation obtained in the post-test was lower than the mean and standard deviation of the pre-test in the control group, and that the mean and standard deviation obtained in the posttest was greater than the mean and standard deviation of the pretest in the experimental group. Likewise, the diff-in-diff analysis showed a favorable impact when the teaching material in question is used. Finally, it was concluded that the application of the teaching material that was the subject of our research had a high level of effectiveness for learning in university students.

Keywords: Learning, economic history, university, simulation game



LA TECNOLOGÍA E INNOVACIÓN COMO COMPONENTE CLAVE AL DESARROLLO SOSTENIBLE EN EL 2023

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RESUMEN

Uno de los intereses humanos hoy en día es poder cambiar los efectos dañinos del medio ambiente, buscar aportar soluciones al ambiente y generar ventajas. Es decir, permitir mejorar la calidad de vida, los recursos económicos y sociales sin dañar el ambiente.

Este trabajo de investigación tiene como objetivo presentar la Innovación tecnológica como componente clave al desarrollo sustentable en el 2023. A través de los conceptos de desarrollo sustentable, la importancia de la innovación y la tecnología para la sostenibilidad, la presentación de generaciones con conciencia ambiental, principios de la sostenibilidad, y ventajas del desarrollo sustentable. Dando como resultado los principales retos de la tecnología sustentable. Concluyendo en como la implementación de la tecnología sostenible puede marcar la diferencia en el 2023 y proponiendo tecnologías con efecto verde.

Palabras Clave: Innovación, tecnología, desarrollo sustentable.

ABSTRACT

One of human interests today is to be able to change the harmful effects of the environment, seek to provide solutions to the environment and generate advantages. That is, allowing the quality of life, economic and social resources to be improved without damaging the environment.

This research work aims to present technological innovation as a key component of sustainable development in 2023. Through the concepts of sustainable development, the importance of innovation and technology for sustainability, the presentation of generations with environmental awareness, principles of sustainability, and advantages of sustainable development. Resulting in the main challenges of sustainable technology. Concluding on how the implementation of sustainable technology can make a difference in 2023 and proposing technologies with a green effect.

Keywords: Innovation, technology, sustainable development.



APPLICATION OF HEART METHOD IN AIS SYSTEM ON SHIPS WITHIN THE SCOPE OF HUMAN RELIABILITY ANALYSIS

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ABSTRACT

Since the beginning of the 20th century, numerous technical, legal, and managerial systems mandated by international treaties have been instrumental in preventing maritime accidents. However, it is a known fact that no system involving human interaction can achieve perfection and be completely error-free. In this context, electronic navigation aids have emerged. Ship personnel sometimes encounter issues with the navigation aid systems within the ship, such as producing incorrect information under specific conditions, the device broadcasting incorrect data, or experiencing display loss on the electronic screen.

The contribution of the Automatic Identification System (AIS) in ensuring safety for life, property, and the environment at sea is undeniable. Especially with advancing technology and increased interoperability and correlation between devices, the reliability of AIS has further improved. Many bridge navigation equipment on ships receive their primary data via AIS and process this information. Navigational officers and related ship personnel can conduct safe navigation with the help of these data. Alongside these advancements, the importance of human reliability analysis comes to the forefront. Human Reliability Assessment (HRA) involves qualitative and quantitative evaluations to assess the contribution of humans to a risk situation. These methods were initially developed to minimize accidents encountered in nuclear power plants. In this study, the HEART (Human Error Assessment and Reduction Technique) methodology, one of the first-generation studies used in HRA and still valid today, is employed. The goal is to minimize human-related errors in the context of a specific ship, focusing on reducing errors related to personnel using the AIS device.

The analysis conducted within the framework of the HEART methodology provides a new risk analysis result that the responsible person using the AIS device could generate. The obtained data on the probability of human error indicate that production errors, operational errors, external factors, and human errors related to the AIS device are significant. According to the results of this study, it is once again understood that minimizing the probability of human error is highly beneficial for safe navigation.

Keywords: HEART Methodology, Maritime Risk Analysis, Automatic Identification System Human Reliability Analysis



GRAFLARIN TAMSAYI DİZİLERİNE UYGULAMASI APPLICATION OF GRAPHS TO INTEGER SEQUENCES

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ÖZET

Kenar kümesi $E = \{\{i, j\}: i, j \in V, i \neq j, i + j \text{ bir Lucas sayısı}\}$ şeklinde tanımlı grafa Lucas toplam graf denir.

Bu çalışmada öncelikle yukarıdaki tanımdan esinlenerek Pell toplam graf, Jacobsthal toplam graf, Mersenne toplam graf ve Leonardo toplam graf tanımlanarak izole noktaları, pendant noktaları, komşuluklar kümesi bulunmuştur. Daha sonra bazı değerler için atom-bond connectivity indeks, augmented Zagreb indeks ve geometrik-aritmetik indeks incelenmiştir. Sonrasında, $n = 3$ ve $n = 4$ noktalarına karşılık gelen grafların komşuluk matrisleri bulunarak özdeğerleri ve enerjileri hesaplanmıştır.

Anahtar Kelimeler: Graf teori, Tamsayı Dizileri, Topolojik indeks.

ABSTRACT

Let $H_n = (V, E)$ be a Lucas-sum graph, where $E = \{\{i, j\}: i, j \in V, i \neq j, i + j \text{ is a Lucas number}\}$

In this study, firstly, Pell sum graph, Jacobsthal sum graph, Mersenne sum graph and Leonardo sum graph were defined and isolated points, pendant points and neighborhood sets were found. Then, atom-bond connectivity index, augmented Zagreb index and geometric-arithmetic index were examined for some values. Afterwards, the adjacency matrices corresponding to $n = 3$ and $n = 4$ values of these sequences were found, and their eigenvalues and energies were calculated.

Key Words: Graph theory, Integer Sequences, Topological index.



LA INNOVACIÓN Y LAS NUEVAS TECNOLOGÍAS A NIVEL SOCIAL Y ECONÓMICO EN EL 2023

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RESUMEN

El surgimiento y la rápida adopción de tecnologías como la inteligencia artificial, el Internet de los aparatos electrónicos, la robótica, la realidad aumentada, la biotecnología, entre otras, remodela la forma en que se vive, trabaja e interactúa el ser humano. En el aspecto social, las nuevas tecnologías revolucionan la forma de comunicación, interacción y acceso a la información. Además, transforman sectores como la educativa, de salud y movilidad urbana. En el ámbito económico, las innovaciones impulsan la productividad y la eficiencia de las industrias, facilitando la creación de nuevos mercados y empresas, a su vez mejoran la competitividad global. La convergencia de tecnologías también abre oportunidades emocionantes para abordar desafíos globales, como el cambio climático, la pobreza y la salud. La combinación de IA, biotecnología y otras disciplinas permite enfoques más integrados y soluciones más efectivas para estos problemas. A medida que avanza el siglo XXI, es esencial que los gobiernos, las empresas y la sociedad en general trabajen en conjunto para aprovechar los beneficios de la innovación tecnológica de manera responsable y equitativa. Este trabajo de investigación tiene como objetivo mostrar por método descriptivo y exploratorio el impacto de la innovación y las nuevas tecnologías a nivel social y económico en el 2023, a través del concepto de innovación y su relación con las nuevas tecnologías, el panorama actual, el impacto en el mercado laboral, la creación de empleo y las habilidades requeridas en el futuro, dando como resultado de la investigación las Tendencias Tecnológicas estratégicas y sus posicionamientos como tendencias.

Palabras claves: Innovación, Tecnología, Economía

ABSTRACT

The emergence and rapid adoption of technologies such as artificial intelligence, the Internet of electronic devices, robotics, augmented reality, biotechnology, among others, reconfigures the way in which human beings live, work, and interact. In the social aspect, new technologies revolutionize the way of communication, interaction and access to information. In addition, they transform sectors such as education, health and urban mobility. In the economic field, innovations boost the productivity and efficiency of industries, facilitating the creation of new markets and companies, while improving global competitiveness. The convergence of technologies also opens up interesting opportunities to address global challenges, such as climate change, poverty and health. The combination of AI, biotechnology and other disciplines allows for more integrated approaches and more effective solutions to these problems. As the 21st century progresses, it is essential that governments, businesses and society at large work together to reap the benefits of technological innovation in a responsible and equitable manner. This research work aims to show through a descriptive and exploratory method the impact of innovation and new technologies at a social and economic level in the year 2023, through the concept of innovation and its relationship with new technologies, the current panorama, the impact in the labor market, the creation of employment and the skills required in the future, giving as a result of the research the strategic Technological Trends and their positioning as trends.

Keywords: Innovation, Technology, Economy.



TÜRKİYE'DE GİRGİR AVCILIĞININ DENİZ ÜRÜNLERİ İLE BESLENMEYE ETKİSİ THE EFFECT OF PURSE SEINE FISHING ON SEAFOOD NUTRITION IN TURKEY

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ÖZET

Türkiye'de gırgır avcılığı kriterleri, deniz ekosistemi ve balık popülasyonunu etkilemesinin yanında insanların deniz ürünü ile beslenmesinde de önemli rol oynamaktadır. Gırgır avcılığında belirlenen 24 metre sınırı ve belirli dönemlerde Karadeniz'de 18 metre sınırı Avrupa standartlarına göre çok düşük kalmaktadır. Bu derinlikte avlanma deniz ekosistemi üzerinde olumsuz etkiler yaratabilmektedir.

Denizlerin 50 metreye kadar olan derinlikleri, denizlerin akciğeri sayılmaktadır ve bu sınırın altında yapılan avlanmalar deniz canlılarının yaşam alanına müdahale etmektedir. Bu alanlar aynı zamanda deniz canlılarının üreme alanları olduğundan, müdahale sonucu ekosistemi bozulmasının yanı sıra deniz canlılarının nesillerinin devamlılığı da tehlikeye atılabilmektedir.

Balık çeşitlerindeki azalma ekonomik açıdan balık fiyatlarının artmasına sebep olabilmektedir. Fiyatlarda artış yaşandığında ise insanların yıllık deniz ürünü tüketimi azalmaktadır. Ayrıca bazı türlerde azalma veya yok olma sektöründe istikrarsızlık ve kayıplara yol açabilmektedir.

Bu durumlar göz önünde bulundurulduğunda gırgır avcılığı kriterlerinin gözden geçirilmesi önem arz etmektedir. Nitekim bazı dönemler deniz canlılarının sayıca fazla olup bazı dönemlerde az olmasından ziyade sürdürülebilirliği ve devamlılığı daha önemlidir. Deniz biyologları, çevre uzmanları ve balıkçılık sektörü temsilcileri ile iş birliği içinde daha etkili ve ekosisteme uyumlu avlanma yöntemleri geliştirilmelidir.

Sonuç olarak, Türkiye'deki gırgır avcılığının denizlerdeki derinlik sınırları, deniz ekosistemi üzerindeki etkileri ve balıkçılık sektörüne olan yansımaları ile ilgili detaylı bir inceleme ve düzenleme gerekmektedir. Bilimsel araştırmaların ve sektör temsilcilerinin katılımıyla daha sürdürülebilir bir deniz avcılığı politikası oluşturulabilir ve deniz ekosistemi uzun vadeli olarak korunabilir.

Anahtar kelimeler: Denizlerde avlanma, gırgır avcılığı, avlanma derinliği

ABSTRACT

Purse seine fishing criteria in Turkey not only affect the marine ecosystem and fish population, but also play an important role in feeding people with seafood. The 24 meter limit set for purse seine fishing and the 18 meter limit in the Black Sea in certain periods are very low compared to European standards. Fishing at this depth can have negative impacts on the marine ecosystem.

The depths of the seas up to 50 meters are considered the lungs of the seas and fishing below this limit interferes with the habitat of marine species. Since these areas are also the breeding grounds of marine species, the intervention may not only disrupt the ecosystem but also jeopardize the continuity of the generations of marine species.

The decrease in fish species may cause an increase in fish prices in economic terms. When prices increase, people's annual seafood consumption decreases. In addition, the decline or disappearance of some species can lead to instability and losses in the sector.

Considering these situations, it is important to review the purse seine fishing criteria. As a matter of fact, the sustainability and continuity of marine organisms is more important than the fact that they are more



numerous in some periods and less in others. More effective and ecosystem-friendly fishing methods should be developed in cooperation with marine biologists, environmental experts and fisheries sector representatives.

As a result, a detailed study and regulation is required regarding the depth limits of purse seine fishing in Turkey, its impacts on the marine ecosystem and its reflections on the fishing sector. With the participation of scientific research and sector representatives, a more sustainable marine fishing policy can be established and the marine ecosystem can be protected in the long term.

Key words: Marine fishing, purse seine fishing, fishing depth



PERCEPCIÓN UNIVERSITARIA SOBRE LAS EMPRESAS SOCIALMENTE RESPONSABLES

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RESUMEN

Responsabilidad Social Empresarial (RSE) abarca tanto organizaciones públicas como privadas, y esta responsabilidad social está relacionada a las dimensiones económica, legal, ética y filantropía. Para determinar que percepción tienen universitarios sobre las empresas que ostentan ser RSE, se aplicó una encuesta donde se hicieron preguntas sociodemográficas y se midieron las dimensiones ya mencionadas, logrando un total de 134 respuestas. El resultado fue que para los encuestados es muy importante que las empresas RSE deben “controlar de forma estricta sus costos de producción” (dimensión económica); también que “deben asegurarse de que sus empleados actúen dentro de los estándares definidos por la ley” y “las empresas RSE cumplan con sus obligaciones contractuales” (dimensión legal); asimismo deben “comprometerse con principios éticos bien definidos” (dimensión ética); sin embargo con la dimensión filantrópica consideran que son funciones propias del gobierno y ellas solo apoyar, como “ayudar a resolver problemas sociales” y “participar en la gestión de los asuntos públicos”.

Palabras clave. Responsabilidad Empresarial. Responsabilidad Legal. Responsabilidad Económica. Responsabilidad Ética.



EFFECT OF TDF LENGTHS ON GAIN AND NOISE FIGURE OF TWO-STAGE FOUR-PASS TDFA

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ABSTRACT

Many technological developments such as 5G, Artificial Intelligence, Machine Learning, Virtual Reality, Digital Transformation and the Internet of Things (IoT) have begun to take their place in our lives. These new technologies connect more people and things than ever before. Optical amplifiers have a great impact on the change and development of this infrastructure. The optical amplifier used in the C and L-bands, which are the most used communication bands, are Erbium-Doped Fiber Amplifiers (EDFA). Since these communication bands are expected to be insufficient in time, alternative band researches are carried out. These studies mostly focused on the S-band adjacent to the C-band. Thulium Doped Fiber Amplifiers (TDFA), which can achieve high gain in the S-band, are a good alternative to EDFA.

In order to increase the performance of optical amplifiers, studies based on the optimization of TDF length, ion density, pump power have been carried out. Another method is to use multistage designs. When the literature is examined, it will be seen that while there are multi-stage EDFA studies, no such studies on TDFA. Our team conducted a further study on the single pass (SP), double pass (DP), and triple pass (TP) TDFA designs and compared all. This study used Two-Stage Four-Pass TDFA (TS FP TDFA) in the S-band for the first time in the literature. With TS FP TDFA, the gain values increased without changing the stable band gap. It seems suitable for achieving higher gain over wider stable bandwidths.

In this study, the lengths of the TDFs in TS FP TDFA were optimized by varying between 1 and 10 m. 54,80 dB gain was obtained in the most efficient TDF length couples. The repeater distance can be increased in new-generation long-distance fiber optic communication systems by using TS FP TDFA, which can achieve high gain.

Keywords: two-stage, four-pass, TDFA

INTRODUCTION

Technological developments such as 5G networks, virtual reality, Robotic Process Automation (RPA), blockchain and internet of things require serious infrastructure changes in existing telecommunication networks. Next-generation technologies require not only infrastructure renewal of the network but also speed and capacity increase. Since fiber optic communication systems are of great importance in meeting all these needs, studies on these systems have increased recently. Work is mostly on optical amplifiers that can provide greater bandwidth in wavelength division multiplexing (WDM) transmission systems. [1-4]. Erbium-doped fiber amplifiers (EDFA) are the most commonly used ones that can achieve high efficiency in the C band and L band [5-7]. On the other hand, thulium-doped fiber amplifiers (TDFA) with good gain in S-band seem to be a good alternative to EDFAs [8,9]. There are some studies done by changing basic parameters such as TDF length, pumping power, and thulium ion



density to obtain a good gain and low noise factor in TDFA [10-13]. Another working method for the same purpose is multi-pass designs. Two-stage designs and distributed pumping techniques have been implemented to excite all thulium ions [14]. Some studies show that gain values can be increased with the help of a mirror or circulator. The output signal is passed through the amplifier again by being reflected from a mirror or rerouted by a circulator [14-17].

When the literature is examined, it is seen that various studies have been conducted on multi-pass EDFA in the C and L bands [18-21]. However, the number of multi-pass studies on TDFA is very few.

In this study, the effects of TDF1 and TDF2 lengths on gain and the noise figure for TS FP TDFA were investigated. At the end of the research, the most efficient lengths for TDF1 and TDF2 will be determined.

In the first part, the theoretical analysis of TDFA is made. In the second part, the TS FP TDFA design and TDFA parameters used in simulations are shared. The following section shares the spectrum of the gain and noise figure graphs obtained from the simulation results and discusses the most efficient lengths in the last section.

THEORETICAL ANALYSIS OF TDFA

In TDFAs, the gain depends on the ion density and reverse deposition of thulium ions at different energy levels [13]. Figure 1 shows the energy levels of thulium ions in silica fiber [22]. The energy levels 0, 1, 2, 3, 5 are respectively named as 3H_6 , 3F_4 , 3H_5 , 3H_4 , 1G_4 .

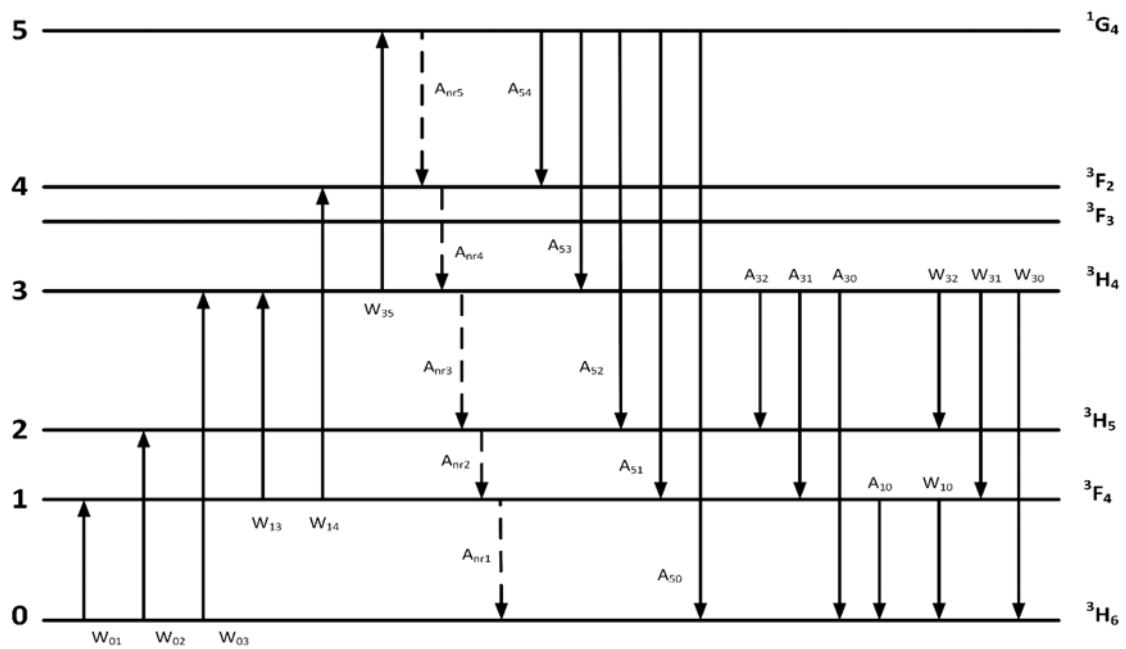


Figure 1: Detailed energy diagram of thulium ions.

The value equation of the different energy levels of thulium was proposed by P. Peterka et al. as follows [13]:

$$\frac{dN_2}{dt} = N_0(W_{01} + W_{02}) - N_1(W_{10} + W_{13} + W_{14} + A_1^{nr} + A_{10}^r) + N_3(W_{31} + W_{32} + A_3^{nr} + A_{32}^r + A_{31}^r) + N_5(A_{51}^r + A_{52}^r) \quad (1)$$



$$\frac{dN_3}{dt} = N_0(W_{03}) + N_1(W_{13} + W_{14}) - N_5(A_5^{nr} + A_{52}^r + A_{53}^r) - N_3(W_{35} + W_{32} + W_{31} + W_{30} + A_3^{nr} + \sum_{j=0}^2 A_{3j}^r) \quad (2)$$

$$\frac{dN_5}{dt} = N_0(W_{05}) + N_3W_{35} - N_5(W_{50} + A_5^{nr} + \sum_{j=0}^4 A_{5j}^r) \quad (3)$$

$$N_t = N_0 + N_1 + N_3 + N_5 \quad (4)$$

Where, the N_0, N_1, N_3, N_5 values represent the population density of 3H6, 3F4, 3H4, 1G4 levels, respectively. N_i and W_{ij} variables are functions of r, ϕ, z positions. Considering that the thulium ions are homogeneously excited in the fiber cross-section, the transition value expression describing the electromagnetic interaction of the ions can be written as in Equation W_{ij} (5) [22].

$$W_{ij}(z) = \int_0^\infty \lambda \Gamma(\lambda) \sigma_{ij}(\lambda) \frac{(P_\lambda^+(z, \lambda) + P_\lambda^-(z, \lambda))}{hc\pi b^2} d\lambda \quad (5)$$

Where σ_{ij} is the relevant cross section, h is the Plank constant, c is the speed of light, P_λ^+ and P_λ^- is the spectral power density of the positive and negative diffuse emission of the fiber axis. $\Gamma(\lambda)$ is the overlap factor and is defined by equation (6) [22].

$$\Gamma(\lambda) = \frac{\int_0^\infty |E(r, \phi, \lambda)|^2 N(r) r dr}{N_t \int_0^\infty |E(r, \phi, \lambda)|^2 r dr} \quad (6)$$

For flexibility in choosing the number of pumps and wavelength, the same equation (7) is defined for the propagation of each forward segment of the wave [22].

$$\begin{aligned} \frac{dP^+(\lambda)}{dz} = & \Gamma(\lambda) P^+(\lambda) \sum_{ij \in \{10,30,31,50,32\}} (N_i \sigma_{ij}(\lambda) - N_j \sigma_{ji}(\lambda)) - \Gamma(\lambda) P^+(\lambda) (N_0 \sigma_{02}(\lambda) + N_1 \sigma_{14}(\lambda) + N_3 \sigma_{35}(\lambda)) + \\ & \Gamma(\lambda) \sum_{ij \in \{10,30,31,50,32\}} 2h\nu_{ij} \Delta\nu N_i \sigma_{ij}(\lambda) - \alpha(\lambda) P^+(\lambda) \end{aligned} \quad (7)$$

At certain boundary states of $z=0$ and $z=L$, the problem is reduced to steady state when the time derivatives $\frac{dN_1}{dt}, \frac{dN_2}{dt}, \frac{dN_3}{dt}$ are set to zero. L is the length of the fiber amplifier. To obtain the gain characteristic of TDFA, the equation is completed over space and frequency.

TWO-STAGE FOUR-PASS TDFA DESIGN

As seen in Figure 2, two TDFs, two Pump Couplers, two Optical Circulator and two Mirror are used in TS FP TDFA. The input signal at 1469 wavelength with -40 dBm power is used. The pump is selected with a power of 1800 mW (800 +1000 mW) in the 1050 nm band. TDF 1 and TDF 2 fiber lengths were changed to 1-10 m, respectively. The design is simulated in Optiwave 21.0 software. Parameter values in Table 1 are used in the simulation.

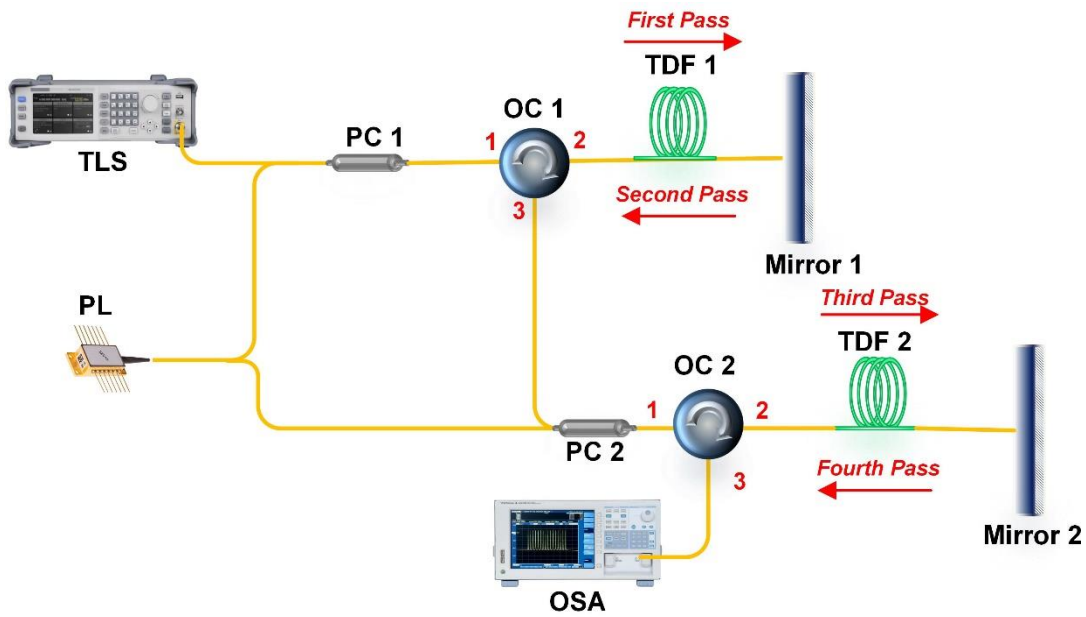


Figure 2: TS FP TDEFA Design

Parameters	Values	Parameters	Values
Numerical aperture	1	Pump power	1800 <i>mW</i>
Core radius	1.3 μm	Non-radiant ion lifetime 1	430 x 10 ⁻⁶ <i>s</i>
Doping radius	0.8 μm	Non-radiant ion lifetime 2	45 x 10 ⁻⁶ <i>s</i>
Thulium ion density	20e+024 <i>m</i> ⁻³	Non-radiant ion lifetime 3	784 x 10 ⁻⁶ <i>s</i>
Ar10	285.7 (<i>I/s</i>)	Ar32	46.153 (<i>I/s</i>)
Ar30	1353.85 (<i>I/s</i>)	Ar50	581.4 (<i>I/s</i>)
Ar31	138.46 (<i>I/s</i>)		

Table 1: The parameters are used in the simulations

SIMULATION RESULTS

The gain and noise figure graphics were evaluated separately. Then, the most efficient fiber lengths were determined by examining the graphics.

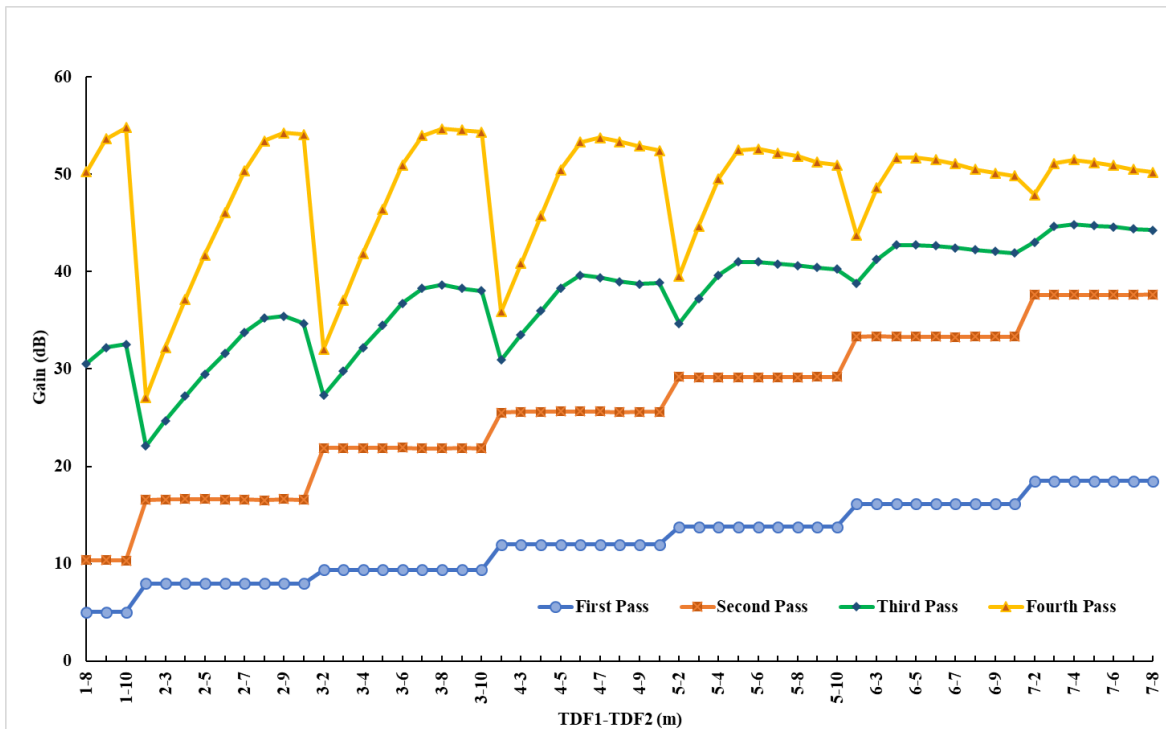


Figure 3: Gain versus TDF 1 – TDF2 lengths of TS FP TDFA

As seen in Figure 3, as the length of TDF 1 increases in the first pass and the second pass, the gain obtained increases accordingly. In the third and fourth pass, the gain values decrease as the TDF 1 length increases. The first two passes are independent of the length of the TDF 2. Therefore, the increase in TDF 2 does not affect the gain at the end of these first two passes. In the third and fourth pass, it is seen that the gains increase with the length of TDF 2. Considering the total gain after four passes, choosing TDF 1 as low as possible and TDF 2 as large as possible gives the highest values. The fiber couples that give the highest gain in the fourth pass are 1-10 m, 2-9 m and 3-8 m long.

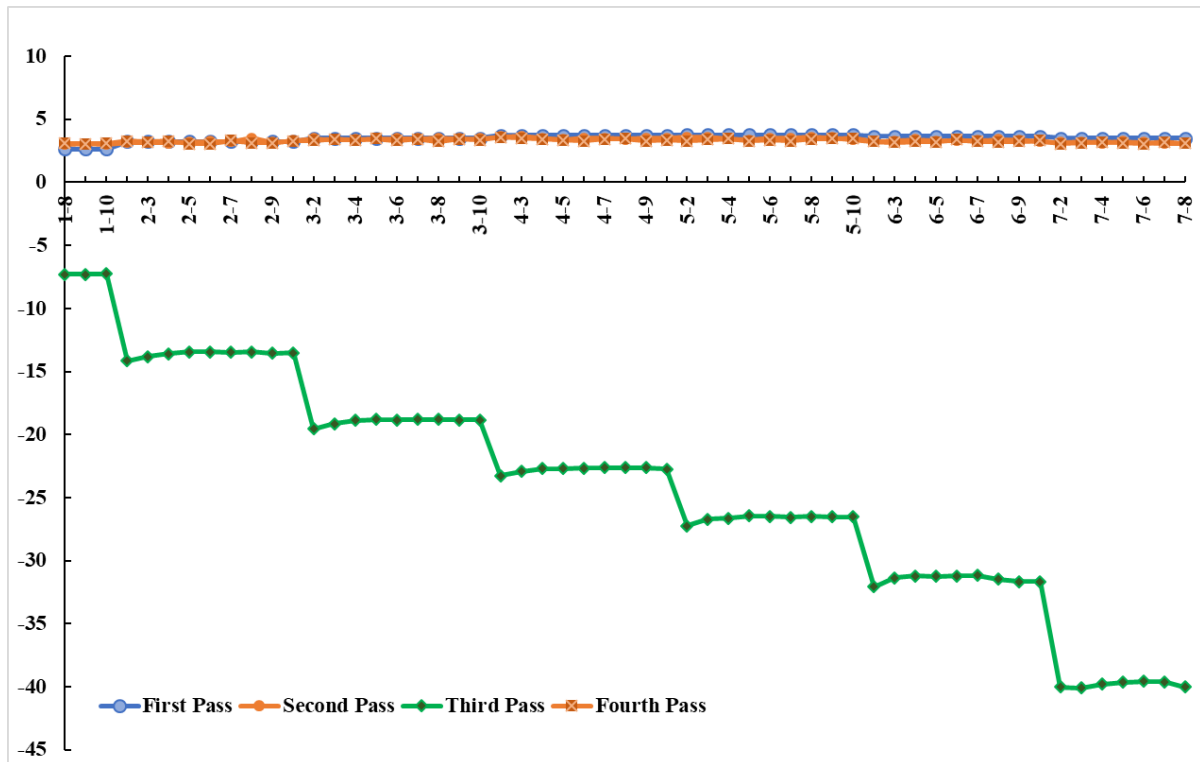


Figure 4: Noise Figure versus TDF 1 – TDF2 lengths of TS FP TDFA

In Figure 4, first, second and third pass noise values are approximately the same for all fiber length possibilities. However, the noise figure values obtained by re-amplifying the signal passing through the mirror are higher than the values in other passes. Noise figure values also increase in parallel with the increase in TDF 1 length. The second pumping increases not only the gain but also the noise values.

CONCLUSION

This study investigates how the TDF 1 and TDF 2 fiber lengths of TS FP TDFA, which can be obtained with high gain in the S-band, affect the gain and noise figure. At the end of the research, the most efficient lengths for TDF1 and TDF2 were determined. When the TDF1-TDF 2 pair is selected in 1-10 m, 2-9 m and 3-8 m lengths, the highest gain will be obtained, while the noise values are not change so much.

When TDF1-TDF 2 pair 1-10 m is selected, the third pass gain is 54.80 dB and the noise figure is 3.10 dB. When TDF1-TDF2 pair 2-9 m is selected, the third pass gain is 54.27 dB and the noise figure is 3.13 dB. When the TDF1-TDF2 pair is selected 3-8 m, the third pass gain is 54.67 dB and the noise figure is 3.23 dB. Accordingly, the pair that gives the highest gain and the lowest noise figure value is 1-10 m.

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EFFECT OF INPUT POWER AND PUMP POWERS ON GAIN AND NOISE FIGURE OF TWO-STAGE FOUR-PASS TDFA

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ABSTRACT

Increasing demands with new generation technologies such as the Internet of Things (IoT), Robotic Process Automation (RPA), 5G networks, Blockchain and Virtual Reality bring radical changes in communication systems infrastructures. Optical amplifiers are of great importance in this infrastructure change and development. The optical amplifier used in the C and L-bands, which are the most used communication bands, are Erbium-Doped Fiber Amplifiers (EDFA). Since these communication bands are expected to be insufficient in time, alternative band researches are carried out. These studies mostly focused on the S-band adjacent to the C-band. Thulium Doped Fiber Amplifiers (TDFA), which can achieve high gain in the S-band, are a good alternative to EDFA.

When the literature is examined, it will be seen that studies based on optimization of the TDF length, ion density and pump power of optical amplifiers have been carried out to increase performance. It is also possible to use multi-stage designs. Although there are multi-stage EDFA studies, there is no multi-stage TDFA study. Our team conducted a further study on the single pass (SP), double pass (DP), and triple pass (TP) TDFA designs and compared all. This study used Two-Stage Four-Pass TDFA (TS FP TDFA) in the S-band for the first time in the literature. With TS FP TDFA, the gain values increased without changing the stable band gap. It seems suitable for achieving higher gain over wider stable bandwidths.

In this study, the optimum input power was determined by varying the input signal power between -20 dBm and -50 dBm in the TS FP TDFA design. In the same design, the most efficient pump power pair was determined by changing the pump powers between 200-1000 mW. With TS TP TDFA, which can provide high gain using the obtained values, the repeater distance can be increased in new generation long distance fiber optic communication systems.

Keywords: two-stage, four-pass, TDFA

INTRODUCTION

With new applications brought by technological developments such as 5G, artificial intelligence, machine learning, virtual reality, digital transformation and the internet of things, data traffic and the number of devices connected to the system are increasing day by day. These new generation technologies require not only the renewal of the network infrastructure but also the increase in speed and capacity. In order to respond to this increasing demand, new infrastructure systems that can adapt to new technologies are needed. Since fiber optic communication systems are of great importance in meeting all these needs, studies on these systems have increased recently. Work is mostly on optical amplifiers that can provide greater bandwidth in wavelength division multiplexing (WDM) transmission systems. [1-4]. Erbium-doped fiber amplifiers (EDFA) are the most commonly used ones that can achieve high efficiency in the C band and L band [5-7]. On the other hand, thulium-doped fiber



amplifiers (TDFA) with good gain in S-band seem to be a good alternative to EDFAs [8,9]. There are some studies done by changing basic parameters such as TDF length, pumping power, and thulium ion density to obtain a good gain and low noise factor in TDFA [10-13]. Another working method for the same purpose is multi-pass designs. Two-stage designs and distributed pumping techniques have been implemented to excite all thulium ions [14]. Some studies show that gain values can be increased with the help of a mirror or circulator. The output signal is passed through the amplifier again by being reflected from a mirror or rerouted by a circulator [14-17].

When the literature is examined, it is seen that various studies have been conducted on multi-pass EDFA in the C and L bands [18-21]. However, the number of multi-pass studies on TDFA is very few.

In this study, the effects of input power and pump power on gain and the noise figure for TS FP TDFA were investigated. At the end of the research, the most efficient values for input power and pump power will be determined.

In the first part, the theoretical analysis of TDFA is made. In the second part, the TS FP TDFA design and TDFA parameters used in simulations are shared. The following section shares the spectrum of the gain and noise figure graphs obtained from the simulation results and discusses the most efficient values in the last section.

THEORETICAL ANALYSIS OF TDFA

In TDFAs, the gain depends on the ion density and reverse deposition of thulium ions at different energy levels [13]. Figure 1 shows the energy levels of thulium ions in silica fiber [22]. The energy levels 0, 1, 2, 3, 5 are respectively named as 3H_6 , 3F_4 , 3H_5 , 3H_4 , 1G_4 .

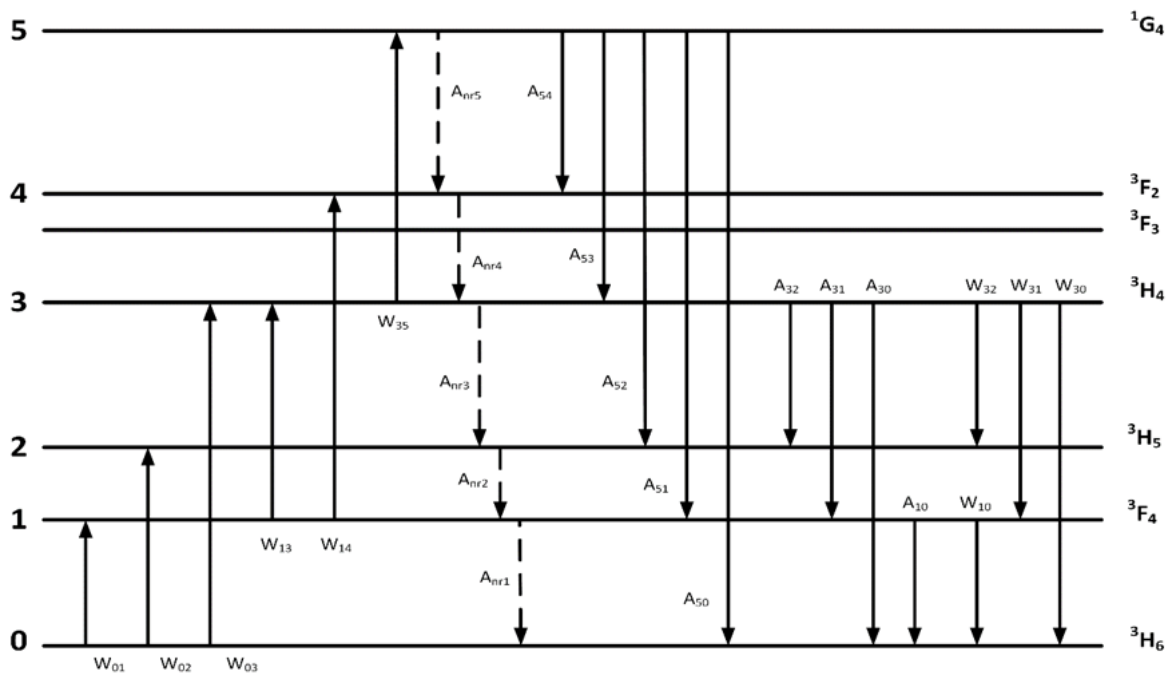


Figure 1: Detailed energy diagram of thulium ions.

The value equation of the different energy levels of thulium was proposed by P. Peterka et al. as follows [13]:

$$\frac{dN_2}{dt} = N_0(W_{01} + W_{02}) - N_1(W_{10} + W_{13} + W_{14} + A_{11}^{nr} + A_{10}^r) + N_3(W_{31} + W_{32} + A_{31}^{nr} + A_{32}^r + A_{31}^r) + N_5(A_{51}^r + A_{52}^r) \quad (1)$$



$$\frac{dN_3}{dt} = N_0(W_{03}) + N_1(W_{13} + W_{14}) - N_5(A_5^{nr} + A_{52}^r + A_{53}^r) - N_3(W_{35} + W_{32} + W_{31} + W_{30} + A_3^{nr} + \sum_{j=0}^2 A_{3j}^r) \quad (2)$$

$$\frac{dN_5}{dt} = N_0(W_{05}) + N_3W_{35} - N_5(W_{50} + A_5^{nr} + \sum_{j=0}^4 A_{5j}^r) \quad (3)$$

$$N_t = N_0 + N_1 + N_3 + N_5 \quad (4)$$

Where, the N_0, N_1, N_3, N_5 values represent the population density of 3H6, 3F4, 3H4, 1G4 levels, respectively. N_i and W_{ij} variables are functions of r, ϕ, z positions. Considering that the thulium ions are homogeneously excited in the fiber cross-section, the transition value expression describing the electromagnetic interaction of the ions can be written as in Equation W_{ij} (5) [22].

$$W_{ij}(z) = \int_0^\infty \lambda \Gamma(\lambda) \sigma_{ij}(\lambda) \frac{(P_\lambda^+(z, \lambda) + P_\lambda^-(z, \lambda))}{hc\pi b^2} d\lambda \quad (5)$$

Where σ_{ij} is the relevant cross section, h is the Plank constant, c is the speed of light, P_λ^+ and P_λ^- is the spectral power density of the positive and negative diffuse emission of the fiber axis. $\Gamma(\lambda)$ is the overlap factor and is defined by equation (6) [22].

$$\Gamma(\lambda) = \frac{\int_0^\infty |E(r, \phi, \lambda)|^2 N(r) r dr}{N_t \int_0^\infty |E(r, \phi, \lambda)|^2 r dr} \quad (6)$$

For flexibility in choosing the number of pumps and wavelength, the same equation (7) is defined for the propagation of each forward segment of the wave [22].

$$\begin{aligned} \frac{dP^+(\lambda)}{dz} = & \Gamma(\lambda) P^+(\lambda) \sum_{ij \in \{10,30,31,50,32\}} (N_i \sigma_{ij}(\lambda) - \\ & N_j \sigma_{ji}(\lambda)) - \Gamma(\lambda) P^+(\lambda) (N_0 \sigma_{02}(\lambda) + N_1 \sigma_{14}(\lambda) + N_3 \sigma_{35}(\lambda)) + \\ & \Gamma(\lambda) \sum_{ij \in \{10,30,31,50,32\}} 2h\nu_{ij} \Delta\nu N_i \sigma_{ij}(\lambda) - \alpha(\lambda) P^+(\lambda) \end{aligned} \quad (7)$$

At certain boundary states of $z=0$ and $z=L$, the problem is reduced to steady state when the time derivatives $\frac{dN_1}{dt}, \frac{dN_2}{dt}, \frac{dN_3}{dt}$ are set to zero. L is the length of the fiber amplifier. To obtain the gain characteristic of TDFA, the equation is completed over space and frequency.

TWO-STAGE FOUR-PASS TDFA DESIGN

In the amplifier design shown in Figure 2, signals of different powers (-20, -30, -40 and -50 dBm) in the range of 1444-1514 nm were amplified by pumping with a pump couple at a wavelength of 1050 nm. In the first case, the power of both pumps is taken as 1000 mW and the length of both fibers is 5 m. In the second case, the pump powers were changed between 200 mW and 1000 mW and the pair that gave the highest gain and lowest noise figure values was determined. The input signal at 1469 nm wavelength and the length of both fibers is 5 m, again. TS FP TDFA was simulated in Optiwave 21.0 software

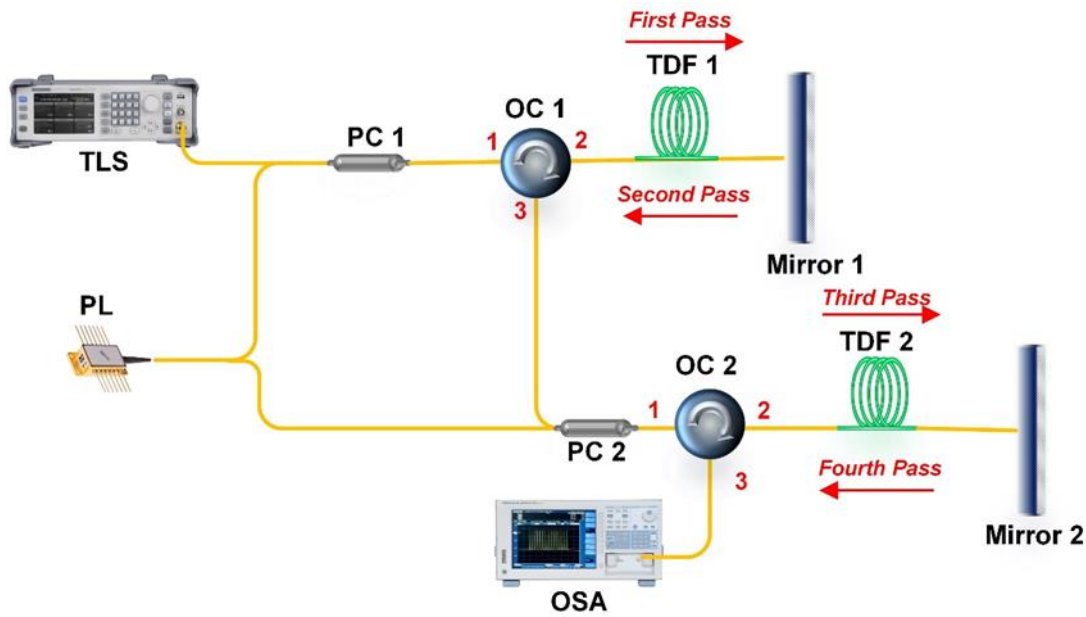


Figure 2: TS FP TDEFA Design

Parameter values in Table 1 are used in the simulation.

Parameters	Values	Parameters	Values
Numerical aperture	1	TDF1-TDF2	5 m-5 m
Core radius	1.3 μm	Non-radiant ion lifetime 1	430 x 10^{-6} s
Doping radius	0.8 μm	Non-radiant ion lifetime 2	45 x 10^{-6} s
Thulium ion density	20e+024 m^{-3}	Non-radiant ion lifetime 3	784 x 10^{-6} s
Ar10	285.7 (1/s)	Ar32	46.153 (1/s)
Ar30	1353.85 (1/s)	Ar50	581.4 (1/s)
Ar31	138.46 (1/s)		

Table 1: The parameters are used in the simulations

SIMULATION RESULTS

The gain and noise figure graphics were evaluated separately. In the first case, the most efficient input power was determined by examining the graphics.

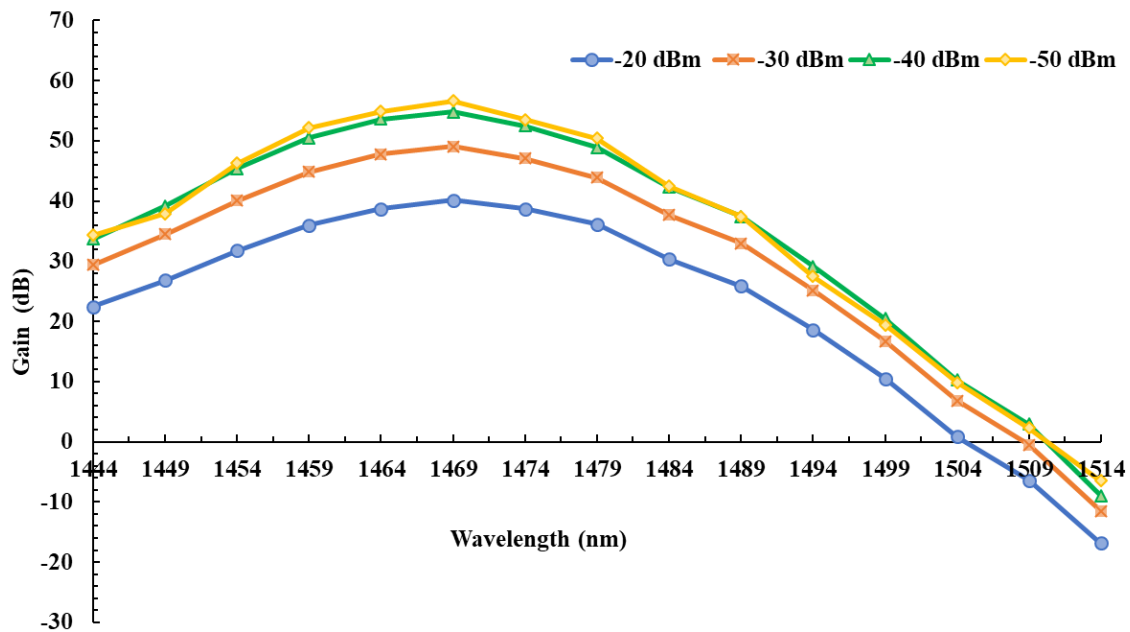


Figure 3: Gain versus Input Powers of TS FP TDFA

As seen in Figure 3, while gain values increased up to -40 dBm, the change was at very low levels after this value. The appropriate input power for this device is -40 dBm.

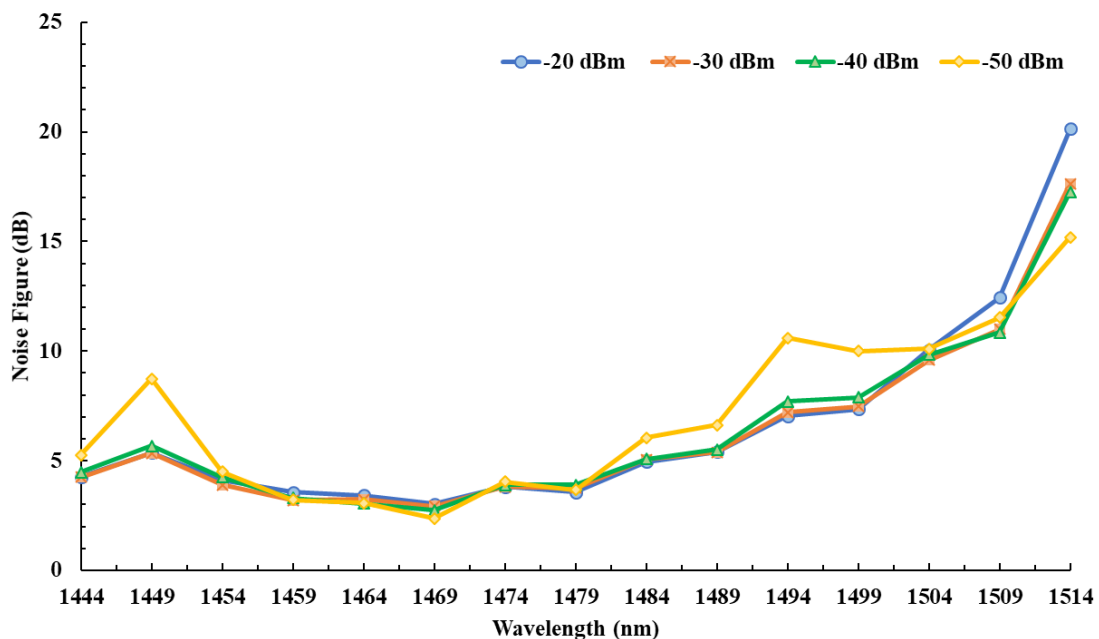


Figure 4: Noise Figure versus Input Powers of TS FP TDFA

According to the noise figure graph in Figure 4, noise values are approximately close to each other. Noise figure values for -50 dBm input power are higher than others.

In the second case, the effect of pump power change on gain and noise figure was examined. The first pump affects the first two passes more. Looking at the graphic data in Figure 5, if the first two passes are examined, a saturation of 800 mW will be seen for the first pump. Therefore, 800 mW power can be considered the most appropriate value for the first pump.

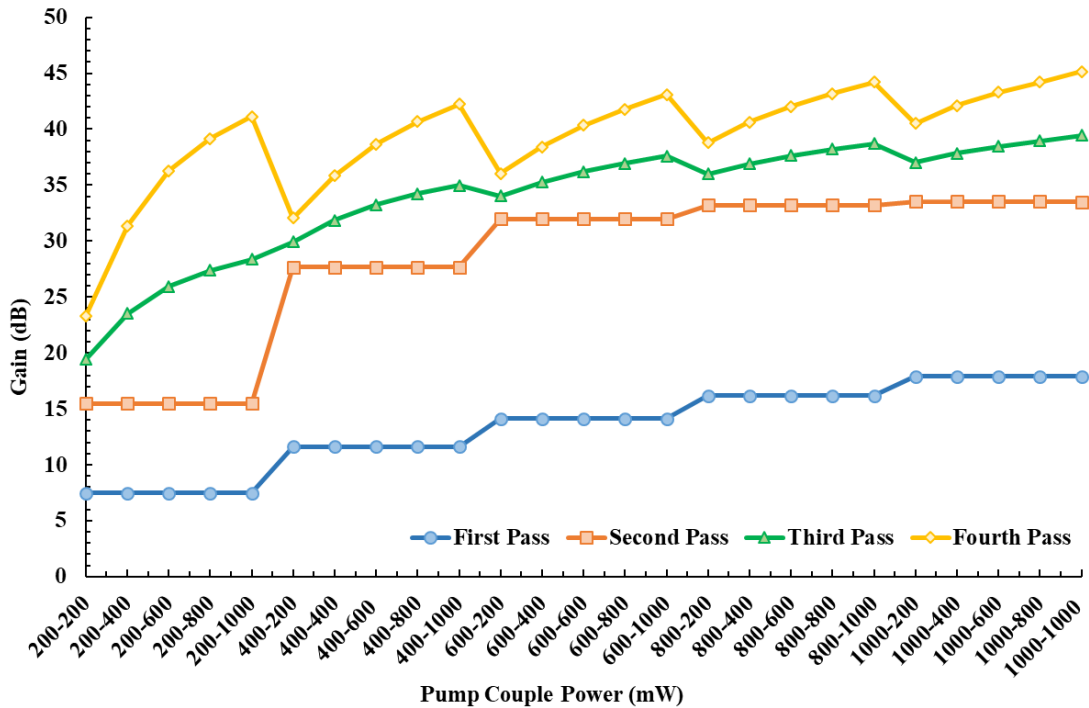


Figure 5: Gain versus Pump Powers of TS FP TDFA

When the third and fourth passes are examined, it will be seen that the gain values increase as the second pump power increases. Therefore, the power that gives the highest gain value in the second pump is 1000 mW.

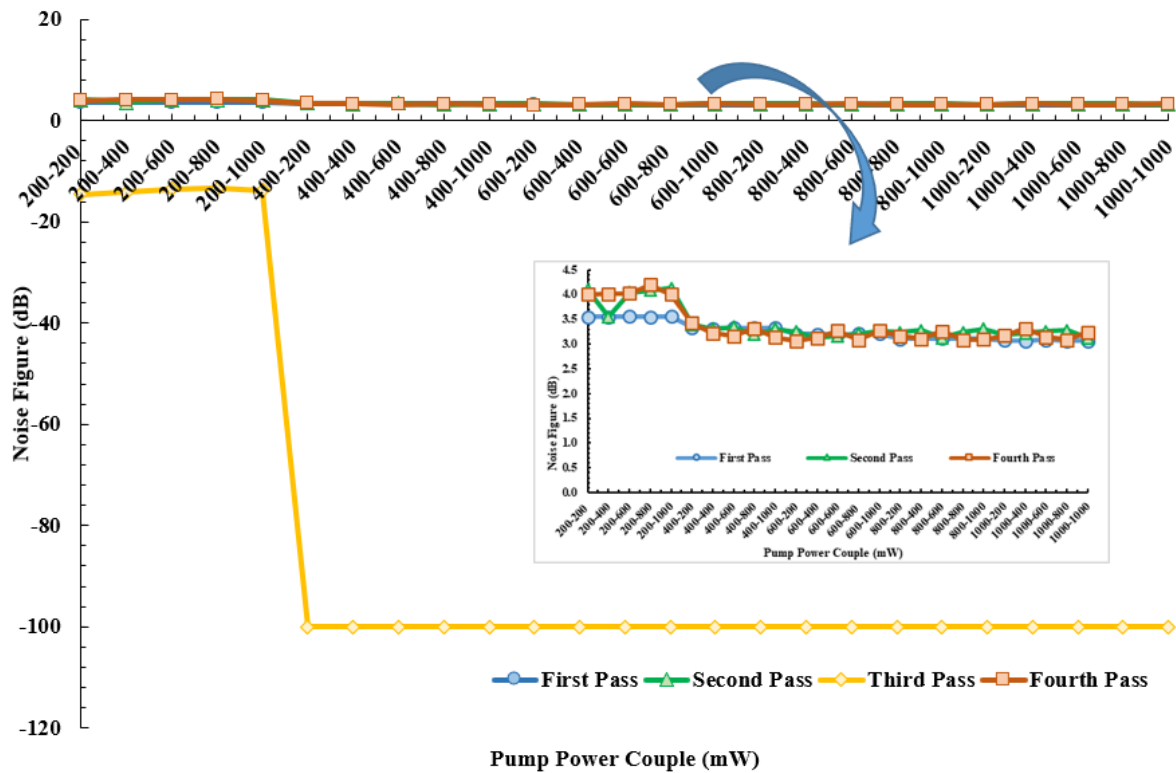


Figure 6: Noise Figure versus Pump Powers of TS FP TDFA



Figure 6 shows the input power-noise figure change graph. When the graph is examined, it can be seen that the noise figure values in the first, second and fourth pass are close to each other. In the third pass, it is seen that the values resulting from the second pumping increase considerably. Additional pumping in multi-pass systems has such effects.

CONCLUSION

This study investigates how the input power and pump power of TS FP TDFA, which can be obtained with high gain in the S-band, affect the gain and noise figure. At the end of the research, the most efficient input power and the most efficient pump power couple were determined. When the input power is selected -40 dBm and the pump power couple is selected 800-1000 mW, the highest gain will be obtained, while the noise values of fourth-pass are not change so much.

When the signal with -40 dBm input power is pumped with an 800-1000 mW pump pair, the maximum power obtained is 44.80 dB and the noise figure value is around 3.5 dB for the fourth pass.

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KANALDAKİ ÜÇLÜ JET AKIŞININ FARKLI MODEL ŞEKİLLERİNE SAHİP YÜZEYLERDEKİ ISI TRANSFERİNE OLAN ETKİSİNİN İNCELENMESİ

EXAMINATION OF THE EFFECT OF TRIPLE JET FLOW IN THE DUCT ON HEAT TRANSFER ON FACETS WITH DISTINCT MODEL SHAPES

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ÖZET

Çarpan jet tekniği ile ısı transferi, elektronik sistemlerde fazla ısı üreten cihaz ve ekipmanların soğutulmasında kullanılan yüksek ısı transferi karakteristiğine sahip gelişmiş bir soğutma teknolojisidir. Soğutma işleminin çarpan jet tekniği kullanılarak gerçekleştirilmesiyle yüksek ısı üretim kapasiteli cihazlardan daha fazla ısının transferi olanaklı hale gelmektedir. Çalışmada, $1,25D_h$ jet giriş genişlikli kanallardaki yarım kare ve yarım daire modellenmiş yüzeylerden olan ısı transferi ve akış yapısı üçlü hava jeti akışı kullanılarak araştırılmıştır. Araştırmalar, sayısal olarak zamandan bağımsız ve üç boyutlu $k-\epsilon$ türbülans modeli kullanılarak Ansys-Fluent bilgisayar programıyla gerçekleştirilmiştir. Kanal yüzeyleri adyabatik olup yalnızca model yüzeylerinde sabit 1000 W/m^2 lik ısı akısı bulunmaktadır. İncelenen jet Re sayısı aralığı 4000-10000 iken; jet-plaka arası uzaklığı 3, 6 ve $10D_h$ 'dir. Kanal boyutlarına uygun olarak her iki kanalda yedi adet farklı model yüzeyleri bulunmaktadır. Çalışmanın sonuçları literatürde bulunan çalışmanın sayısal ve deneysel çıktılarıyla kıyaslanmış ve uyumlu oldukları belirlenmiştir. Sonuçlar, her bir model yüzeyi için ortalama Nu sayısı ve yüzey sıcaklığının değişimi şeklinde verilmiştir. Farklı Re sayıları ve H/D_h oranlarında model yüzeyleri için kanal boyunca jet akışın hız-akım ve sıcaklık konturu dağılımları değerlendirilmiştir. $Re=10000$ ve $H/D_h=3$ için yarım daire modellenmiş yüzeyin Nu_o sayısının yarım kare modellenmiş yüzeyden %33,66 daha yüksek olduğu belirlenmiştir. Ayrıca, $Re=8000$ için $H/D_h=3$ ' den 6' ya çıkarıldığında yedinci sıradaki model yüzeyinde sırasıyla yarım kare ve yarım daire modeller için ortalama Nu sayılarında %41,89 ve %45,18' lik azalışlar elde edilmiştir.

Anahtar Kelimeler: Üçlü hava jeti, Model yüzeyi, Soğutma

ABSTRACT

Heat transfer with the impinging jet technique is an advanced cooling technology with high heat transfer characteristics used in cooling devices and equipment that produce excess heat in electronic systems. By performing the cooling process using the impinging jet technique, it becomes possible to transfer more heat from devices with high heat production capacity. In the study, heat transfer and flow structure from semi-square and semi-circular model surfaces in channels with $1.25D_h$ jet inlet width were investigated using triple air jet flow. The research was performed numerically with the Ansys-Fluent computer program using a steady, three-dimensional, and $k-\epsilon$ turbulence model. The channel surfaces are adiabatic and there is a constant heat flux of 1000 W/m^2 only on the model surfaces. While the jet Re number range examined was 4000-10000, the distance between the jet and the plate is 3, 6, and $10D_h$. There are seven different model surfaces in both channels, by the channel dimensions. The results of the study were compared with the numerical and experimental outputs of the study in the literature and were determined to be compatible. The results were given as the mean Nu number and variation of surface temperature for each model surface. Velocity-flow and temperature contour distributions of the jet flow



along the channel were evaluated for model surfaces with different Re numbers and H/D_h ratios. For Re=10000 and H/D_h=3, it was determined that the mean Nu number of the surface with the semi-circular model was 33.66% higher than that of the semi-square model. In addition, when H/D_h = 3 to 6 is increased for Re = 8000, decreases of 41.89% and 45.18% in the mean Nu numbers were obtained for the semi-square and semi-circular models, respectively, on the seventh-row model surface.

Keywords: Triple Air Jet, Model Surface, Cooling

1. Giriş

Günümüzde, küresel iklim değişikliğinin ortaya çıkardığı sonuçlara bağlı olarak enerjiyle ilgili bilim dallarında çalışan mühendisler enerji tüketimi daha az olan ve verimliliği yüksek cihazların geliştirilmesi üzerine daha fazla araştırma ve geliştirme yapma gayreti içerisindeyler. Böylece, yüksek teknoloji ürünlerinde karşılaşılan en büyük problemlerden biri olan ısınma ve bunun sonucunda güvenilir sıcaklık sınırlarını aşma problemiyle karşılaşma olasılığı da azalmaktadır. Çarpan jet tekniği ile ısı transferi, elektronik sistemlerde fazla ısı üreten cihaz ve ekipmanların soğutulmasında kullanılan yüksek ısı transferi karakteristiğine sahip gelişmiş bir soğutma teknolojisidir (Narumanchi ve ark., 2003; Kercher ve ark., 2003). Soğutma işleminin çarpan jet tekniği kullanılarak gerçekleştirilmesiyle yüksek ısı üretim kapasiteli cihazlardan daha fazla ısının transferi olanaklı hale gelmektedir (Babic ve ark., 2003).

Literatürde çarpan jet ile ısı transferi hakkında çeşitli çalışmalar bulunmakla birlikte; yapılan çalışmaların birinde Arguis ve ark. (2007) laminer hava jeti akışına sahip bir kanalda ısıtılmış bloklardan olan ısı transferini incelemişler ve bunun için jet Re sayısı, kanal yüksekliği, jet giriş genişliği, soğutma plakaları arasındaki mesafe, plakaların yüksekliği ve ısı transfer katsayılarının etkisini değerlendirmişlerdir. Sonuç olarak, genel itibarıyla kanal yüksekliğinin azalması ve Re sayısının artmasıyla blokların etkili bir şekilde soğutulmasının mümkün olduğunu belirlemişlerdir. Karabulut ve Alnak (2021) çatı ve ters yamuk olarak iki farklı modele sahip yüzeylerden olan ısı transferini farklı jet giriş genişliklerinde bir tek hava jeti akışı kullanarak incelemişlerdir. Çalışma, Re sayısının 5000-11000 değerlerinde ve jet-plaka arası uzaklığın 3 ve 6 oranlarında yapılmıştır. 0,5D_h jet giriş genişliğinde, H/D_h=6 iken Re=5000 için ortalama Nu sayısının çatı desenli yüzey için ters yamuk desenli yüzeyden %25,92 daha yüksek olduğu belirlenmiştir. Zou ve ark. (2022) deneylerinde ve sayısal hesaplamalarında hava soğutma sürecinde ısı transferi ve gaz akışını incelemek için yüksek hızlı sıkıştırılmış hava çarpmasını kullanmışlardır. Numune çapının ve jet mesafesinin (jetten soğutma yüzeyine olan mesafe) akış modeli ve sıcaklık alanları üzerindeki etkisini incelemişlerdir. Barbosa ve ark. (2023) sınırlandırılmış ve çevrelendirilmiş çoklu hava jeti çarpmasının ayrıntılı bir analizini gerçekleştirmişlerdir. Bu amaçla, çoklu hava jeti çarpma sistemlerindeki jetin akış dinamikleri ve ısı transfer karakteristiklerinin bir incelemesi sunmuşlardır. Ayrıca, bu çalışmada taşınım ısı transfer sürecini etkileyen yüzey tasarımı ve hareketi, jet eğimi ve yüksek jet sıcaklığı gibi parametreler incelenmiştir. Sonuç olarak, tekli ve çoklu jet çarpmasının ısı transferini karakterize etmek için ortalama Nu sayısı ile ilgili bağıntılar özetlenmiştir. Radmard ve ark. (2021) su jeti çarpmasına maruz kalan çipe bağlı bir mikro iğne kanatlı soğutma cihazından ısı transferini araştırmıştır. Bu amaçla, iğne kanat kesiti, kanatlık aralığı ve kanat yükseklik profili gibi tasarım parametrelerinin davranış parametreleri üzerindeki etkisi, hesaplamalı akışkanlar dinamiği (HAD) ve tam faktöriyel deney tasarımı (FFD) kullanılarak incelenmiştir. Genel analiz, optimize edilmiş soğutma cihazının termal ve hidrolik performansta ilk çalışma tasarımını geçebileceğini göstermiştir. Rathore ve Verma (2022) Re sayısındaki ve kaydırma oranındaki (OR) değişimin türbülanslı akış ve eğik kaydırılmış jetlerin termal özellikleri üzerindeki etkileri hakkında sayısal çalışma yapmışlardır. Jet eğiklik açısı ve Reynolds sayısının daha yüksek olması durumunda, ısıtılmış çarpma duvarından akışkana ısı transferinin daha yoğun olduğunu elde etmişlerdir. Oluşturulan modellerin ısı kaynağı üzerine yerleştirilen dairesel, kare ve üçgen kanatların ısı transfer performansları $500 \leq Re \leq 10.000$ aralığında Koca ve Güder (2022) tarafından incelenmiştir. İncelenen modellerde ısı transferi açısından en iyi çalışma sonucunu Re = 5000 ile Re = 6500 arasında elde etmişlerdir. Bununla birlikte, en iyi ısı performansını dairesel kanatlı modelde ulaşımlardır.



Bu çalışmada, $a=1,25D_h$ jet giriş genişlikli kanallar içerisindeki yarım-kare ve yarım-daire modelli bakır plakalı yüzeylerin üç adet hava jeti akışıyla ısı transferinin sayısal araştırması yapılmıştır. İncelenen jet Re sayısı aralığı 4000-10000 iken; jet-plaka arası uzaklığı 3, 6 ve $10D_h$ 'dir. Elde edilen sonuçlar, yarım-kare ve yarım-daire olarak her bir model yüzeyi için ortalama Nu sayısının ve yüzey sıcaklığının değişimleri olarak incelenmiştir. Ayrıca, farklı H/D_h oranları ve modeller için kanal boyunca üçlü jet akışın sıcaklık ve hız-akım çizgisi konturu dağılımları model yüzeyleri için değerlendirilmiştir.

2. Sayısal Modelleme

Çalışmada, zorlanmış taşınım ısı transferinin çözümünde Ansys-Fluent programından yararlanılmıştır.

Gövde kuvvetinin bulunmadığı, zamandan bağımsız türbülanslı akış için zaman ortalamalı kütle, momentum ve enerjinin korunumu denklemlerinden türetilen kısmi türevli diferansiyel denklemlerin çözümüyle çalışmanın sonuçları elde edilmiştir (Wang ve Mujumdar, 2005).

Reynolds sayısı (Re) denklem (1) ile hesaplanmaktadır

$$Re_k = \frac{V_\infty D_h}{\nu} \quad (1)$$

Burada D_h , jet girişinin hidrolik çapıdır.

$$D_h = \frac{4A_c}{P} = \frac{4(a.W)}{2(a+W)} \quad (2)$$

Bu denklemde A_c ve P sırasıyla jet girişinin kesit alanı ve çevre uzunluklarıdır.

Ortalama ısı taşınım katsayısı

$$h_o = \frac{1}{L} \int_0^L h dx \quad (3)$$

Ortalama Nu sayısı

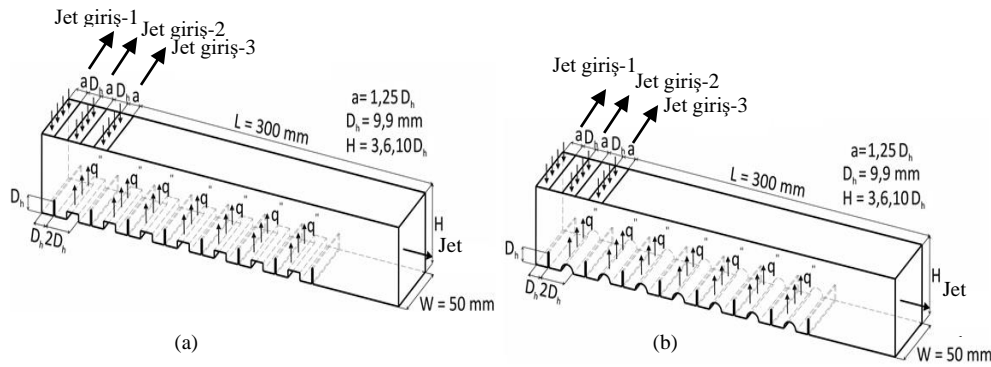
$$Nu_o = \frac{h_o D_h}{k} \quad (4)$$

Eşitlik (10) ve (11)' de h ve h_o sırasıyla noktasal ve ortalama ısı taşınım katsayılarını belirtmektedir.

3. Modellerin Tasarımı

Şekil 1’de incelenen model yüzeylerinin olduğu kanalların görünüşleri verilmektedir. Şekil 1 (a) ve (b)’de gösterilen yarım-kare ve yarım-daire modellerin şekilleri kanal sonuna kadar 50 mm’lik kanal genişliği boyunca devam etmektedir. Ayrıca, üçlü jet girişi Şekil 1’deki her iki kanal için de gösterilmiş olup; kanallarda yedişer adet desenli model yüzeyi bulunmaktadır.

Uniform hız profilli dikdörtgen jet püskürtücüsünün boyutları $4,95 \times 50 \text{ mm}$ ve $9,9 \times 50 \text{ mm}$ ölçülerindedir. Bununla birlikte, modellerin genişlik ve yükseklikleri $2D_h$ ve D_h ’dir. Bu çalışma için uygulanan kabuller ise şunlardır: a) üç boyutlu, sürekli ve türbülanslı akış mevcuttur, b) sıkıştırılmaz hava, jet akışkanı olarak kullanılmıştır, c) model yüzeylerine uygulanan ısı akısı sabit ve 1000 W/m^2 değerindedir, d) akışkanın ısıl özellikleri, 300 K sıcaklıkta sabit alınarak çözümlere ulaşılmıştır, e) akışkan ve model yüzeylerinde ısı üretimi bulunmamaktadır.

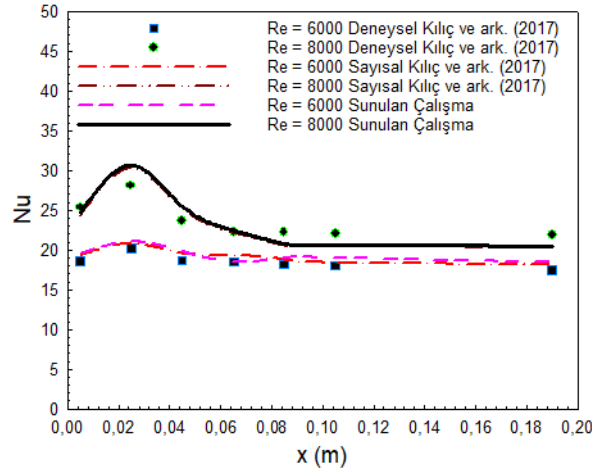


Şekil 1. Kanalların ve modellerin görünüşleri (a) yarım-kare model (b) yarım-daire model

4. Araştırma ve Bulgular

Kılıç ve ark. (2017)’nin gerçekleştirdikleri çalışmanın deneysel ve sayısal Nu sayısı sonuçları, $H/D_h=6$ ve $Re=6000$ ve 8000 ’de bu çalışmanın sayısal sonuçlarıyla kıyaslanmış ve ulaşılan sonuçlar Şekil 2’de verilmiştir. Buna göre, farklı Re sayılarında Kılıç ve ark. (2017)’nin deneysel sonuçlarıyla bu çalışmanın sayısal sonuçları arasındaki fark %3,99-%9,15 arasında değişirken; Kılıç ve ark. (2017)’nin sayısal sonuçları ile bu çalışma arasındaki sapma ise %1 dolaylarındadır. Buna göre, bu çalışmanın sayısal sonuçlarının kabul edilebilir doğrulukta olduğu sonucuna varılabilmektedir.

$H/D_h=4$ için kanaldaki ağ sayısının model yüzeylerinin ortalama Nu sayıları (Nu_o) üzerindeki etkisini belirlemek amacıyla yarım-kare ve yarım-daire modelli yüzeyleri dikkate alınarak gerçekleştirilen ağ bağımsızlık testlerinin sonuçları sırasıyla Çizelge 1 ve 2’de verilmektedir. Ulaşılan sonuçlar, yarım-kare ve yarım-daire modelli yüzeylerin bulunduğu kanallar için sırasıyla 2213537 ve 2160782 adet elemanın yeterli olduğunu göstermiştir.



Şekil 2. Literatürle sonuçların kıyaslanması

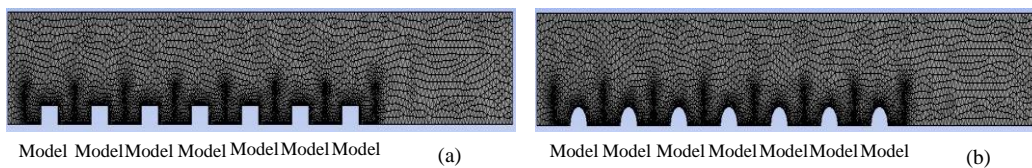
Çizelge 1. Yarım-kare modelli kanalda Nu_o için ağ sayısından bağımsızlık testi

Ağ sayısı	Nu_o	Nu_o	Nu_o	Nu_o
	Re=4000	Re=6000	Re=8000	Re=10000
845741	8,41	12,47	13,54	17,47
2213537	9,62	13,25	16,81	20,5
2547104	9,61	13,25	16,81	20,48

Çizelge 2. Yarım-daire modelli kanalda Nu_o için ağ sayısından bağımsızlık testi

Ağ sayısı	Nu_o	Nu_o	Nu_o	Nu_o
	Re=4000	Re=6000	Re=8000	Re=10000
895472	11,24	16,74	21,47	26,64
2160782	12,45	17,68	22,78	27,75
2475471	12,44	17,68	22,78	27,74

Yarım-kare ve yarım-daire modelli yüzeyler için kanallardaki ağ yapıları, görünürlük için yaklaştırılarak Şekil 3 (a) ve (b)'de sunulmuştur. Bununla birlikte, şekillerden de görülebildiği gibi çözümün hassasiyeti açısından model yüzeyleri etrafında daha yoğun bir ağ yapısı bulunmaktadır.



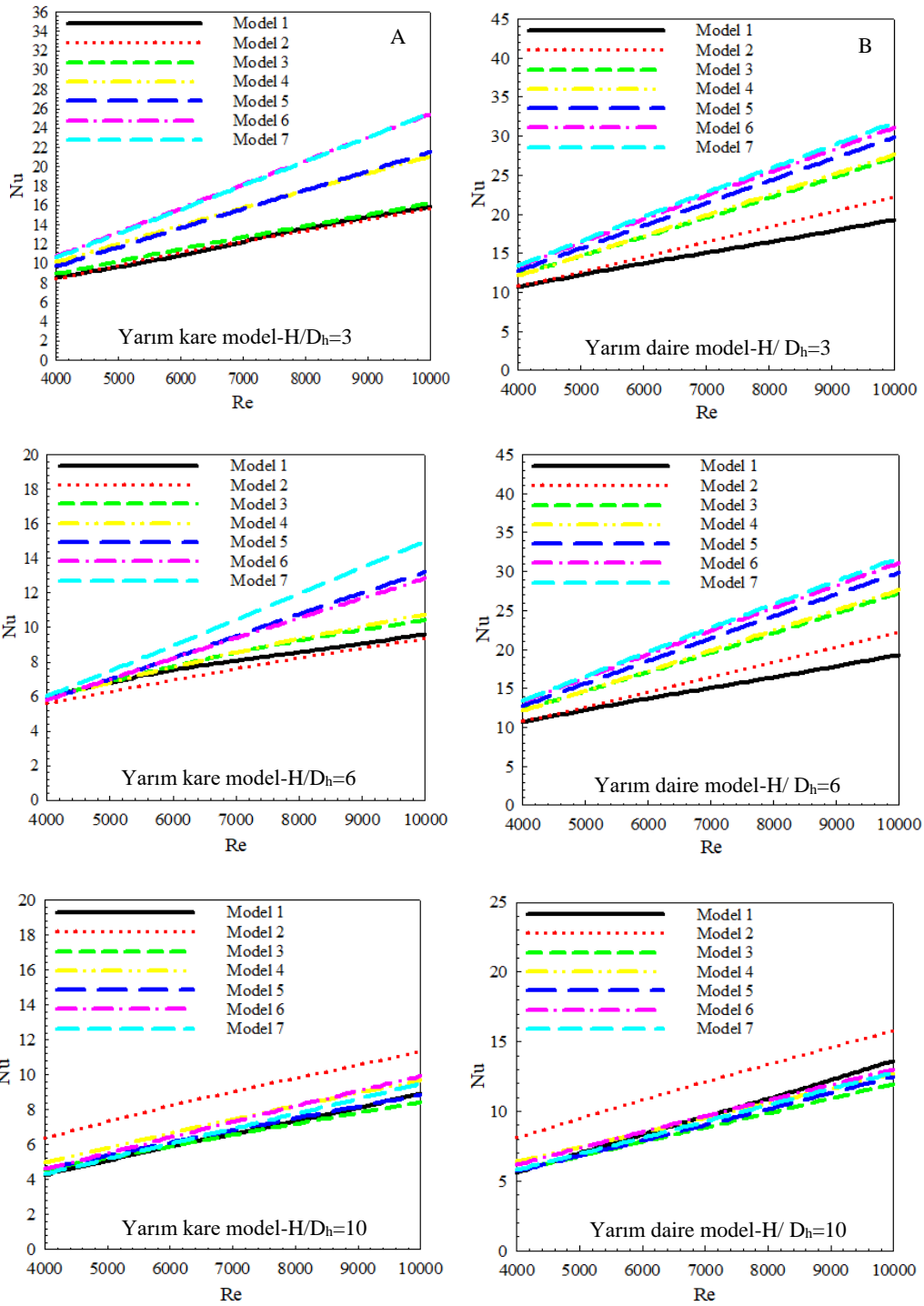
Şekil 3. (a) yarım-kare (b) yarım-daire modelli kanalların ağ yapıları



Şekil 4' de farklı kanal yükseklikli ($H/D_h=3, 6$ ve 10), $a=1,25D_h$ jet giriş genişlikli ve üçlü jet akışlı kanallarda bulunan yarım kare ve yarım daire modellenli yüzeylerin kanallardaki diziliş sıralarına göre ortalama Nu sayılarının Re sayılarına bağlı değışimleri gösterilmektedir. Kanal yüksekliđi, kanaldaki jet akış sayısı ve Re sayısı; jet akışın kanaldaki ve model yüzeyleri üzerindeki akış yapısını etkileyerek farklı model sıraları üzerinde farklı Nu sayıları elde edilmesini sağlamaktadır. $H/D_h=3$ değeriinde her iki model yüzeyi için de Model 7' de en yüksek ortalama Nu sayısı değeriine ulaşılrken; en düşük Nu sayısı değeri ise Model 1 için elde edilmektedir. Bununla birlikte, yarım daire model yüzeyleri için elde edilen Nu sayısı değeri, yarım kare modellenli yüzeylerden daha yüksektir. $H/D_h=3$ ve $Re=6000$ için yarım daire yüzeyli Model 7' de ulaşılan ortalama Nu sayısı değeri, yarım kare yüzeyli olandan %26,26 daha fazla olmaktadır. Re sayısı artırıldığında ısı transferi artışına bağlı olarak Nu sayısı değeri de artmaktadır. Kanal yüksekliđi (H/D_h) 6 değeriine çıkarıldığında ise jet akışın model yüzeyleri için ısı transferini artırıcı etkisinin azalmasıyla her iki model yüzeyi için de Nu sayısı değeriinde düşüşler görölmektedir. $Re=8000$ için $H/D_h=3'$ den $6'$ ya çıkarıldığında yedinci sıradaki model yüzeyinde (Model 7) sırasıyla yarım kare ve yarım daire modeller için ortalama Nu sayılarında %41,89 ve %45,18' lik azalışlar elde edilmektedir. $H/D_h=10$ olduğunda ise Nu sayıları, diđer H/D_h oranlarına göre en düşük değeriine ulaşmakla birlikte; kanaldaki akış yapısına bağlı olarak en yüksek Nu sayıları her iki model yüzeyli kanalda da Model 2 için elde edilmektedir.

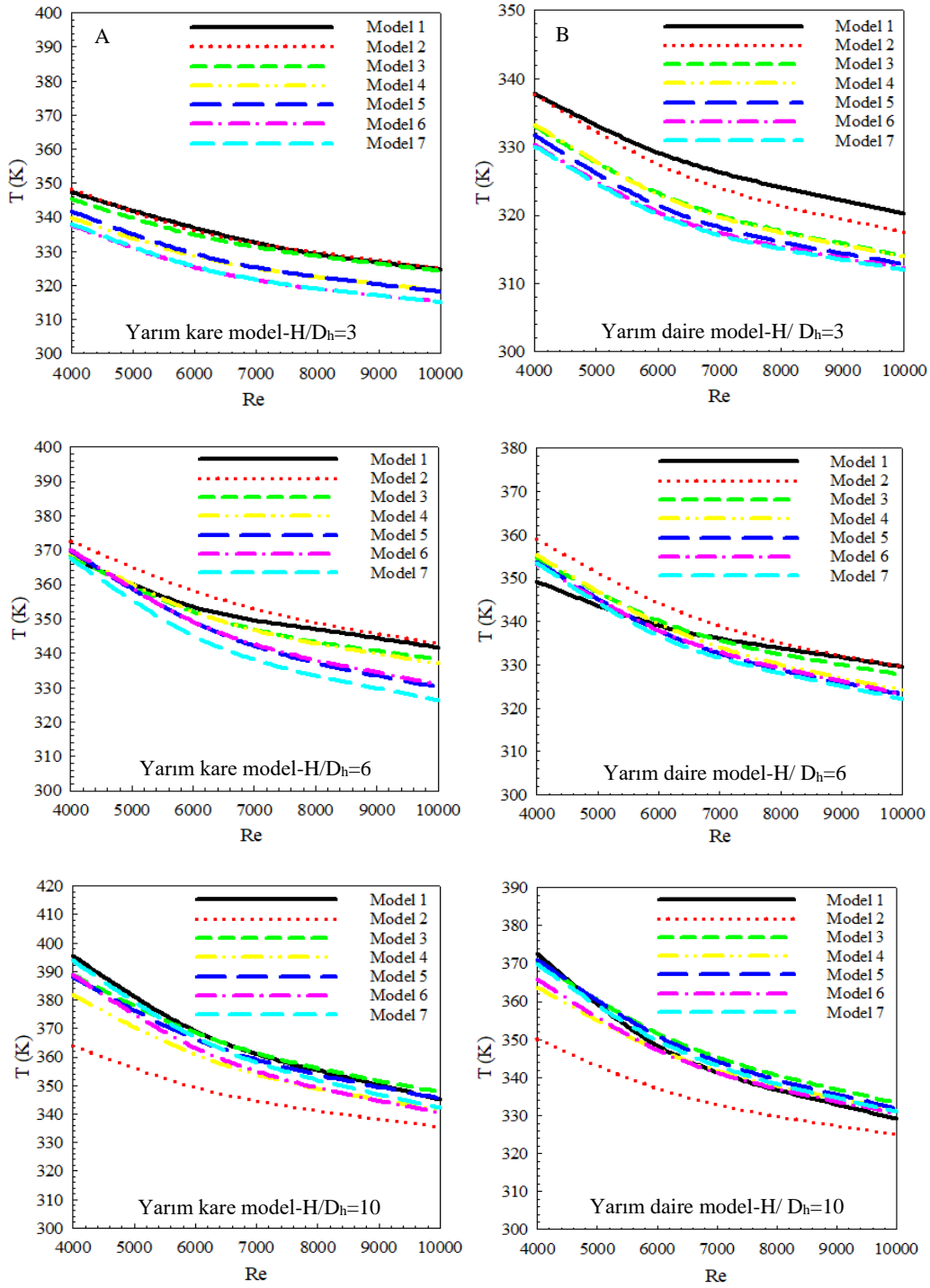
$a=1,25D_h$ jet giriş genişliđi ve üç adet hava jeti akışına sahip farklı yükseklikli ve Re sayılı kanallarda bulunan yarım kare ve yarım daire modellenli yüzeylerin kanallardaki diziliş sıralarına göre ortalama yüzey sıcaklıklarının (T) değışimleri Şekil 5' de verilmektedir. Her iki model yüzeyli kanalda da Re sayısı artışına bağlı olarak artan sođuma etkisiyle; model yüzeylerinin sıcaklıkları azalmaktadır. Tüm kanal yükseklik (H/D_h) değeriinde yarım kare modellenli yüzeyler için ulaşılan yüzey sıcaklıđı değeri daha yüksektir. Bu durum, üçlü jet akışının yarım daire modellenli yüzeylerde ısı transferini artırıcı etkisine bağlı sođutma performansının daha iyi olduğunu göstermektedir. Ayrıca, kanal yüksekliđinin artışıyla ($H/D_h=6$ ve 10) jet akışlarının yüzeyler üzerindeki çarpma etkisinin azalmasına bağlı olarak ısı transferi azaldığından; yüzey sıcaklıklarında $H/D_h=3'$ e göre artışlar görölmektedir.

Çizelge 3' de $a=1,25D_h$ jet giriş genişlikli ve üçlü jet akışlı kanallarda bulunan tüm yarım kare ve yarım daire modellenli yüzeylerdeki ortalama Nu sayısı (Nu_o) ve jet akışların kanaldan çıkış sıcaklıkları (T_c) farklı kanal yükseklikleri (H/D_h) ve Re sayıları için gösterilmektedir. Kanaldaki Re sayısının artışına bağlı olarak Nu_o değeri artarken; T_c değeri azalmaktadır. Bununla birlikte, yarım daire model yüzeyleri için elde edilen Nu_o değeriinin, yarım kare modelden daha fazla olduğu Çizelge 3' den de görölebilmektedir. $Re=10000$ ve $H/D_h=3$ için yarım daire modellenli yüzeyin Nu_o sayısı, yarım kare modelden %33,66 daha fazladır. Bunun yanı sıra, kanal yüksekliđinin artışıyla her iki model yüzeyi için de Nu_o sayıları azalmaktadır.



Şekil 4. $a=1,25D_h$ giriş genişlikli üçlü jet akışlı kanallardaki A-yarım-kare B-yarım-daire modelli yüzeylerin kanaldaki sıralanış düzenlerine göre ortalama Nu sayısının

Re sayısına göre değişimi



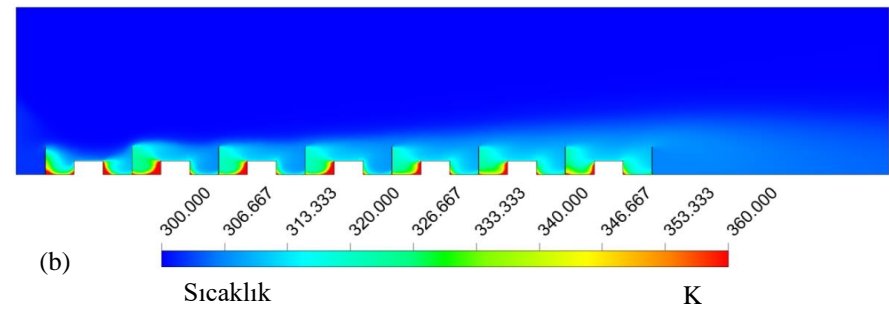
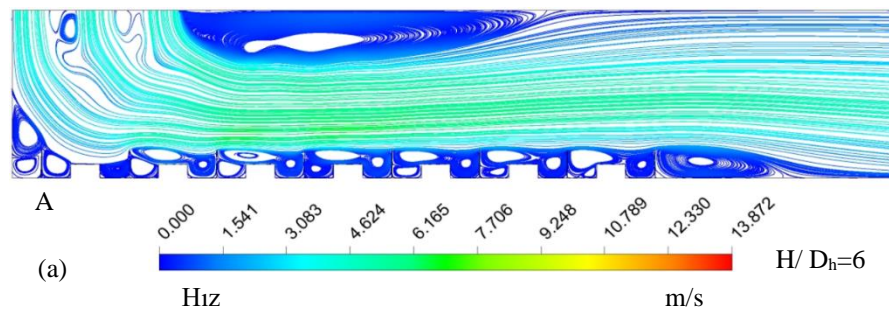
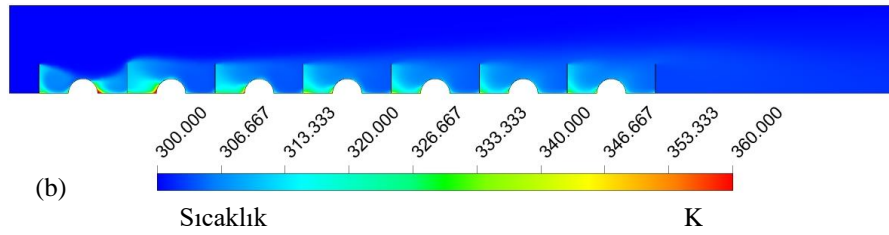
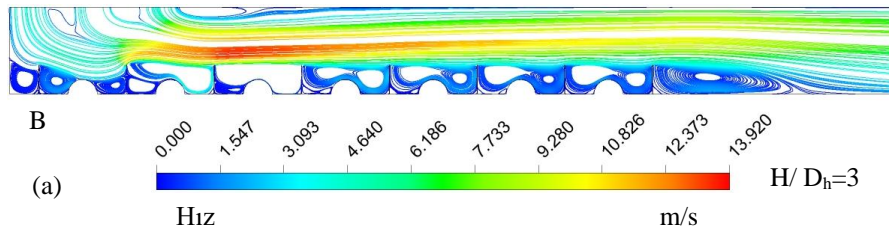
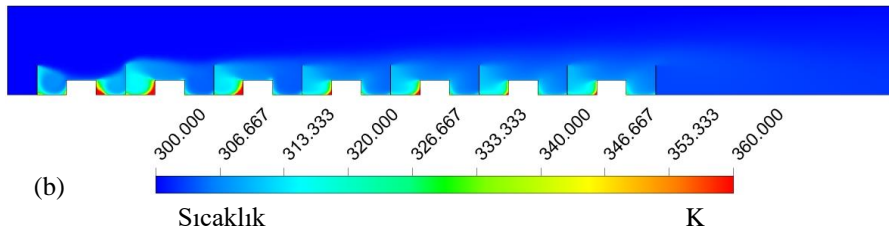
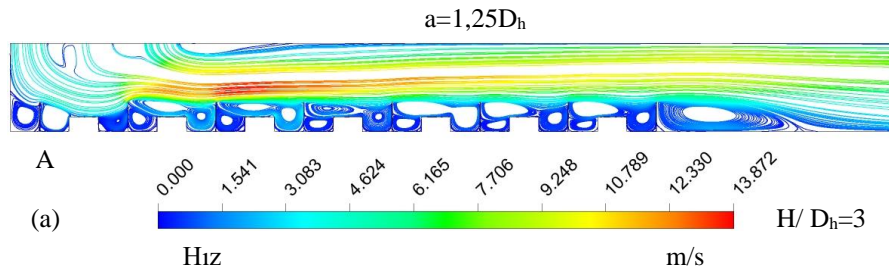
Şekil 5. $a=1,25D_h$ giriş genişlikli üçlü jet akışlı kanallardaki A-yarım-kare B-yarım-daire modelli yüzeylerin kanaldaki sıralanış düzenlerine göre ortalama yüzey sıcaklığının

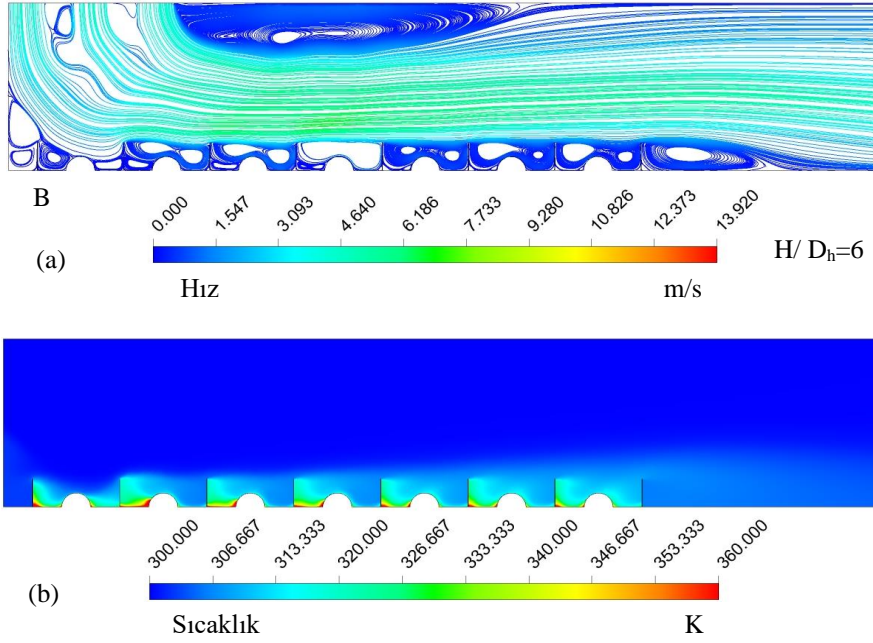


Yarım Kare Model	H/D _h =3		H/D _h =6		H/D _h =10	
	T _ç (K)	Nu _o	T _ç (K)	Nu _o	T _ç (K)	Nu _o
Re=4000	312,33	9,61	312,22	5,87	311,96	4,83
Re=6000	311,56	13,23	311,49	7,91	311,3	6,47
Re=8000	311,16	16,78	311,11	9,81	310,98	8,01
Re=10000	310,93	20,23	310,89	11,62	310,77	9,52

Yarım Daire Model	H/D _h =3		H/D _h =6		H/D _h =10	
	T _ç (K)	Nu _o	T _ç (K)	Nu _o	T _ç (K)	Nu _o
Re=4000	312,09	12,22	311,94	7,53	311,93	6,23
Re=6000	311,4	17,19	311,33	10,27	311,3	8,58
Re=8000	311,04	22,14	311,01	12,93	310,93	10,88
Re=10000	310,83	27,04	310,76	15,63	310,68	13,2

Şekil 6' da Re=6000 değerinde üçlü hava jeti akışlı ve $a=1,25D_h$ jet giriş genişlikli kanallardaki A-yarım kare B-yarım daire model yüzeyleri için (a) hız-akım ve (b) sıcaklık konturu dağılımları sergilenmektedir. $H/D_h=3$ kanal yükseklikli durumlarda birinci model yüzeylerinden sonra ikinci ve üçüncü jet akışlarının birleşmesiyle model yüzeyleri üzerindeki akış hızları artmaktadır. Bu durum da model yüzeylerinin soğuma performansını artırmaktadır. Model aralarında meydana gelen yeniden dolaşım bölgeleri, akışkanın kendi içinde sirkülasyon halindeki bölgeler olduğundan model yüzey şekline bağlı olarak üçlü jet akış etkisinin daha az olduğu ilk sıradaki modeller arasında sıcaklığın arttığı bölgeler görülebilmektedir. Özellikle yarım kare modellenli yüzeylerde; yarım daire modellenli yüzeye göre sıcaklığın artış sergilediği model yüzeyleri daha fazla olmaktadır. Kanal yüksekliği artırıldığında ise hem kanal içerisindeki hem de model yüzeyleri etrafındaki yeniden dolaşım bölgelerinin yoğunlukları ve büyüklükleri arttığından $H/D_h=3'$ e göre yüzeylerin sıcaklıkları da artmaktadır. Bu durum kanal yüksekliği artırılınca; ısı transferi performansının azalmasının bir göstergesidir. Bu nedenle, özellikle model yüzeylerinin geometrisi ve kanal yüksekliği soğutma performansının belirlenmesinde önemli değişkenler olarak göz önüne alınmalıdır.





Şekil 6. $a=1,25D_h$ giriş genişlikli ve üçlü jet akışlı A-yarım-kare B-yarım-daire model yüzeyli kanallardaki (a) hız-akım (b) sıcaklık konturu dağılımları

5. Genel Sonuçlar ve Değerlendirme

Bu çalışmada, $1,25D_h$ jet giriş genişliğindeki üç adet jet akışı kullanılarak kanallarda bulunan sabit ısı akıllı ve bakır plakalı yarım-kare ve yarım-daire modellenli yüzeylerden olan ısı transferi ve kanallardaki akış yapıları değerlendirilmiştir. Çalışma sonucunda ulaşılan veriler aşağıdaki gibi özetlenebilir:

- $H/D_h=3$ değerinde her iki model yüzeyi için de Model 7' de en yüksek ortalama Nu sayısı değerlerine ulaşılrken; en düşük Nu sayısı değerleri ise Model 1 için elde edilmektedir.
- Yarım daire model yüzeyleri için elde edilen Nu sayısı değerleri, yarım kare modellenli yüzeylerden daha yüksektir.
- $H/D_h=3$ ve $Re=6000$ için yarım daire yüzeyli Model 7' de ulaşılan ortalama Nu sayısı değerleri, yarım kare yüzeyli olandan %26,26 daha fazladır.
- Re sayısı artırıldığında ısı transferi artışına göre Nu sayısı değerleri de artış göstermektedir.
- Kanal yüksekliği (H/D_h) 6 değerine çıkarıldığında jet akışın model yüzeyleri üzerindeki ısı transferini artırıcı etkisinin azalması sonucu her iki model yüzeyi için de Nu sayısı değerlerinde düşüşler görülmektedir.
- $Re=8000$ için $H/D_h=3$ ' den 6' ya çıkarıldığında yedinci sıradaki model yüzeyinde (Model 7) sırasıyla yarım kare ve yarım daire modeller için ortalama Nu sayılarında %41,89 ve %45,18' lik azalışlar elde edilmektedir.
- $H/D_h=10$ olduğunda ise Nu sayıları, diğer H/D_h oranlarına göre en düşük değerlerine ulaşmakla birlikte; en yüksek Nu sayıları her iki model yüzeyli kanalda da Model 2 için elde edilmektedir.
- Her iki model yüzeyli kanalda da Re sayısı artışına bağlı olarak artan soğuma etkisiyle; model yüzeylerinin sıcaklıkları azalmaktadır.
- Tüm kanal yükseklik (H/D_h) değerlerinde yarım kare modellenli yüzeyler için ulaşılan yüzey sıcaklığı değerleri daha yüksektir.



- Kanal yüksekliğinin artışıyla ($H/D_h=6$ ve 10) model yüzey sıcaklıkları $H/D_h=3'$ e göre artmıştır.
- Kanallardaki modellerin tümü değerlendirildiğinde; $Re=10000$ ve $H/D_h=3$ için yarım daire modelli yüzeyin Nu_o sayısının yarım kare modelliden %33,66 daha fazla olduğu belirlenmiştir.
- Sonuç olarak, üçlü çarpan hava jeti akışının model yüzeyleriyle olan temaslarının artırılması; jet akışkana olan ısı transferini artırarak soğuma performansını iyileştirmektedir. Isı transferindeki bu iyileşme oranında ise kanal yüksekliği, kanaldaki jet akış sayısı ve jet Re sayısı ve bu etkenlere bağlı olarak jet akışın kanaldaki ve model yüzeyleri üzerindeki akış yapısı önemli unsurlardandır.

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AŞAĞI FIRAT HAVZASINDA BİRECİK BARAJI SULARINDAN ETKİLENEN KÖYLERİN KIRSAL TURZİM İLE YENİDEN İŞLEVLENDİRİLMESİ REUSE OF VILLAGES IN THE LOWER EUPHRATES BASIN UNDER THE WATERS OF BİRECİK DAM WITH RURAL TOURISM

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ÖZET

Kırsal yerleşimler, buldukları bölgenin özelliklerini yansıtan ve bölgeye özgü mimari özelliklere sahip yapıların bulunduğu alanlardır. Özgün mimari unsurlara sahip kırsal alanlar zaman içerisinde çeşitli nedenlerle terk edilmekte ve özgün doku kaybolma tehlikesi ile karşı karşıya kalmaktadır. Aynı zamanda kırsal yerleşimler kültürel mirasın önemli bir parçasını oluşturmaktadır. Kırsal mimari, kırsal mirasın en önemli değerlerinden biri olduğu için korunması gereken değerlerin başında gelmektedir.

Bu yerleşimler ekonomi, eğitim, sağlık, sanayileşme, küçülen aile yapısı, gelişen teknoloji ve değişen yaşam kalitesi, siyasi ve doğa olayları gibi nedenlerle nüfus kaybetmektedir. Çalışma alanı olarak belirlenen Aşağı Fırat Havzası'nda yer alan Gaziantep'in Nizip ilçesine bağlı Aşağıçardak, Gümüşgün, Erenköy ve Kamışlı köyleri tüm bu nedenlerden dolayı zaman içerisinde nüfus kaybetmiş, 2000 yılında inşa edilen Birecik barajı nedeniyle de tamamen terk edilerek nüfusunun tamamını kaybetmiştir. Fırat Nehri üzerinde inşa edilen ve GAP kapsamında 1985 yılında yapımına başlanan baraj 2000 yılında tamamlanarak su tutmaya başlamış ve baraj Gaziantep'in Nizip ilçesindeki bazı köyleri sular altında bırakmıştır. Kırsal yerleşimin tamamen terk edilmesi, özgün mimari dokusunun bozulmasına neden olmuştur.

Bu çalışmada, kırsal mimarinin koruma araçlarından biri olan kırsal turizm, çalışma alanı için önerilmektedir. Çalışma alanında Aşağı Fırat Havzası'nda bir turizm rotası oluşturulması önerilmektedir.

Öneri doğrultusunda alanlar için yeni işlevler geliştirilmiş ve bu doğrultuda yapıların restore edilerek korunması hedeflenmiştir. Çalışma alanındaki geleneksel evlerin ve yerleşimlerin özgün dokusuna uygun işlevler ve yeni yapılaşma için kullanılacak çağdaş malzemeler önerilmiştir.

Sonuç olarak önerilen yeniden işlevlendirme projesi kapsamında hem kırsal mimarinin korunması hem de kırsal turizme katkı sağlanması ve böylece kırsal mirasın gelecek nesillere aktarılması hedeflenmektedir.

Anahtar Kelimeler: Kırsal Mimari, Yeniden Kullanım, Kültürel Miras, Gaziantep

ABSTRACT

Rural settlements are areas with structures that reflect the characteristics of the region in which they are located and have architectural features unique to the region. Rural areas with unique architectural elements are abandoned over time for various reasons and the original texture is in danger of being lost. At the same time, rural settlements constitute an important part of cultural heritage. Since rural



architecture is one of the most important values of rural heritage, it is one of the values that should be protected.

These settlements are losing population due to reasons such as economy, education, health, industrialization, shrinking family structure, developing technology and changing quality of life, political and natural events. The villages of Aşağıçardak, Gümüşgün, Erenköy and Kamışlı in the Nizip district of Gaziantep, located in the Lower Euphrates Basin, which was determined as the study area, lost population over time due to all these reasons, and were completely abandoned and lost their entire population due to the Birecik dam built in 2000. The dam, which was built on the Euphrates River and started to be constructed in 1985 within the scope of GAP, was completed in 2000 and started to hold water, and the dam flooded some villages in Nizip district of Gaziantep. The complete abandonment of the rural settlement caused the deterioration of its original architectural texture.

In this study, rural tourism, one of the conservation tools of rural architecture, is proposed for the study area. In the study area, it is proposed to create a tourism route in the Lower Euphrates Basin.

In line with the proposal, new functions have been developed for the areas and it is aimed to restore and protect the buildings in this direction. Functions appropriate to the original texture of the traditional houses and settlements in the study area and contemporary materials to be used for new construction are proposed.

As a result, within the scope of the proposed re-functioning project, it is aimed both to preserve rural architecture and to contribute to rural tourism and thus to transfer rural heritage to future generations.

Key Words: Rural Architecture, Reuse, Cultural Heritage, Gaziantep

GİRİŞ

Kırsal yerleşimler, bölgenin fiziksel özellikleri ve halkın kültürel değerleriyle biçimlenmekte ve bunu yansıtan birer somut öge halini almaktadır. Kırsal yerleşimler, kültürel mirasın önemli bir parçasını oluşturmaktadır. Bu yerleşimler ekonomi, eğitim, sağlık, sanayileşme, küçülen aile yapısı, gelişen teknoloji ve değişen yaşam kalitesi gibi nedenlerle nüfus kaybetmektedir. Çalışma alanı olarak seçilmiş olan Aşağı Fırat Havzası bahsi geçen bu nedenlerden dolayı zaman içinde nüfus kaybına uğramış ve 2000 yılında GAP kapsamında inşa edilen Birecik barajı nedeniyle nüfusunun büyük bir kısmını kaybetmiş hatta bazı köyler tamamen terk edilmiştir. Fırat Nehri üzerinde inşa edilen ve 1985 yılında GAP kapsamında yapımına başlanan baraj 2000 yılında tamamlanarak su tutmaya başlamış ve baraj Gaziantep'in Nizip ilçesine bağlı bazı köyleri sular altında bırakmıştır. Bu köylerden olan Aşağıçardak köyünün tarım arazilerinin tamamı, Erenköy'de yerleşimin büyük bir kısmı hatta bir cami, Gümüşgün köyünde de tarım arazileri konutlar ve okul ve Kamışlı köyünün tarım arazilerinin bir kısmı baraj gölü için istimlak edilmiştir. Aşağıçardak köyünde yerleşimin barajdan etkilenmemesi sebebiyle nüfus kaybından az etkilenmiş fakat diğer köyler büyük nüfus kayıpları yaşamıştır, hatta Kamışlı köyü istimlak sonrasında tamamen terk edilmiştir. Nehirden daha yüksek bir kotta çağdaş yapı malzemeleriyle inşa edilmiş yapılardan oluşan yeni bir köy kurulmuştur. Nüfusunu kaybeden kırsal yerleşimlerde olduğu gibi burada da kırsal mimarinin özgünlüğü zarar görmüştür. Bahsi geçen köyler aynı zamanda nehirle ilişki kuran ve doğal güzelliklere sahip yerleşim yerleridir. Alan bu değerler açısından sürdürülebilir bir yöntem olarak kırsal turizm ile değerlendirildiğinde kırsal mimari mirası da korunmuş olacaktır.

Kırsal turizm uzmanlar tarafından çeşitli biçimlerde tanımlanmıştır. Bu tanımları ele alarak kırsal turizmi, insanların dinlenmek, konaklamak, farklı kültürlerle bir arada olmak, yerel etkinliklere katılmak veya izlemek amacıyla kırsal alanlara gitmesi olarak ifade etmek yanlış olmaz. Kırsal turizm, kırsal alanlarda farklı mekânların ve yerel kültürün deneyimlenmesi nedeniyle tüm dünyada gün geçtikçe önem kazanmaktadır. Bu amaçta yola çıkarak çalışma alanı olarak belirlenen yerleşim alanının kırsal turizm kapsamında yeniden işlevlendirilmesine dair bir öneri geliştirmiş ve bu öneri doğrultusunda dikkat edilmesi gereken bazı tasarım ilkelerine değinilmiştir.



Kırsal Turizm

Kırsal turizm, Avrupa Birliği tarafından "tarımsal veya yerel değerlerle iç içe hoşça vakit geçirmeyi amaçlayan turistlerin beklentileri doğrultusunda konaklama, yiyecek, içecek ve diğer hizmetleri sağlayan küçük ölçekli işletmelerle küçük yerleşim yerlerinde gerçekleştirilen faaliyetler bütünü" olarak tanımlanmaktadır (European Commission (EC), 1999). Soykan, insanların doğal ortamlarda dinlenmek, farklı kültürlerle bir arada olmak, kırsal alanlarda konaklamak, yerel etkinlikleri izlemek ve katılmak amacıyla kırsal yerleşim yerlerine gittikleri bir turizm türü olarak tanımlamaktadır (Soykan, 2006). Kırsal turizmin çeşitli tanımları vardır ve bu tanımlardan yola çıkarak kırsal alanlarda yapılan tüm turizm faaliyetlerinin bütünü olduğu sonucuna varmak mümkündür. Kırsal turizm kapsamında sınıflandırılacak faaliyetlerin çeşitliliği fazladır, bu nedenle kırsal turizmin kapsamını belirlemek zordur. Bu alanlarda alışveriş, atlı doğa gezileri, rafting, kayak, macera, doğa yürüyüşü, termal turizm, balıkçılık, dağcılık, avcılık, sanat, balıkçılık, tarih ve etnik yapı ile ilgili faaliyetler kırsal turizm kapsamında sıralanabilecek faaliyetlerdir (Soykan, 2006). Kırsal yerleşimler tarihsel olarak sahip oldukları eşsiz doğal ve kültürel nitelikleri ile sanayileşmiş büyük kentlerin sakinlerinin reaktif ihtiyaçlarını karşılamak için kullanılmıştır. Kırsal turizmin tarihsel gelişimine bakıldığında, ilk tur programlarının 19. yüzyılda İngiltere'de doğaya dönüş ile gerçekleştiği ve bu turizm şeklinin Avrupa'nın sanayileşmiş ülkelerinde yaygınlaştığı görülmektedir. Bu turizm türünün hızla yaygınlaşmasında, şehir sakinlerinin sosyo-ekonomik gücünün artması ve büyük şehirlerdeki hava kirliliği, gürültü, stres ve yoğun yaşamdan kaçma isteği gibi faktörler etkili olmuştur (Holloway & Taylor, 2006). Kırsal alanları ziyaret etme nedeni zaman içinde değişmiş, günlük rekreasyon veya akraba ziyaretinden insanların tüm tatillerini uzun süre geçirmeyi tercih ettikleri alanlara dönüşmüştür.

Kırsal turizm, sürdürülebilir turizm kavramı ile en uyumlu turizm türüdür. Bu nedenle kırsal turizm, doğal ve kültürel mirasın korunmasında ve dünyaya sunulmasında önemli bir işleve sahiptir. (Soykan, 2003). Kırsal turizm, turistik kaynakları tahrip etmeden yerli ve yabancı turistlerin ihtiyaçlarını karşılamaya çalışır. Bu sayede bu kaynakların gelecek nesillere miras kalmasına da katkı sağlamaktadır (Uçar, Çeken ve Ökten, 2017). Dünya genelinde birçok gelişmiş ve gelişmekte olan ülkede kırsal turizm, kırsal alanların ekonomilerinin güçlenmesini hızlandırmaktadır. Kırsal alanlar, kentsel alanlara göre daha düşük gelir seviyesine sahiptir. Ancak kırsal turizmden elde ettikleri gelir sayesinde kırsal alanlar ile kent arasındaki gelişmişlik farkı zamanla azalmaktadır. Kırsal alanlarda ekonomik seviyenin yükselmesi, kırsaldan kente göçü azaltır. Kırsal turizmin canlanmasının kırsal alanlar üzerinde ekonomik etkilerinin yanı sıra kültürel ve sosyal etkileri de bulunmaktadır. Örneğin, kırsal turizmin yarattığı istihdama bağlı olarak kadınların aile ve toplum içindeki statüleri güçlenmektedir. Aynı zamanda kırsal turizm, bölgedeki hem kültürel mirasın hem de geleneksel mimarinin korunmasına olumlu etki etmektedir. Turizm sayesinde kırsal alanlarda çevre bilinci gelişmektedir. Kırsal alanda yaşayan insanlar, ekonomileri bölgedeki turistik değerlere bağlı olduğu için bu değerleri korumaya özen göstermektedir (Çeken, Dalgın ve Çakır, 2012).

Aşağı Fırat Havzası Turizm Rotası

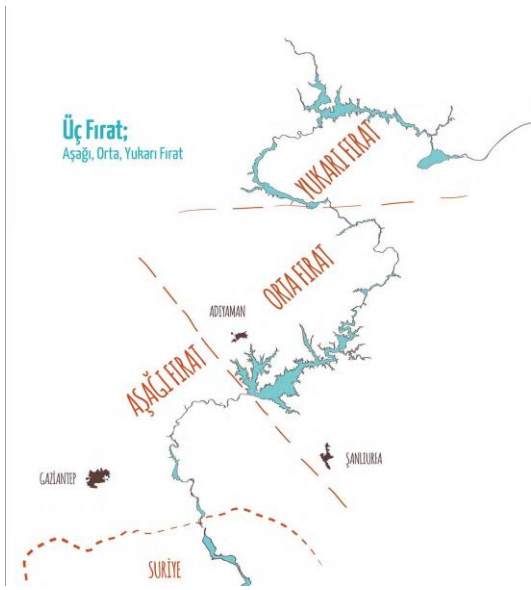
Güneydoğu Anadolu Projesi (GAP) Aşağı Fırat Havzası Turizm Master Planı'nda (2002-2010) "Zeugma, Halfeti ve Runkale'nin turizm potansiyelinin değerlendirilerek Birecik Baraj Gölü'nün göl turizmine açılması, göl üzerinde konaklama ve yeme-içme imkanı sunan teknelerin işletilmesi, proje kapsamında Şanlıurfa ve Gaziantep'e ortak hizmet verebilecek su sporları ve rekreasyon alanlarının geliştirilmesi" hedefi yer almaktadır. çalışmanın hedefiyle örtüşen bu hedeften de yola çıkarak bu bölge için tasarlanacak turizm rotası için dünyadaki havza örnekleri incelenmiştir.

Bunlardan ilki 2857 km uzunluğu ile Avrupa'nın ikinci büyük nehri olan Doğu Avrupa'daki Tuna Havzası'dır (Maden, 2015). 19 ülke nehir için Avrupa Komisyonu Su Çerçeve Direktifini kabul etmiştir. Bu yönetmelik üç ilke içermektedir: planlamaya halkın katılımı, ekonomik yaklaşımlarla entegrasyon ve su yönetiminin diğer politika alanlarıyla entegrasyonu. Bu ilkeler aynı zamanda havza yönetimi için uygulanacak faaliyetlerin çerçevesinin de temelini oluşturmaktadır. Havzanın yönetimi için koruma ve kirlilik ekseninde bir vizyon geliştirilmiştir. Bu vizyon, havzadaki su kaynaklarının ve tatlı suyun sürdürülebilir ve adil bir şekilde kullanıldığı, kirlilikten arındırılmış bir havza habitatu olarak tanımlanmıştır. Tuna Havzası Alan Yönetim Planı'nda sekiz tema bulunmaktadır. Bu temalar şunlardır:



havadaki kilit baskılar, havza alanındaki korunan alanlar, izleme ağları ve ekolojik/kimyasal durum, çevresel hedefler ve istisnalar, su kullanımının ekonomik analizi, ölçümler için ortak program, taşkın riski yönetimi ve iklim değişikliği ve halkın bilgilendirilmesi ve istişare. Havzaya yönelik stratejiler bu temalar altında, belirli yılları hedef alacak şekilde düzenlenmiştir ve ana strateji havzanın ve havza alanının korunmasıdır. Havzadaki ülkeler tarım, sanayi ve kentleşme için nehirde su kullanmaktadır. Nehir suyunun %40'ı tarımsal amaçlarla, %40'ı enerji üretimi de dahil olmak üzere endüstriyel amaçlarla ve kalan %20'si de kentsel amaçlarla kullanılmaktadır.

İncelenen bir diğer havza ise Amerika Birleşik Devletleri'ndeki St. Havzanın yönetim planında vizyonu "Ekonomik, tarımsal, konut ve rekreasyon ihtiyaçlarını sürdürülebilir ve dengeli bir şekilde sağlayan olağanüstü bir doğal kaynak olacaktır." şeklinde tanımlanmıştır. Bu vizyona dayalı olarak misyon, "Büyük Göller Havzası'nın kritik bir bileşeni olarak St. Joseph Nehri Havzası'nı korumak, restore etmek ve yönetmek için havza genelinde çeşitli paydaşları işbirliğine dayalı bir çabada birleştirmektir." Havzanın yönetim planı, yüzey suyu fonksiyonlarının ve estetiğinin iyileştirilmesi ve korunması, koruma, restorasyon, muhafaza ve açık alanların değerlendirilmesi, halk sağlığını tehdit eden organizmaların ortadan kaldırılması ve toksinlerin azaltılmasını amaçlamaktadır. Su, tarımsal, endüstriyel su temini, sıcak su ve/veya soğuk su balıkçılığı, rekreasyon ve doğal su yaşamı ve yaban hayatı desteği gibi işlevler için kullanılmaktadır. Ele alınan son havza Güney Asya'daki Mekong Havzasıdır. Havzanın vizyonu "ekonomik açıdan zengin, sosyal açıdan adil ve çevresel açıdan duyarlı bir Mekong Havzası" olarak ifade edilmektedir. Yönetim planı ekonomik kalkınma, bölgesel entegrasyon, doğal kaynakların korunması, kültürel ve miras değerlerinin korunması, çevrenin ve doğal ortamın korunması, kirliliğin önlenmesi ve insan kaynaklarının geliştirilmesi gibi hedefleri içermektedir.



Şekil 1: Fırat Nehri Haritası

Çalışma alanı olan ülkemizin en uzun nehirlerinden biri olan Fırat Nehri üç bölümden oluşmaktadır: Aşağı, Orta ve Yukarı (Şekil 1). Aşağı Fırat havzasında yer alan Gaziantep ve Şanlıurfa'nın bazı köyleri nehir kıyısında yer almaktadır. 2000 yılında su tutmaya başlayan Birecik Barajı rezervuar alanından 5 höyük ve 9 yerleşim yeri etkilenmiş, bazı köyler bu nedenle tamamen terk edilmiştir. Bu yerleşim yerlerinden biri olan Halfeti, sular altında kalarak adından söz ettirmiş ve 2013 yılında cittaslow unvanını kazanmıştır. İlçe, doğal güzellikleri ve görülmeye değer geleneksel mimari yapıları ile turistik bir merkez haline gelmiştir. İlçeden bir Roma yapısı olan Rumkale ve baraj nedeniyle terk edilen Savaşan köyü güzergahında tekne turları düzenlenmektedir. Roma dönemine ait kalıntıları, Savaşan köyünde ayakta kalmayı başarmış geleneksel evleri ve bir kısmı su üstünde kalan meşhur minareyi görebileceğiniz bir turdur. Aynı zamanda Savaşan köyünde mola verilerek hizmet veren kafelerden birinde

vakit geçirmek ve geleneksel dokuyu yakından incelemek mümkün. Halfeti bu tur fırsatı ile bahar aylarında çok sayıda turist tarafından ziyaret ediliyor. Butik otele dönüştürülmüş geleneksel evlerde konaklamak, nehirde tutulan balıkların servis edildiği balık restoranlarında hizmet almak ve yöreye özgü siyah gülden yapılan ürünlerin satıldığı hediyelik eşya dükkanlarından alışveriş yapmak mümkün.





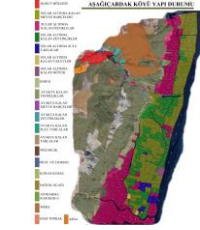
Latin American Scientific Research Programmes

Köy bu turizm rotası üzerinde, Zeugma Ören yerinden sonraki ilk durak noktası olarak önerilmektedir. Tarım arazilerinin büyük bir kısmını baraj suları altında kaybetmiş olan köy turizm rotasında rekreasyon alanı olarak kullanılması önerilmektedir. Önerilen rota üzerinden sudan ulaşım sağlamak amacıyla Nizip Gemi İskelesinden çıkan bir taşıt ile köye ulaşmanın mümkün olması gerektiği düşünülmekte ve bu sebeple bu taşıtlara uygun bir iskele yapılması öneriler arasında yer almaktadır. Su ile yakın temasta olmaya imkan veren alanlara sahip köy için rekreasyon alanlarının yanı sıra günü birlik tesislerin de yapılması turizm gerekliliklerinden biri olarak önerilmiştir.





AŞAĞIÇARDAK KÖYÜ YERLEŞİM ÖZELLİKLERİ

DOĞAL ÇEVRE	YAPILI ÇEVRE	EKONOMİK	DEMOGRAFİK	KÜLTÜREL MİRAS	TURİZM
-Eğimli araziye yerleşim -İlçe merkezine 21 km uzaklıkta -İl merkezine 49 km	- Geleneksel taş mimari - Betonarme yapılar -Kıvrımlı Sokaklar	-Tarım • Fıstık -Zeytin -Meyve Ağaçları	-Nüfusu 308 kişi	-III. Derece Arkeolojik Sit Alanı	Kırsal Turizm ÖNERİLER - İskele -Günöbirlik tesis - Rekreasyon alanları
FOTOĞRAFLAR					
					

Erenköy Köyü

Erenköy Gaziantep il merkezine 55 km, Nizip ilçe merkezine ise 27 km uzaklıkta yer almaktadır. Fırat nehri kıyısında eğimli bir araziye yerleşmiş olan köyün rakımı 398m'dir. Baraj yapımından sonra terk edilmesi sebebiyle köy içerisinde eğitim ve ticaret yapısı yer almamaktadır. Kıvrımlı ve toprak sokaklara sahip köy içerisinde geleneksel taş mimarinin nitelikli örnekleri yer almaktadır. Köy, barajdan en çok etkilenen köylerden biridir ve birçok yapısı sular altında kalmıştır, bu yapılardan en dikkat çekenini ise, sular üstünde kalan üç şerefeli minaredir.





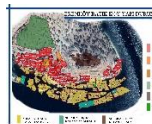
Şekil 6. Baraj Öncesi Erenköy

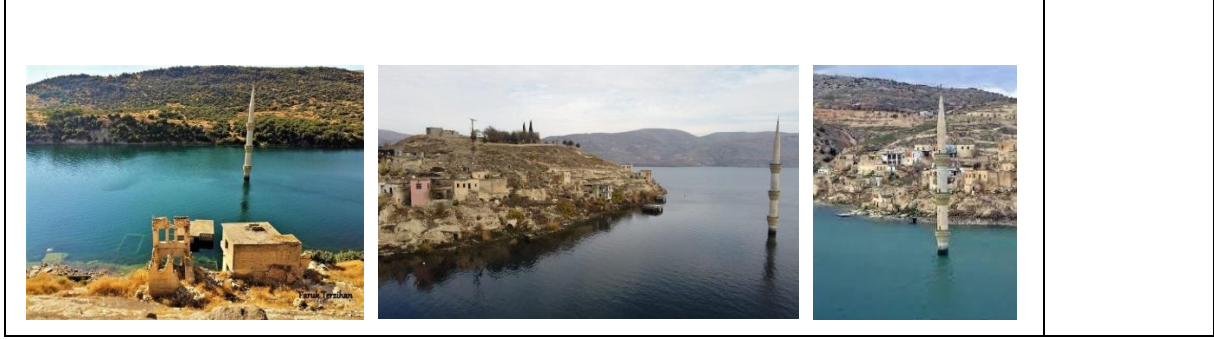


Şekil 7: Baraj Sonrası Erenköy

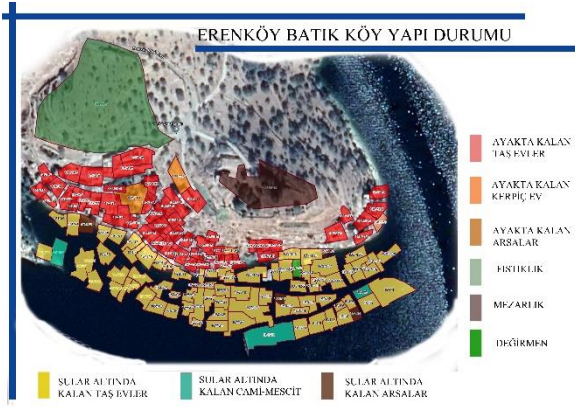
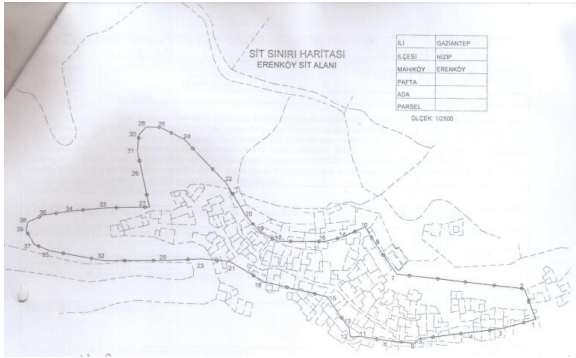
Hatta Halfeti Savaşan köyünde bulunan turistlerin ve fotoğrafçıların çokça ilgisini çeken tek şerefeli minare ile sıkça karıştırılmaktadır. Köy sadece yapılarını değil diğer köylerde de olduğu gibi tarım arazileri de sular altında kalmıştır. Bu sebeple ekonomisi fıstık ve zeytin üretimine bağlı bu köy ekonomik olarak çökmüştür. 2012 nüfus kayıtlarına göre 145 kişinin yaşadığı belirtilen köyde, yapılan ziyaretlerde daimî ikamet eden çok daha kısıtlı bir nüfusa rastlanmıştır. Köye hafta sonlarını değerlendirmek için gelen eski sakinlere ve il veya ilçeden aile büyüklerini ziyarete gelen aile bireylerine rastlamak mümkündür.

ERENKÖY KÖYÜ YERLEŞİM ÖZELLİKLERİ

DOĞAL ÇEVRE	YAPILI ÇEVRE	EKONOMİK	DEMOGRAFİK	KÜLTÜREL MİRAS	TURİZM	
-Eğimli araziye yerleşim -İlçe merkezine 27 km uzaklıkta -İl merkezine 55 km uzaklıkta -Rakım 398m -Fırat nehri kıyısında	-Geleneksel taş mimari -Sular altında kalan yapılar -Eğitim, sağlık ve ticari yapılar yok -Kıvrımlı ve toprak sokaklar	• Tarım -Fıstık -Zeytin	-Nüfus 145 kişi -Baraj suları altında kalmasından sonra köy büyük oranda terk edilmiş -Genç nüfus yok -Eski sakinler ve mevcut sakinlerin diğer aile bireyleri hafta sonları konaklama gelerek geçici nüfus oluşturmakta	-III. Derece Arkeolojik Sit Alanı -Batık cami -Tescillenmemiş nitelikli sivil mimarlık örnekleri	-Kültür Turizmi ÖNERİLER -İskele -Konaklama birimleri -Günübirlik Tesis -Rekreasyon Alanları	  
FOTOĞRAFLAR						



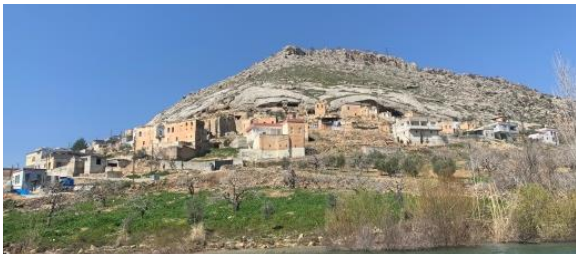
Köyde yer alan nitelikli sivil mimarlık örneklerinin hiçbiri tescillenmemiştir, fakat 2013 yılında köyün turizm ile değerlendirilmesi amacıyla Kültür ve Turizm Müdürlüğüne III. Derece Arkeolojik Sit Alanı ilan edilmesine karar verilmiştir. Maalesef, ülkemizde yaşanan 6 Şubat 2023 tarihli deprem felaketinden Erenköy de etkilenmiş ve birçok yapısı hasar almıştır. Son zamanlarda köyde kontrollü bir biçimde yıkımlar gerçekleşmekte, köy halkı bugün AFAD tarafından temin edilen çadır ve konteynerlerde hayatlarını sürdürmektedir.



Öneri rotasında yapılması önerilen eklemelerle ilgili Erenköy ile ilgili, iskele, günübirlik tesis ve rekreasyon alanlarının düzenlenilmesine yer verilmiştir. Bu öneri tablosu yıkımlardan önce yapılması sebebiyle önerinin sınırları bu biçimde belirlenmiştir. Fakat bugün gerçekleşen yıkımlar sonrasında yıkılan konutların yerine kalan tarihi yapılara saygılı ve uyumlu biçimde inşa edilecek çağdaş yapılar ile konaklama birimlerinin oluşturulması da eklenebilir.

Gümüşgün Köyü

Gümüşgün Gaziantep il merkezine 48 km, Nizip ilçe merkezine ise 33 km uzaklıktadır. Fırat kıyısında



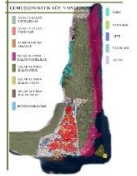
eğimli bir araziye oturan yerleşim alanının rakımı 400m'dir. Birkaç kez kullanıcı değiştiren köyde birden fazla medeniyete ait kalıntılara rastlamak mümkündür. Romalılar döneminden kalma Taş ocakları, Ermenilerden kalan bir Surp Sarkis Kilisesi kalıntıları, Ermenilerden kalma taş konaklar yer almaktadır.



yapılması önerilmiştir. Buna ek olarak, günebirlik tesis, konakların ve benzer nitelikli yapıların butik otel olarak kullanılması, kilisenin restore edilerek yeniden işlevlendirilmesi önerileri getirilmiştir. Aynı zamanda tarihi kiliseyi, Roma Taş Ocaklarını ve köyün kültürel mirasını tanıtan bir ziyaretçi merkezi yapılması önerilmiştir.

GÜNEBİRLİK KÖYÜ KIRSAL YERLEŞİM ÖZELLİKLERİ

DOĞAL ÇEVRE	YAPILI ÇEVRE	EKONOMİK	DEMOGRAFİK	KÜLTÜREL MİRAS	TURİZM
-Eğimli arazi yerleşimi -İlçeye uzaklık 33 km -İl merkezine uzaklık 48 km -Rakım 400 m -Fırat nehri kıyısında	-Geleneksel konut mimarisi -Geleneksel taş malzeme kullanımı -Özgün dokuyu bozan betonarme yeni konutlar -Nitelsiz ekler -Eğitim, sağlık ve ticari yapılar bulunmamakta -Kıvrımlı ve toprak sokaklar -Sular altında kalan yapılar	-Tarım -Fıstık -Zeytin	-Köy nüfusu 60 kişi -Baraj suları altında kalmasından sonra köy büyük oranda terk edilmiş -Genç nüfus yok -Eski sakinler ve mevcut sakinlerin diğer aile bireyleri hafta sonları konaklama gelerek geçici nüfus oluşturmaktadır	-Roma Taş Ocakları -Ermeni Surp Sarkis Kilisesi -Tescillenmemiş nitelikli sivil mimarlık örnekleri -Tarihi mağaralar	-Kültür Turizmi ÖNERİLER -İskele -Günebirlik Tesis -Kilisenin renovasyonu -Butik otel -Kilise ve Taş ocakları tanıtım merkezi



FOTOĞRAFLAR



Kamışlı Köyü

Kamışlı köyü Fırat Nehri kenarında nehre doğru inen eğimli bir arazi üzerine kurulmuştur. Baraj yapımından önce 1972 yılında yaşanan depremde bir nüfus kaybına uğrayan köy barajdan sonra tarım arazilerinin tamamı sular altında kalınca tamamen terk edilmiştir. Depremden sonra daha üst kote yeni bir köy kurulmuş ve baraj sonrasında da köyü terk eden halk oraya yerleşmiştir. Yeni Kamışlı Köyü'nün



nüfusu 391'dir. Baraj öncesinde zeytin ve fıstık dışında bir çok meyve bahçesi bulunan köyün tarım faaliyetleri barajın yapımıyla birlikte neredeyse son bulmuştur. Bugün yeni köyde yaşayan ve eski köyde tarım faaliyetlerini yürüten birkaç aile bulunmaktadır. Aynı zamanda yeni köyden eski köye balık tutmak için gelenleri ve teknelerini görmek mümkündür.







Geleneksel taş mimarinin nadir eserlerinin bulunduğu köyün tepesinde, Roma dönemi mezarlarının yer aldığı bir nekropol ve mağaralar bulunmaktadır. Bu nekropol alanında oldukça dikkat çekici bir anıt bulunmaktadır. Bu ilginç yapı içerisinde kabartmalar yer almaktadır. Kaya kütlesi içerisine yarım ay biçiminde oyulmuş bu yapının rölyefli alanının genişliği 209 cm, yüksekliği 220 cm giriş genişliği 332 cm, sağ alan 93cm sol alan ise 175 cm'dir. Sağda solda ve ortada ikişer rölyef bulunmakta, bu kabartmalar arasında insan figürüne benzeyen iki kabartma yer almaktadır. Köylüler tarafından kabartmaların altında bugün hazine avcıları tarafından tahribata uğrayarak yok edilmiş bir yazıt bulunduğundan söz edilmektedir. Sağ, sol ve ortada rölyeflerin üzerinde elips çeklinde toplam üç adet rölyef bulunmaktadır.



Eski Kamışlı köyünde iki adet pınar yer almaktadır. Pınarlardan su dağıtımını sağlamak amacıyla kaya içerisine doğru tüneller oyulmuştur. Hayatın çetin olduğu bu bölgede su pınarlarının bulunması ve köy halkının söylemine göre 700 e yakın mağaranın bulunması tarih boyunca burada oldukça fazla insanın yaşadığının da bir göstergesi olarak kabul edilebilir.

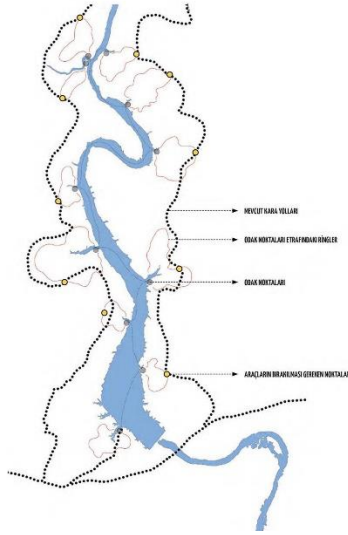


KAMIŞLI KÖYÜ YERLEŞİM ÖZELLİKLERİ

DOĞAL ÇEVRE	YAPILI ÇEVRE	EKONOMİK	DEMOGRAFİK	KÜLTÜREL MİRAS	TURİZM
-Eğimli araziye yerleşim -İlçe merkezine 45 km uzaklıkta -İl merkezine 58 km uzaklıkta -Fırat nehri kıyısında	- Geleneksel taş mimari	-Tarım • Fıstık -Zeytin	-Tamamen terk edilmiş -Köy üst kota başka bir konuma taşınmıştır ve yeni Kamışlı köyünün nüfusu 391	-III. Derece Arkeolojik Sit Alanı -Kaya Mezarları	-Kültür turizm ÖNERİLER - İskele -Butik Otel -Günübirlik Tesis - Su Sporları Tesisi - Yüzülebilir Alan
FOTOĞRAFLAR					
   					

Kültürel mirasın korunması ve Aşağı Fırat Havzası'nın canlandırılması amacıyla Kamışlı köyünün bu turizm rotası üzerinde bir konaklama birimi olarak işlev görmesi önerilmektedir. Konaklama işlevinin yanı sıra yerleşimde rekreasyon alanları, yüzülebilir alanlar, sosyal tesisler ve su sporları için tesis alanları oluşturulması planlanmaktadır. Bunlara ek olarak köyde bulunan mağaralar, mezarlar ve Roma taş ocağı için bir tanıtım merkezi oluşturulması önerilmektedir. Ayakta kalan yedi ev bir bütün olarak ele alınmış ve bir otel kompleksi olarak restore edilmesi önerilmiştir. Otelde konaklama birimleri, bir teras kafe, bir kahvaltı salonu ve bir restoran bulunmaktadır. Yürüyüş yollarının eklenmesi, mevcut çeşmenin restore edilmesi ve çevresine rekreasyon alanları eklenmesi önerilmektedir. Tarım arazilerinin çoğunu baraj sularına teslim etmiş olan köy için ağaçlandırma alanları da önerilmiştir. Öneri için köyün rölövesine dayalı bir restorasyon projesi hazırlanmış ve fonksiyon lejantı işlenmiştir

ARAÇ ULAŞIMI



Karada bulunan odak noktalarının turizm kapasitesinin artırılması ile köylere/kıyıya araç ulaşımı ihtiyacı artacaktır.

Araç trafiğinin doğal ve tarihi dokuya zarar vermemesi için belirli kurallara bağlı olarak kurgulanması gereklidir.

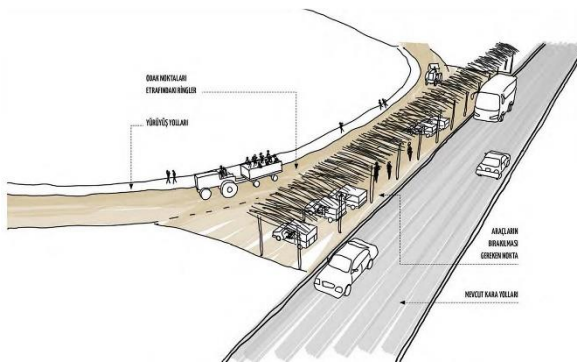
Odak noktası olarak canlandırılması önerilen köylerin tümüne araç yolu ile ulaşmak mümkündür. Fakat bu yollar arazi araçları dışındaki vasıtalarla geçmek için çok elverişli değildir.

Kıyı köylerinde yaşanan dönüşümle birlikte, bu yolların da alt yapısının iyileştirilmesi gereklidir.,

Köylerin arka tarafından geçmekte olan yolların köylerin doğal dokusuna zarar vermemesi için kontrollü araç geçişi sağlanmalıdır.

Doğanın ve Fırat'ın orijinal dokusunu deneyimlemek amacıyla köylere gelen ziyaretçilerin ulaşımı, bisiklet, hafif araçlar, binek hayvanları gibi hafif ve mekana özgü olmalıdır.

Köye gelen bireysel veya turistik otobüslerin bırakılması için köy girişinde kıyıda görünmeyecek şekilde bir araç durağı yapılmalıdır. Duraklar gizlenmek için köylerin çoğunda olduğu gibi tepelerin arkalarına yerleştirilebilir.



Motorlu taşıtlar köylerin arka tarafında gölgelikli duraklara bırakılır ve ziyaretçiler buradan traktör kasası, hafif arabalar, bisiklet, at, eşek gibi tarihi dokuyu bozmayacak vasıtalarla köy getirilir. Köyün etrafındaki ringle ve iç yollarda yalnızca bu vasıtalar kullanılır. Ziyaretçiler köyden ayrılacakları zaman tekrar bu durağa gelip kendi araçlarına veya otobüslere binebilirler.

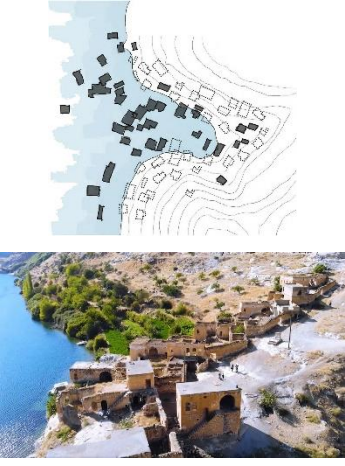
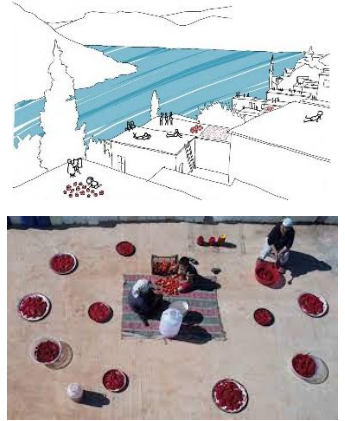
Kütlesel müdahaleler ise, tarihsel dönüşüm, kütle oranları, kütle ilişkileri, cephe oranları, çatı

formları ve araziye yerleşim alt başlıkları altında değerlendirilmiştir.



	GÖRSEL ÖRNEK	GÖZLEMLER	ÖNERİLER
TARİHSEL DÖNÜŞÜM		<p>Su seviyesinin yükselmesi ile terk edilen köylerde bulunan boş yapılar, önerilen deneyim turizmin başarılı olması için iyi korunmalı ve değerlendirilmelidir.</p> <p>İnsanların farklı ülke veya şehirlerden Fırat'a gelmesinin en önemli sebebi tarihi yapılar içinde konaklamak ve vakit geçirmek isteğidir. Bu nedenle yeni yapılar inşa etmeden önce, mevcutta kullanılmayan ve herhangi bir restorasyon ve bakım çalışması yapılmazsa zaman içinde tamamen çürüyecek/çökecek olan yapıların dönüştürülmesi gerekmektedir.</p>	<p>Önerilen restorasyon ve rehabilitasyon işlemleri hem yapıların korunması hem de turizm senaryolarının işlemesi bakımından önemlidir. Rölöve ve resititüsyon çalışmaları uzmanlar tarafından hassasiyetle yapılmalıdır.</p> <p>Yapıların orijinal kısımları uygun teknik ve malzemelerle onarılması, restitüsyon araştırmaları ile niteliksiz olan muhdeslerin çıkarılması gerekir.</p> <p>Yeniden işlevlendirilecek restorasyonu için belirli sınırlar getirilmelidir. Örneğin bir yapı butik otele dönüştürülecekse alt yapı gereksinimine ihtiyaç duyulur, bu ihtiyacın giderilmesi sırasında yapıya ve komşu yapıları tahrip etmeyecek şekilde önlemler alınmalıdır.</p>
KÜTLE ORANLARI		<p>Mevcut yapı stoğu değerlendirilse bile, kapasitenin yetmediği veya tarihi yapıları zarar vermeden restore edilemeyeceği durumlarda yeni yapıların eklenmesi söz konusudur.</p> <p>Fırat Havzası için kıyı yapılaşma ve/veya detaylı bir tasarım rehberi bulunmadığı için, Hlafeti'de bulunan otel gibi özgün dokuyu bozan ve alanın tarihi değerine zarar veren yapılaşmanın çoğalması ihtimali olasıdır. Bu tür yapıların çoğalması Fırat'ın cazibesine ve orijinal dokunun zarar görmesine zaman içerisinde tehlike oluşturmaktadır.</p>	<p>Yeni yapıların özgün dokuya uyum sağlayabilmesi için, mevcut dokuyu referans alınarak bir dizi tasarım kuralı hazırlanmalıdır.</p> <p>Bu kuralların en önemlisi kütleli ölçek ilişkileridir.</p> <p>Mevcut kütlelerin oranlar tespit edilmeli ve yeni yapılarda bu oranların takip edilmesi teşvik edilmelidir.</p> <p>Bu çalışma için alanda detaylı bir belgeleme çalışması yapılmalıdır.</p>



KÜTLE İLİŞKİLERİ		<p>Yeni yapıların ölçeklerini kontrol altına almak için yapılacak inceleme çalışması tek başına yeterli olmayacaktır.</p> <p>Eklenecek kütleler özgün dokuya aykırı olması durumunda, köy mekanının özgün dokusu tehlike altına girecektir.</p>	<p>Yeni kütlelerin aynı zamanda birbiriyle olan ilişkisinin de mevcut kütle ilişkileri incelenerek kurgulanması gerekmektedir.</p> <p>Köylerde organik bir sokak yapısı ilişkisi düzeni bulunmaktadır. Bu düzen zaman içerisinde orada yaşayanların sosyal alışkanlıklarına, iklimsel koşulların getirdiği ihtiyaçlara göre şekillenmiştir. Bu sebeple alanda yapılacak olan detaylı çalışmalar yeni yapılaşmanın uyuması gereken kütle ve sokak ilişkilerini ortaya koymalıdır.</p>
CEPHE ORANLARI		<p>Yeni yapıların kütle oran, ölçek ve ilişkileri mevcut dokuya ve bölgenin kendi cephe yapısına uyumlu olmalıdır.</p> <p>Bu konuda herhangi bir tasarım kodu, kontrol olmaması, tarihi sokusuyla uyumsuz PVC doğramalara, iklimsel performansı düşük büyük cam cephelere yol açabilir.</p> <p>Orijinal cephelerin pencere, kapı, havalandırma açıklıkları ve eyvan belirli oranlara sahiptir.</p>	<p>Orijinal cephe ve açıklık oranları belgelenecek kapı-pencere ve diğer cephe elemanlarının oranları, ölçüleri ce birbiri ile olan malzemeleri incelenmelidir.</p> <p>Pencere oranları, yerleri, havalandırma açıklıkları ve eyvanların binaların iklimsel performansına etkisi incelenmelidir.</p> <p>Bu oranların korunması ve tekrarı hem estetik hem de binaların enerji performansı açısından önemlidir.</p>
ÇATI FORMLARI		<p>Arazi ziyaretleri sırasında en dikkat çekici tespitlerden biri, mevcut yapıların tümünün düz damlı olmasıdır.</p> <p>Yapılan araştırmalarda 'dam yaşamının' Gaziantep'linin hayatının büyük bir parçası olduğunu ortaya koymuştur. Kendi söylemleri ile hayatlarının %80'i damda geçmektedir.</p>	<p>Fırat Havzası hem yapısal, hem kültürel olarak korunması gereken bir değerdir. Bölgeye gelen ziyaretçiler bozulmamış bir Fırat kültürü deneyimleme şansına sahip olmalıdır. Bu nedenle yeni yapılacak yapıların çatıları da aynı formda olmalıdır.</p> <p>Damlar, köyde konaklayacak ziyaretçiler</p>

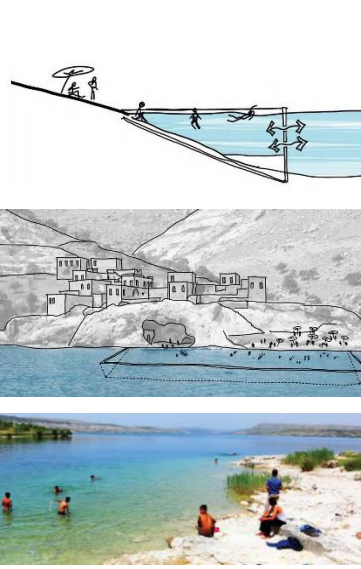


			<p>tarafından Gaziantep ve Şanlıurfa halkı gibi serinlemek için kullanılabilir. Kısa süreli ziyaretçiler için ise nehre farklı kotlardan bakan seyir terasları olarak kullanılabilir.</p> <p>Ayrıca teraslar, salça yapımı tarhana kurutma gibi gibi yörede damların orijinal kullanımında yer alan faaliyetleri ziyaretçilere workshop olarak öğretilmesi için uygun mekanlardır.</p>
ARAZİYE YERLEŞİM		<p>Kıyı köylerinin hepsi, su kotundan başlayarak tepeleşen sert eğimler üzerine oturur.</p> <p>Bu eğimli arazi yapıların yerleşimini de bölgeye özgü bir hale getirir. Kot farklılıklarından oluşan teraslamalar, merdiven yapının farklı katlarından müstakil girişle yeni yapılaşmada da değerlendirmeye alınması gereken tasarım öğeleridir.</p>	<p>Bu bağlamda yapıların da araziye benzer bir biçimde yerleşmeleri, yüksek hacimli harfiyata, dolguya oturma katlarında düzenleme yapılarak görünür yüksek istinat duvarlarına izin verilmemelidir.</p>

Kıyı görünümleri başlığında ise, yapı yükseklikleri, iskele tasarımları, yüzülebilir alanları alt başlıkları altında incelenmiştir.

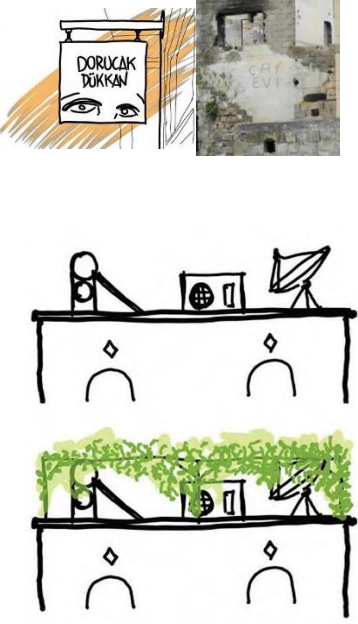
	GÖRSEL ÖRNEK	GÖZLEMLER	ÖNERİLER
ARAZİYE YERLEŞİM		<p>Fırat Nehri kenarındaki tüm köylerin yüksek tepelerden su seviyesine inen topoğrafyaya sahip oldukları, yapılarında bu eğime uyumlu bir biçimde konumlandığı görülmektedir.</p> <p>Su seviyesinden bakıldığında, yapıların üst noktaların çizdiği hiza topoğrafyayla doğrudan ilişkilidir.</p> <p>Bu durum orijinal yapı yükseklikleri neredeyse aynı olduğu için kendiliğinden oluşmuştur. Sudan bakıldığında göze bakan bir silüet oluşmaz ve tüm yapılar</p>	<p>Yeni yapılar inşa edildiğinde, bina yüksekliğini artırmak isteyen yatırımcılar olacaktır. Silüeti korumak adına mevcut düzenlemeyi dikkate alarak bir yükseklik kodu geliştirmek gerekir.</p> <p>Yandaki imajda tarif edilen bu kod, su kotundan topoğrafyayı baz alır ve hem su kotuna bakıldığında görünen silüet ve yapıların</p>



		manzaradan eşit miktarda faydalanır.	manzara hakkı korunmuş olur.
İSKELE TASARIMLARI		Mevcut iskeleler derme çatma görünümündedir. Ne yapısal olarak ne de malzeme kullanımı açısından tarihi doku ile uyumlu değildir.	Hem yeni iskeleleri önerilen yeni iskelelerin tasarımı, hem de mevcut olanların değiştirilmesi için saha modern sisteme sahip, malzeme paleti tarihi yapılara uyumlu tanımlanmış iskeleler tariflenmelidir. Su üzerindeki dolaşım şu anki münferitten ziyade daha toplu taşıma amacı ile yapılacaksa bu daha büyük tekneler kullanılacağı anlamına gelir. Bu durumda iskelelerin sisteminin bu duruma uygun olması gereklidir
YÜZÜLEBİLİR ALANLARI		Fırat nehri genel olarak zemin yapısı ve tatlı su olması sebebiyle yüzmenin tehlikeli olduğu bir alandır. Sıcak yaz aylarında serinlemek için bütün havza halkının akın ettiği günü birlik veya uzun süreli, binlerce kişi tarafından ziyaret edilmektedir. Yeni düzenlemelerle hem ziyaretçi kapasitesinin artması hem de bölgedeki otellerin sayısının artmasıyla yüzülebilir alanlara olan ihtiyaçta artacaktır. Nehir üzerinde güvenilebilir yüzmeye alanları tasarlanabilir.	İlgili sorumlulara danışarak, nehir üzerinde yüzmenin güvenli olduğu yerler tespit edilmelidir. Bu bölgelerde özellikle günü birlik ziyaretçilerin kullanabileceği halk plajları düzenlenmelidir. Yüzmenin güvenli olmadığı fakat ziyaretçi sıklığının yüksek olduğu alanlarda yine nehir üzerinde havuzlar yapılabilir. Doğal havuzlar nehrin içine yerleştirilen, suyu filtreleyerek doğa ekosisteme etki etmeyen fakat yüzmeye elverişli durgun sular yaratan sistemlerdir.

Yapı ölçeği ise tek alt başlık altında ek elemanlar olarak incelenmiş ve aşağıdaki tablodaki gibi gösterilmiştir.



	GÖRSEL ÖRNEK	GÖZLEMLER	ÖNERİLER
EK ELEMANLAR		<p>Tarihi dokunun zarar görmemesi için bu ek elamanların yerleştirilmesi ile bir tasarım kuralı oluşturulmalıdır.</p> <p>Tüm dış klima üniteleri nehir yönüne değil arka cepheye yerleştirilmelidir ve panel veya kafes gibi elmanlar ile gizlenmelidir.</p>	<p>Tarihi dokunun zarar görmemesi için bu ek elamanların yerleştirilmesi ile bir tasarım kuralı oluşturulmalıdır.</p> <p>Tüm dış klima üniteleri nehir yönüne değil arka cepheye yerleştirilmelidir ve panel veya kafes gibi elmanlar ile gizlenmelidir.</p> <p>Mevcut klima üniteleri için de aynı gizleme yöntemi kullanılabilir.</p> <p>Çatılarda veya cephelerde bulunana çanakların tümü çatıya alınmalıdır. Damlarda düşük parapetler kullanılmalıdır, hem tüm çanaklar için kamufraj, hem de güvenliği arttırmak için yeşillikle örtülmüş parapetler önerilebilir.</p> <p>Güneş panelleri e yanında yer alan su depoları da aynı biçimde gizlenebilir.</p>

SONUÇ

Kırsal yerleşimler yer aldıkları yörenin özelliklerini yansıtan, mimarisi doğayla ve topografyayla uyumlu şekillenen bölgelerdir. Kırsal yerleşimlerin birçoğu süreç içerisinde çeşitli sebeplerle nüfus kaybına uğramış ve geriye kalan kırsal mimari kaderine terk edilmiştir. Kırsal alanların korunmasına konusu son yıllarda koruma konusunda değerlendirilmeye başlanmıştır. Koruma konusunda önemli bir belge olan Venedik Tüzüğü'nde tarihi anıt kavramının kırsal yerleşimleri de kapsadığına ve bu bölgelerin de korunması gerektiği vurgulanmaktadır. Türkiye'de kırsal mimari mirasın korunmasına dair çalışmaların tarihi yakın dönemlere dayanmaktadır. Bu kırsal mirasın korunması ve yaşatılması, istihdamın ve ekonominin canlanması, gelişmesi ve sürekliliği ile mümkün olacaktır. Bu sebeple kırsal yerleşimin korunması için kırsal turizmin araç olarak kullanılması bu teoriyi destekleyen bir yöntemdir.

Aşağı Fırat Havzası korunmaya değer kırsal yerleşimlere sahiptir. Bu yerleşimlerin bir kısmı GAP kapsamında yapılan ve 2000 yılında tamamlanan Birecik Barajı rezerv alanından etkilenmiştir. Yapılarını ve tarım arazilerini kamulaştırma kapsamında kaybeden köyler terk edilmiş ve nüfusunu yitirmiştir. Kırsal mimarinin önemli öğelerini barındıran bu yerleşimler nüfuslarını kaybetmeleri sebebiyle mimari değerleri de hasara uğramaktadır. Bu havzada yer alan ve barajdan etkilenen fakat birçok kültürel mirasın yer aldığı kırsal yerleşimlerin korunması için bölgenin kırsal turizm ile değerlendirilmesi önerilmiştir. Kırsal turizme odaklanan bu çalışmada Aşağı Fırat Havzası'nın tümü ele alınmış ve bu alana dair bir turizm rotası geliştirilmiştir. Bu turizm rotası üzerinde yer alan köylerde bulunan kırsal mirasın yeniden işlevlendirmesi gerekmektedir ve aynı zamanda yeni yapı ihtiyacı ortaya çıkmaktadır. Kırsal özgün dokuyla uyumlu olması bakımından bir takım gözlemler yapılmış ve tasarım önerileri geliştirilmiştir.



Bu öneriler kapsamında geliştirilen tasarım önerileri yeni yapılacak yapıların özgün dokuyla uyumlu olmasını sağlayacaktır. Geliştirilen tasarım kriterleri üst ölçekli, kütleli müdahaleler, kıyı görünümleri ve ek elemanlar olmak üzere dört başlıkta ele alınmıştır.

Sonuç olarak tüm bu incelemeler, tespitler ve öneriler ışığında kırsal alanlardaki yaşamın yine kırsal mekânlar aracılığı ile tanıtılması, korunması, canlandırılması ve yaşatılması kırsal mirasın korunması ve geleceğe aktarılması için önem arz etmektedir. Bu çalışma bu amaca hizmetle hazırlanmış ve bölgedeki diğer yerleşimler için de referans olması hedeflenmiştir.

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AUTONOMOUS UNMANNED AERIAL VEHICLE WITH DEEP LEARNING-BASED AUDIO PROCESSING TECHNOLOGY

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ABSTRACT

In this study, an Unmanned Aerial Vehicle (UAV) platform capable of performing real-time object detection and classification using deep learning-based environmental sound classification technology is introduced, enabling autonomous decision-making. The UAV has the ability to listen to environmental sounds. Sound processing allows the UAV to detect and classify objects based on sound, enabling it to autonomously perform defined tasks.

In studies on object detection and classification with UAVs, it is observed that image processing technology is predominantly used, and the use of sound processing technology in UAVs is very limited. To enable UAVs to make autonomous decisions and perform real-time object detection and classification from environmental sounds, UAVs require an embedded artificial intelligence module. By incorporating sound processing technology into the UAV through this embedded system, the capacity for object detection and classification is significantly increased, providing a significant advantage. This allows UAVs to be used more effectively and safely in different tasks.

In the proposed approach, sound processing was implemented on the UAV by mounting a Raspberry Pi 4, camera, and microphone. A compatible 4G/LTE modem kit was used to remotely access the Raspberry Pi and intervene in the system when necessary. Additionally, a Coral Edge TPU auxiliary processor was used with the Raspberry Pi to increase object detection speed. The YAMNet deep learning model based on the MobileNetV1 convolutional neural network was selected as the deep learning model to process the sound signal and was trained using the transfer learning method with the TensorFlow library. Experimental tests for sound classification used helicopter sounds, and it was observed that the model correctly classified the sound.

Keywords: Unmanned aerial vehicle, Audio signal processing, Object detection, Deep learning, Conventional neural network, Rapsberry pi, Sound Classification.

1. INTRODUCTION

Unmanned Aerial Vehicle (UAV), also known as a Drone, is a pilotless aircraft controlled by a ground control center. Nowadays, the use of UAVs has become quite widespread, and they are utilized in various fields such as agriculture [1], logistics [2], filmmaking [3], military [4], health [5], and many others. As UAV applications become more widespread, advanced autonomy is required to ensure safety and operational efficiency, to fulfill defined tasks. Ideally, an autonomous UAV should primarily have sensors, microprocessors, and most importantly, built-in artificial intelligence for safe navigation.

Artificial intelligence is a branch of science aimed at giving computer systems human-like thinking and decision-making capabilities. These systems can perform human-like functions in areas such as data analysis, pattern recognition, autonomous decision-making, and natural language processing. Artificial intelligence generally encompasses subfields such as machine learning and deep learning [6]. Machine learning allows algorithms to learn from data to perform specific tasks, while deep learning uses multi-layered artificial neural networks to automatically learn complex relationships from large and intricate datasets.



The proposed and implemented method in this study is the idea of embedding audio signal processing onto UAVs using deep learning algorithms. This requires a microprocessor to be placed on the UAV. Thus, sound information obtained from the microphone is directly transferred to this microprocessor, where audio signal processing is performed. In this study, the Raspberry Pi 4 B Model was preferred as the microprocessor due to its compatibility with the deep learning model and library.

The YAMNet deep learning model trained with the transfer learning method was later converted to the "TensorFlow Lite" format to run on Raspberry Pi with the assistance of the Edge TPU auxiliary processor. Given the frequent use of UAVs, commonly known as drones, in military applications, the usage scope of the UAV platform was designed with a military focus in mind. The objective was to enable the UAV platform to detect a military helicopter as an object using audio data. However, knowing that it would not be possible to have a military helicopter in the flight area, the method of object detection and classification using sound was simulated in a closed sports hall.

The innovative aspect of this study is the introduction of an autonomous Unmanned Aerial Vehicle (UAV) capable of performing real-time object detection and classification operations using deep learning-based environmental sound classification technology. Although deep learning-based environmental sound classification technology is used for various purposes in different fields, its application is quite limited.

Carlos et al. [7] introduced a system capable of classifying real-time sound events and updating the location and associated information of detected events. They used the pre-trained YAMNet model for real-time sound classification, emphasizing its potential application in various environments to assist visually impaired individuals.

Kumar et al. [8] highlighted the potential use of speech signals as a non-invasive method for early detection of Parkinson's disease, noting the tiring and error-prone nature of manual speech signal analysis. Therefore, they proposed deep learning-based methods to accelerate the procedure and increase accuracy. They mentioned using the YAMNet sound classification model for efficient feature extraction from the dataset to create a sensitive and effective tool for early diagnosis and management of Parkinson's disease.

Tena et al. [9] utilized sound classification for easy detection of COVID-19. They extracted features using the YAMNet sound classification model based on the MobileNetV1 convolutional neural network architecture, from a dataset containing coughs of COVID-19 and non-COVID-19 patients, successfully identifying COVID-19 patients.

Roy and Satija [10] utilized time-frequency mel spectrogram representations of lung sounds and a YAMNet-based transfer learning model for the severity detection of Chronic Obstructive Pulmonary Disease (COPD).

Mohammed et al. [11] converted RF signals into audio signals and used the YAMNet sound classification model to identify drone model types from these audio signals.

It is evident that the application of object classification using sound is not limited to UAVs but is also used extensively in medical diagnosis [12-16] and ground systems with drone detection studies [17-21]. This study aims to make a significant contribution to enhancing the functionality of UAVs. The use of deep learning-based sound processing technology can enable UAVs to operate more effectively, efficiently, and autonomously, offering significant benefits to various industries.

2. METHODOLOGY

In object detection and classification applications with UAVs, commercially available UAVs are predominantly used, and modifications are made to these UAVs as needed [22, 23], depending on the situation. Hardware and software intervention in these systems is limited. Therefore, the UAV platform used in this study was designed from scratch with hardware equipped with open-source software. In this section, the sound processing technology used during the development of the embedded artificial



intelligence module of the UAV platform, the object detection and classification model, the embedded system design, and the software architecture developed for autonomy are detailed.

2.1 Audio Processing and Sound Classification

Developments in the field of deep learning have enabled the processing of audio signals using deep learning methods [24]. Deep learning technologies are utilized in various areas such as speech recognition, music information retrieval, and environmental sound classification [25-30]. Sound classification typically involves the process of extracting features from audio data [31-35].

Convolutional neural networks are commonly used to efficiently process audio data and learn features related to sound [36-39]. In this section, after providing information about sound classification and the deep learning-based sound classifier YAMNet model, the steps towards endowing UAVs with object detection capability through sound classification are described.

The foundation of sound classification lies in extracting features from audio data. Feature extraction from audio data is performed to identify sound sources. Sound signals are usually transformed into two-dimensional time-frequency representations for processing. Recently, convolutional neural networks have been employed to efficiently process audio data and achieve high levels of accuracy in sound classification [40]. Integrating deep learning models into resource-constrained embedded devices like Raspberry Pi is a challenging process. Tensor Processing Units (TPUs), used to increase processing speed in such devices, play a crucial role in achieving better performance.

This study aims to train the pre-trained sound classification model YAMNet for a specific task using the "transfer learning" method, and then convert it into a TensorFlow Lite model that can work more efficiently and quickly on resource-limited devices like Raspberry Pi (RPI) and TPUs.

2.2 Deep learning based YAMNET audio classification model

YAMNet is a pre-trained neural network model developed by the Google TensorFlow team [41]. It utilizes the MobileNetV1 architecture, which is a depth-wise separable convolutional architecture, and it leverages the AudioSet ontology to predict 521 different sound events [42]. The model accepts input in the form of a 1-D float32 Tensor or NumPy array representing audio waveforms of optional length, sampled at 16 kHz and single-channel (mono), within the range of [-1.0, +1.0] [43].

Within the YAMNet model, there exists a feature extraction layer. This layer transforms the audio data into spectrograms. These spectrograms are then passed to the MobileNet for further processing. Finally, the model outputs classification scores. The feature extraction and sound classification process of YAMNet are illustrated in Figure 2.1 below.

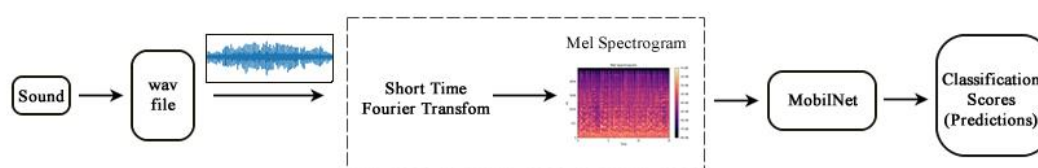


Figure 2.1: YAMNet Sound Feature Extraction and Prediction Process

This model has been specifically adapted and pretrained to extract audio features, making it a powerful tool for tasks such as sound classification and audio analysis. The process of extracting audio features with YAMNet involves a series of mathematical operations and transformations. It is essential to have a good understanding of the feature extraction process of audio signals for training and customizing the model using the transfer learning method. This process is detailed below in the following subsections.



2.2.1 Preprocessing of audio data preparation

The audio signal used to train the neural network must conform to the input format of the YAMNet model. Therefore, the audio signal to be used as input should be converted to the appropriate format. If the audio signal does not have a sampling rate of 16 kHz, it needs to be resampled to 16 kHz, and if it is in stereo format, it should be converted to mono format (single-channel).

2.2.2 Extracting Mel spectrograms

A spectrogram is a visual representation of the variability of a sound signal's frequency spectrum over time [44, 45], and it often contains distinctive features of sounds [46]. Feature maps used as inputs for the YAMNet model are created by extracting coefficients from the time-frequency representations of sounds. The frequency content of a sound is not perceived linearly by humans.

The YAMNet model operates on log-mel spectrograms as feature maps to enable machines to distinguish sounds similar to humans [47].

The Mel scale is a measure used to represent the logarithmic nature of human frequency perception. A Mel spectrogram visualizes the time-varying changes in frequencies on the Mel scale. While traditional spectrograms represent frequencies directly in Hertz, a Mel spectrogram represents frequencies on the Mel scale. This allows for a more suitable visualization of frequency components for human hearing and is widely used in the field of audio processing.

The relationship between the Mel scale and frequency is shown in Equation (2.1) [48]:

$$f_{mel} = \begin{cases} f & , f \leq 1000 \text{ Hz} \\ 2595 \log_{10} \left(1 + \frac{f}{700} \right) & , f > 1000 \text{ Hz} \end{cases} \quad (2.1)$$

here, f_{mel} represents the Mel frequency and f , represents the linear frequency.

To obtain the Mel spectrogram from the pre-processed audio segment, the Short-Time Fourier Transform (STFT) needs to be applied to the audio signal [49]. The Short-Time Fourier Transform (STFT) is a time-frequency analysis technique for continuous signals, which means it transforms the signal into the time-frequency domain [50, 51]. In other words, the STFT considers only a short-term portion of a long signal and computes the Fourier transform [52, 53]. Thus, it divides the signal into several distinct or overlapping frames by multiplying the signal by a window function in the time domain, and then applies the Fast Fourier Transform (FFT) to each frame [24, 54].

As the Fourier transforms are performed while moving the window, this technique can measure changes in the frequency content of a signal over time [55]. As shown in Figure 2.2, a window function ($w(t)$) of equal size is selected for each segment and placed at the beginning of the signal. Depending on the hop length, the window will slide along the signal, repeating the Fourier transform for each new window with updated waveform data [56].

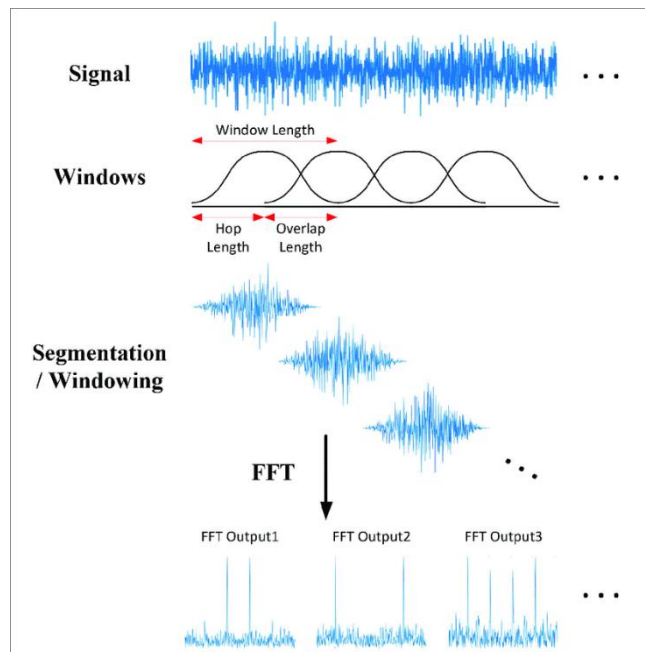


Figure 2.2: Generalized Short-Time Fourier Transform (STFT) [57]

Figure 2.3 shows that, considering STFT is essentially the multiplication of the Fourier transform with a window function, it can also be referred to as windowed Fourier transform or time-varying Fourier transform [58].

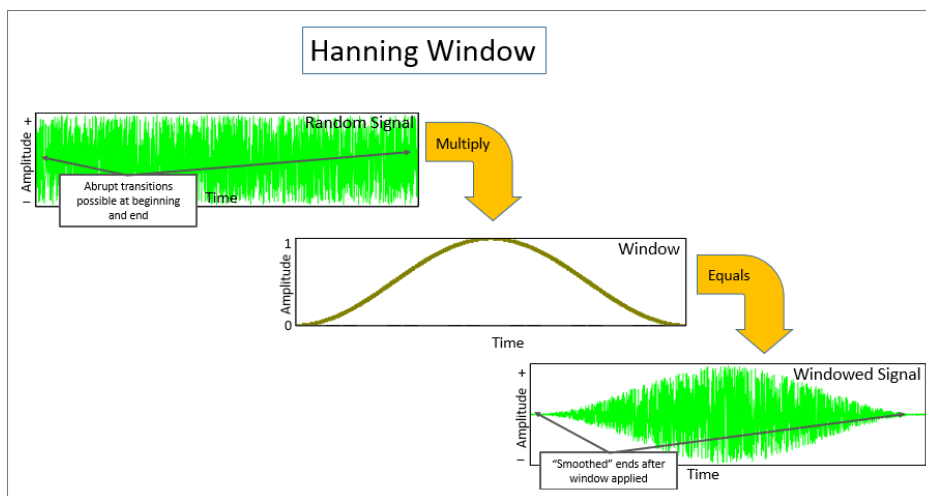


Figure 2.1: Hann(Hanning) Window [59]

Due to these properties, STFT is widely used in various fields requiring frequency measurement over time, such as radar systems and audio signal processing systems. Equation (2.2) represents the continuous version of STFT and is mathematically expressed as follows [60]:

$$\text{STFT}\{x(t)\}(\tau, \omega) \equiv X(\tau, \omega) = \int_{-\infty}^{\infty} x(t)w(t - \tau)e^{-i\omega t}dt \quad (2.2)$$

here, $w(\tau)$ represents the window function, typically either a Hann window or a Gaussian window is used, $x(t)$ is the signal undergoing transformation, and ω is the frequency. $X(\tau, \omega)$ represents the phase and magnitude of the signal in terms of time and frequency, and it is the Fourier transform of $x(t)w(t - \tau)$. The variable τ in Equation (2.2) is often used to apply a phase unwrapping operation along the time axis (τ) and frequency axis (ω) to suppress any discontinuity in the phase result of STFT [58]. Hanning window is commonly used in operational noise and vibration measurements. Many operational signals



are inherently random, as illustrated in Figure 2.3. The Hanning window starts and ends at zero value (Figure 2.3), with a value at the center. This gradual transition from 0 to 1 provides a smooth change in amplitudes when the measured signal is multiplied by the window, helping to reduce spectral leakage [59].

In the YAMNet model, a spectrogram is computed using Short-Time Fourier Transform (STFT) magnitudes with a window size of 25 ms, a window hop size of 10 ms, and a periodic Hann window. Random signals, such as the sound produced by a running motor, can be given as examples. STFT transforms the signal into the frequency domain and then computes its magnitude. Subsequently, a filter bank is applied to the magnitude spectrogram, and the energy in different frequency bands is calculated. Finally, the logarithm of the energy of the filter bank is taken to obtain the Mel spectrogram.

2.3 Detection of Noise in Sound Data and Method for Filtering out This Noise to Improve Sound Classification Results

Environmental noise classification can be challenging due to the presence of various object sounds or noises in the audio data collected using a microphone. Therefore, it is crucial to detect and subsequently filter out noises that could adversely affect object detection and classification based on sound. This study aims to detect objects in the surrounding environment using sound information obtained through a microphone sensor mounted on an Unmanned Aerial Vehicle (UAV). The UAV detects sounds from various sources through the microphone mounted on its embedded system and analyzes these sound data. Since the sound classification model operates on the UAV, detecting noises that negatively impact classification and filtering out these noises using appropriate filtering methods will enhance the efficiency and performance of the model. Initially, after the identification and analysis of noise sources, digital filtering methods can be applied to the noise sound data.

The primary source of noise in sound classification with a Hexacopter UAV is typically the sound generated by the Hexacopter itself. The source of the sound produced by the Hexacopter generally comes from its external rotor brushless DC motors and propellers [61]. Here are the primary sources of the sound produced by the Hexacopter:

Motors: In most multirotor UAVs, outrunner brushless DC motors are used. There are several studies indicating that in outrunner BLDC motors, the primary source of noise is electromagnetic noise [62-68]. The main cause of electromagnetic noise is reported to be the radial force acting on the stator or rotor of a motor [69].

Propellers: Propellers rotate to keep the UAV airborne. The rotation speed of propellers is typically measured in RPM (revolutions per minute). Faster rotating propellers can generate noise at higher frequencies. Noise sources are usually aerodynamically produced on the blade surface and generally classified as thickness and loading noise.

The sound produced by the Hexacopter can vary depending on the operating speed of the motors and the rotational speed of the propellers. The noise generated by the motors and the motor-propeller pair was analyzed separately.

The noise generated by the motors in the Hexacopter is the result of the rotating rotors within the magnetic field. In this context, to detect the electromagnetic noise produced by the motors, six motor units without propellers were operated on the Hexacopter (Figure 2.4). Additionally, since the sound produced varies depending on the rotational speed of the motors, motor sounds corresponding to hover mode (the mode where the Hexacopter maintains a specific target point) and the roll, pitch, and yaw flight movements in hover mode were recorded using the Hexacopter's controller, and frequency analyses of the motor sounds were conducted. Only the electromagnetically induced noise was recorded; therefore, propellers were removed from the six motors. Motor sounds were recorded by a microphone positioned at the exact center of the Hexacopter on the ground, at a distance of 27.50 cm from each motor (Figure 2.4).

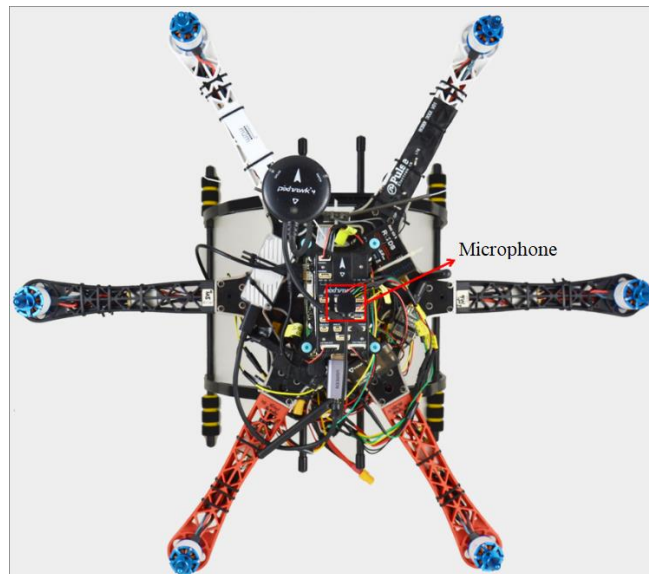


Figure 2.42: Embedded System Microphone on Hexacopter

The motor speeds vary according to the flight movements in the Roll, Pitch, and Yaw axes of the Hexacopter, leading to variations in the sound signals produced by the six motors. Therefore, sound signals were measured separately for each flight movement. For example, the spectrogram of the noise produced by the six motors during the Roll Right flight movement, commanded from the controller, while the Hexacopter is flying in hover mode, is shown in Figure 2.5.

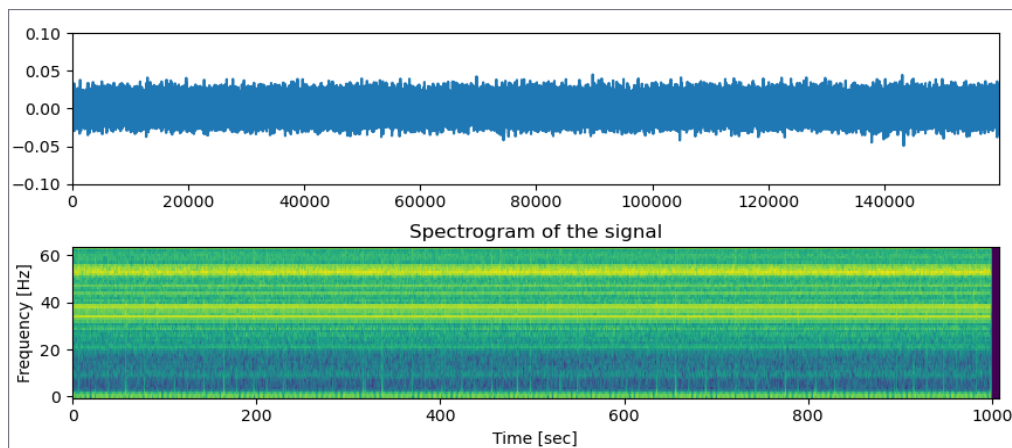


Figure 2.3: Spectrogram of the Noise Produced by the Six Motors during Hexacopter Roll Right Movement

There have been numerous studies in the literature examining the noise generated by propellers in multirotor UAVs [70-74]. In experimental acoustic measurements conducted by researchers, it was found that the rotor-body interaction produces significant tonal noise at blade passing frequency (BPF) harmonics [75]. Additionally, they emphasized the generation of broadband noise due to the interaction between propellers and turbulent flows in the surroundings [76]. To record the sound signals produced by the six motor-propeller pairs in the Hexacopter, the propellers were mounted correctly in the directions shown in Figure 2.6. Subsequently, the Hexacopter was operated by placing sufficient weights on its landing gears. Sound recordings were made according to the hover flight mode and the roll, pitch, and yaw flight movements in hover mode.



Figure 2.6: Hexacopter and its Six Engines with Propeller

The spectrogram of the sound signals produced by the six motor-propeller pairs in response to the Roll Right command (flight movement) sent from the RC controller while the Hexacopter is in hover mode (suspended in the air) is shown in Figure 2.7 below.

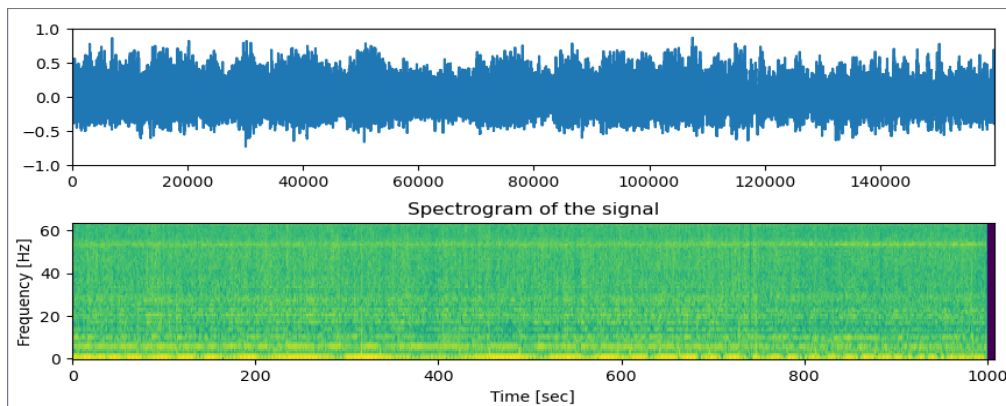


Figure 2.7: Spectrogram of the Noise Produced by the Six Motor-Propeller Pairs during Hexacopter Roll Right Movement

In environmental sound classification, filtering out noise and different sounds is necessary to accurately classify a specific object based on the audio signal. The filtering process is used to remove unwanted noise and other components from the signal to obtain the desired signal. In other words, filters are fundamental tools used in signal processing to eliminate unwanted frequencies or enhance desired frequencies. By using filters, the desired amplitude, phase, and frequency can be obtained from the original signal. Digital filters are more commonly used compared to analog filters as they are preferred for detecting and filtering out noise signals in many fields [77].

Digital filters are algorithms used to remove or amplify specific frequencies in a signal. They are utilized in various fields including audio processing, image processing, and data analysis. The primary function of filters is to eliminate unwanted frequencies while preserving the desired frequencies, allowing efficient extraction of necessary information from a signal. Signal processing is a crucial aspect of modern communication systems, and filters play a vital role in signal processing. The use of filters in signal processing helps to eliminate noise and interference that can degrade the signal and hinder the extraction of essential information. One of the most commonly used filters is the Butterworth filter. The



Python-Scipy Library provides the capability to apply digital Butterworth filters (`scipy.signal.butter`) to audio signals.

In conclusion, filters play a crucial role in signal processing and find widespread applications in various fields such as electronics, audio processing, image processing, and data analysis. Understanding different types of filters and their applications is essential for designing and implementing efficient signal processing systems. Butterworth filters are widely used in various applications including digital signal processing, audio processing, and image processing [78, 79]. In this study, digital Butterworth filters were applied to filter out motor-propeller sounds.

2.4 Training the YAMNet sound classification model using the transfer learning method

The TensorFlow-YAMNet is a highly comprehensive sound classifier with a feature extraction layer and a deep neural network containing MobileNetV1, designed for recognizing sound events [80]. YAMNet is a model that can be retrained using the transfer learning method, allowing us to make changes to its model parameters and quickly create task-specific sound classifiers [43]. In this study, the deep learning-based YAMNet sound classification model was retrained using the transfer learning method to classify the helicopter object with high accuracy, and the model parameters were optimized for the task.

During the retraining of the YAMNet model using the transfer learning method, the Environment Sounds Classifications ESC-50 dataset was utilized for training. The ESC-50 dataset is a collection of 2000 labeled environmental sound events divided into 5 main categories and 50 semantic classes [81, 82]. Each of the 50 classes in the ESC-50 dataset contains 40 recordings in ".wav" format, each lasting 5 seconds.

Understanding the model structure and feature extraction process is crucial for retraining and customizing the model. In order to use the audio signal as input in the YAMNet model, some data preprocessing steps are required. Data preprocessing involves extracting Mel spectrogram coefficients to feed into the YAMNet architecture (Figure 2.8), as these coefficients form the input feature map. The data preprocessing steps are as follows [48, 83-85]:

1. If the audio signal is not mono, it is first converted to a mono signal and then resampled to 16 kHz (16000Hz).
2. A spectrogram is computed using Short-Time Fourier Transform (STFT) magnitudes with a window size of 25 ms (0.025 sec), a hop size of 10 ms (0.010 sec), and a periodic Hann window.
3. A Mel spectrogram is computed by mapping the spectrogram onto 64 mel bins covering the range of 125-7500 Hz.
4. Logarithmic Mel spectrogram is computed by applying $\log(\text{mel-spectrum} + 0.001)$, where the `log_offset` parameter is used with a value of 0.001 to avoid taking the logarithm of zero.
5. These features are then framed into 0.96-second frames with 50% overlap, where each frame encompasses 96 frames of 10 ms each covering 64 Mel bands. As a result, a 96x64-dimensional logarithmic Mel spectrogram is obtained and passed to the YAMNet model for feature extraction.

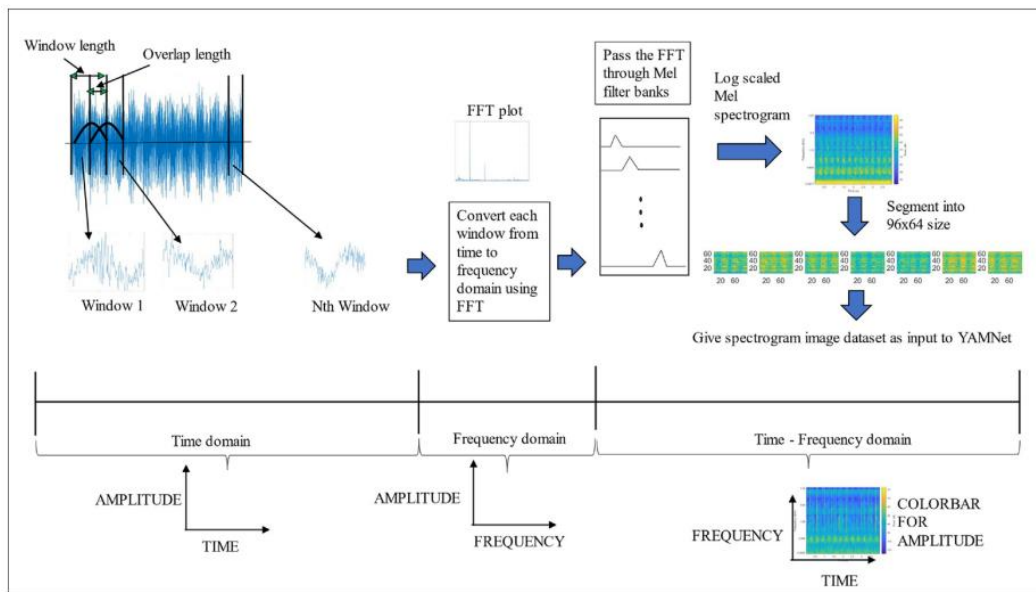


Figure 2.8: Steps for extracting the Mel spectrogram of the audio signal according to the input requirements of the YAMNet model [83]

An environmental sound classifier was developed to accurately classify the sounds surrounding the UAV. The features extracted from YAMNet were provided as input to the model during training. An environmental sound classifier was built using the ESC-50 dataset, which can accurately classify the helicopter object.

YAMNet is a sound classification model that predicts 521 different sound events. Although YAMNet includes a helicopter class, its prediction accuracy for a specific task may be low due to its general nature.

In this study, the specific task of the UAV is to detect the helicopter object from audio data. To achieve higher prediction accuracy, it is necessary to retrain the YAMNet sound classification model with helicopter sound data from the ESC-50 dataset using transfer learning. The YAMNet model consists of a series of convolutional layers followed by dense layers that perform classification based on 521 outputs (Figure 2.9).

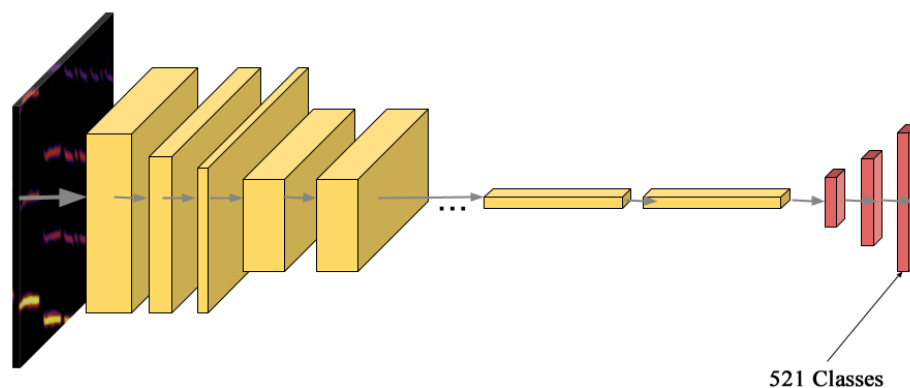


Figure 2.9: The architecture of the YAMNet sound classification model [87]

In the YAMNet model, we can take the pre-trained layers and freeze them so that they cannot be trained. Then, we can train the layers we want to train and add the task-specific classifier (helicopter classifier) as shown in Figure 2.10.

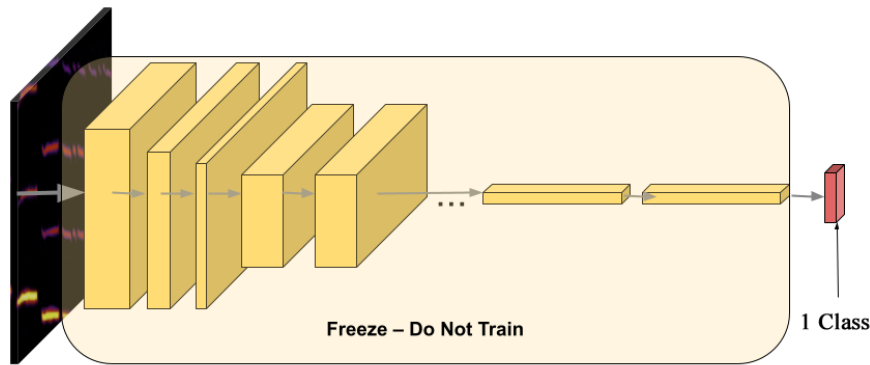


Figure 2.10: Training the YAMNet sound classification model using the transfer learning method [87] The YAMNet sound classification model was retrained with the hyperparameter values given in Table 2.1, leading to an improvement in the model's accuracy in classifying helicopter objects.

Table 2.1: Configuration Values for YAMNet Model Hyperparameters

Hyperparameters	Values
Epoch	30
Activation Function	ReLU
Classifier	Softmax
Optimizer	Adam
Batch Size	64

During the training of the YAMNet model for object classification using audio data, the Rectified Linear Unit (ReLU) activation function and the Adam optimizer were preferred.

After being retrained for a specific task using the transfer learning method, the YAMNet audio classification model was converted into a TensorFlow Lite model for use on Raspberry Pi. Subsequently, the model was tested with test data. The outputs corresponding to the post-training test results of the YAMNet audio classification model are presented in Figures 2.11 and 2.12 below.

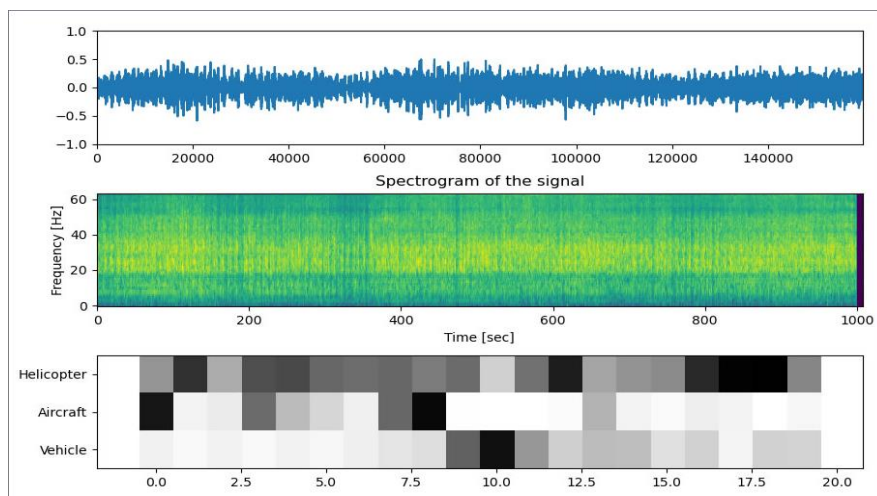


Figure 2.11: YAMNet Sound Classification Model Test Result-1

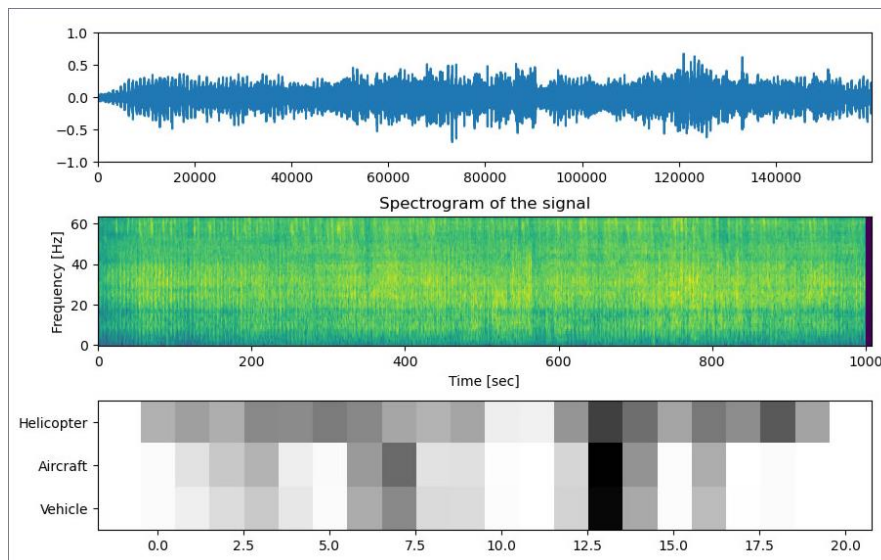


Figure 2.4: YAMNet Sound Classification Model Test Result-2

2.5 Autonomous Decision-Making Architecture

The embedded system software of the UAV consists of multiple scripts written in the Python programming language, which work in synchronization with each other. All the coded software has been loaded onto the Raspberry Pi. Audio processing software containing deep learning algorithms analyze the surroundings of the UAV through embedded system hardware. For the scripts to work in sync with the UAV, they need to start automatically when the Raspberry Pi 4 boots up, which happens when power is supplied to the entire system. To achieve this, a bash script was created to establish the virtual environment where the scripts will run and to start them. The Raspberry Pi 4 was configured to execute the bash script when it receives power and boots up.

3. EXPERIMENTAL RESULTS

The deep learning-based environmental sound classification model YAMNet was trained using the transfer learning method to detect objects belonging to the helicopter class with audio data. Due to both legal regulations and the inability to ensure the presence of helicopters within the flight test area during UAV flights, testing of the neural network model was conducted in a closed sports hall to simulate a real flight environment (Figure 3.1).



Figure 3.1: Experimental Test Environment of the YAMNet Sound Classification Model



The helicopter sound was played from a mobile phone and transmitted to the speakers via Bluetooth. Considering the length of the sports hall, while the Hexacopter remained stationary, the speakers were placed 20 meters away.

In the tests for recognizing the helicopter sound using the sound classification model, the model was evaluated separately for hover mode and the following flight maneuvers: roll left, roll right, pitch forward, pitch back, yaw left, and yaw right. The output results for each condition are shown below. Figure 3.2 demonstrates that the YAMNet sound classification model can recognize the helicopter sound during Hexacopter hover flight mode.

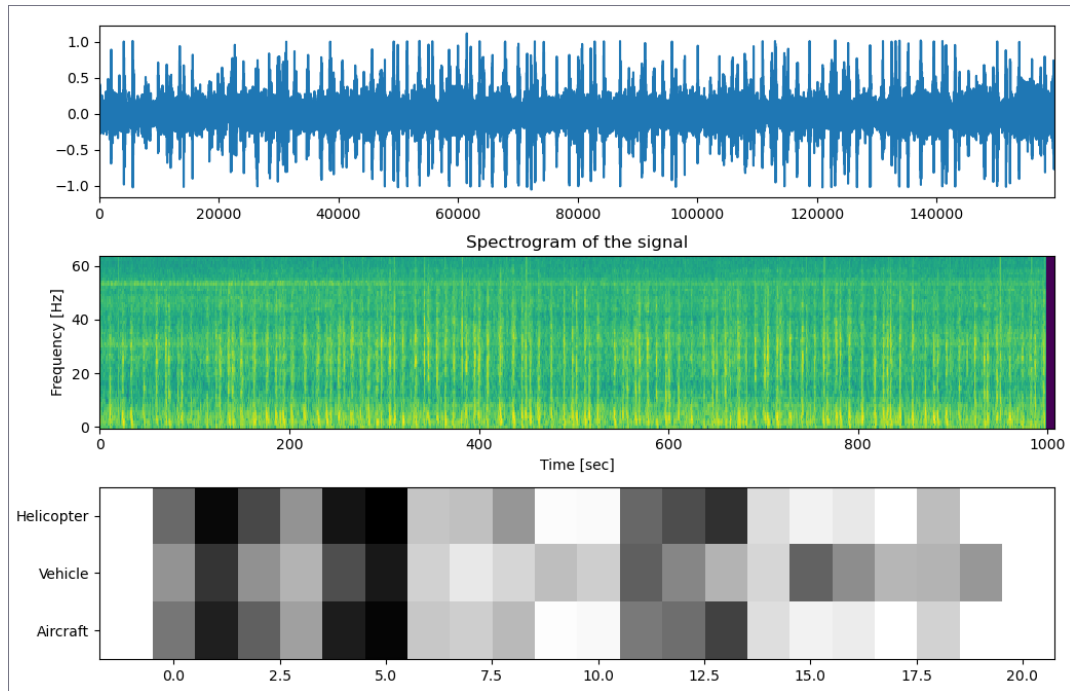


Figure 3.2: Hexacopter Hover Mode Sound Signal (UAV and Helicopter Sound) Spectrogram and Sound Classification Model Prediction

As observed in Figure 3.3 and Figure 3.4, the sound classification model YAMNet successfully recognized the helicopter sound while the Hexacopter performed Roll Left and Roll Right movements.

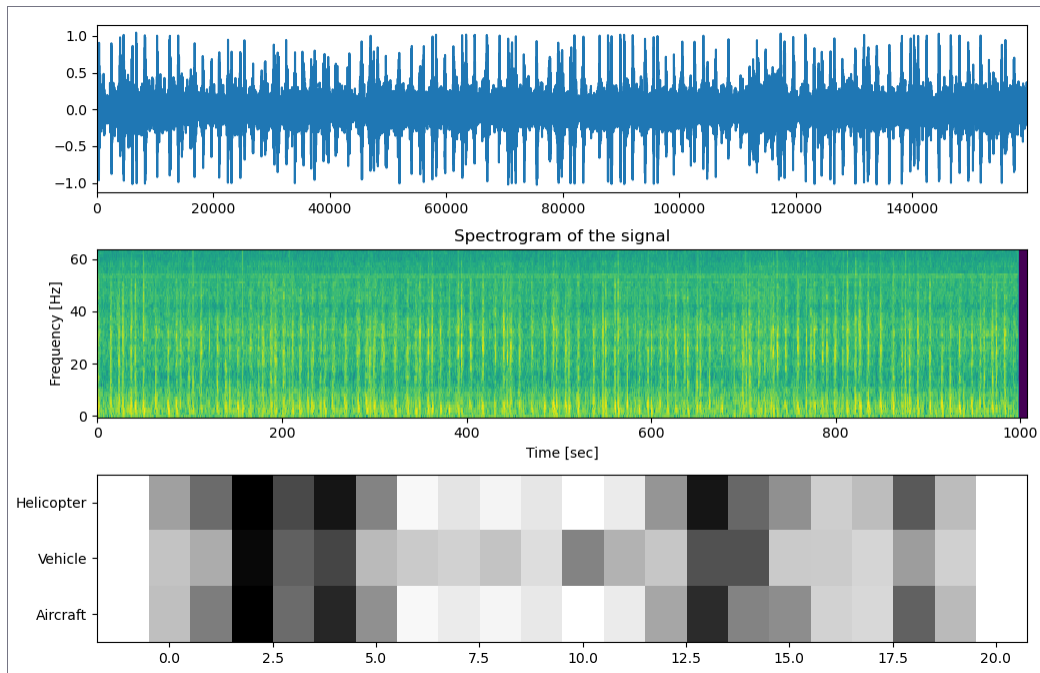


Figure 3.3: Hexacopter Roll Left Movement Sound Signal (UAV and Helicopter Sound) Spectrogram and Sound Classification Model Prediction

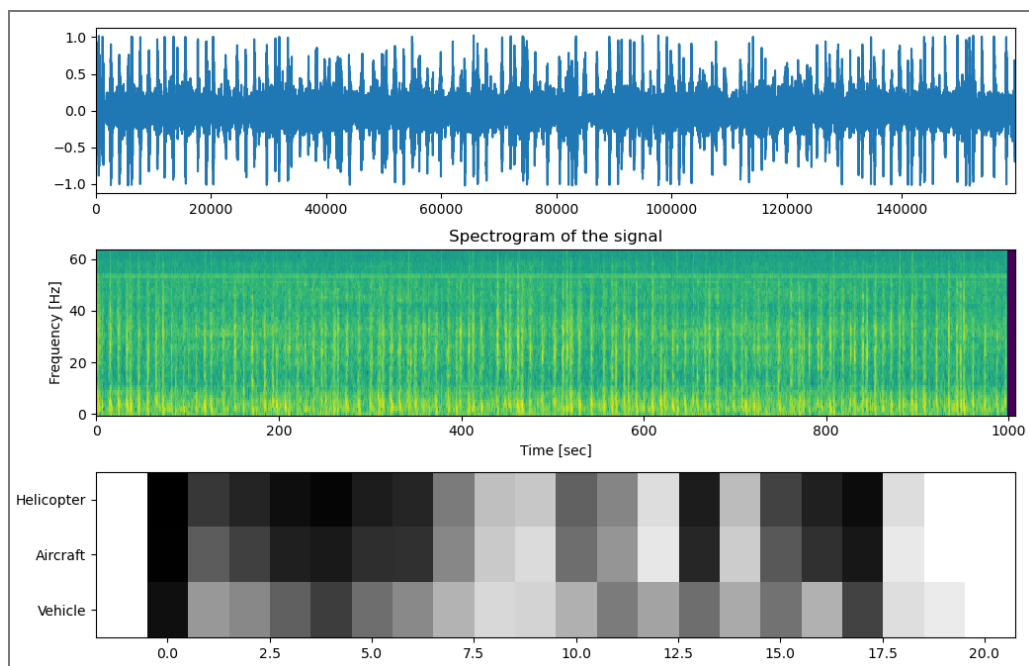


Figure 3.4: Hexacopter Roll Right Movement Sound Signal (UAV and Helicopter Sound) Spectrogram and Sound Classification Model Prediction

As seen in Figure 3.5 and Figure 3.6, the sound classification model YAMNet was able to recognize the helicopter sound while the Hexacopter performed Yaw Left and Yaw Right movements.

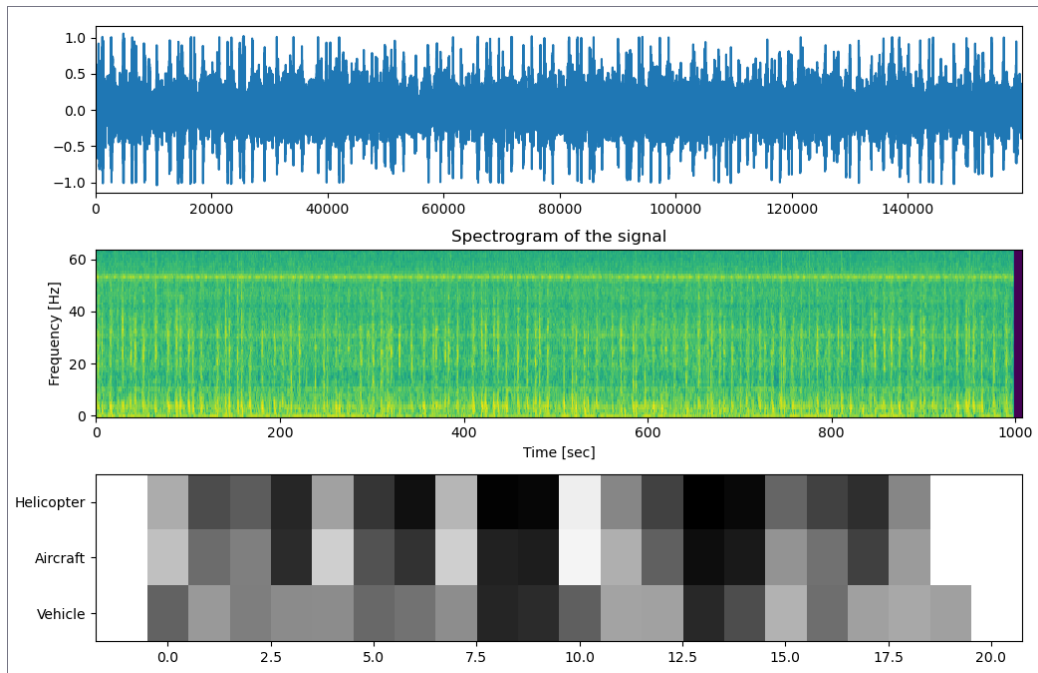


Figure 3.5: Hexacopter Yaw Left Movement Sound Signal (UAV and Helicopter Sound) Spectrogram and Sound Classification Model Prediction

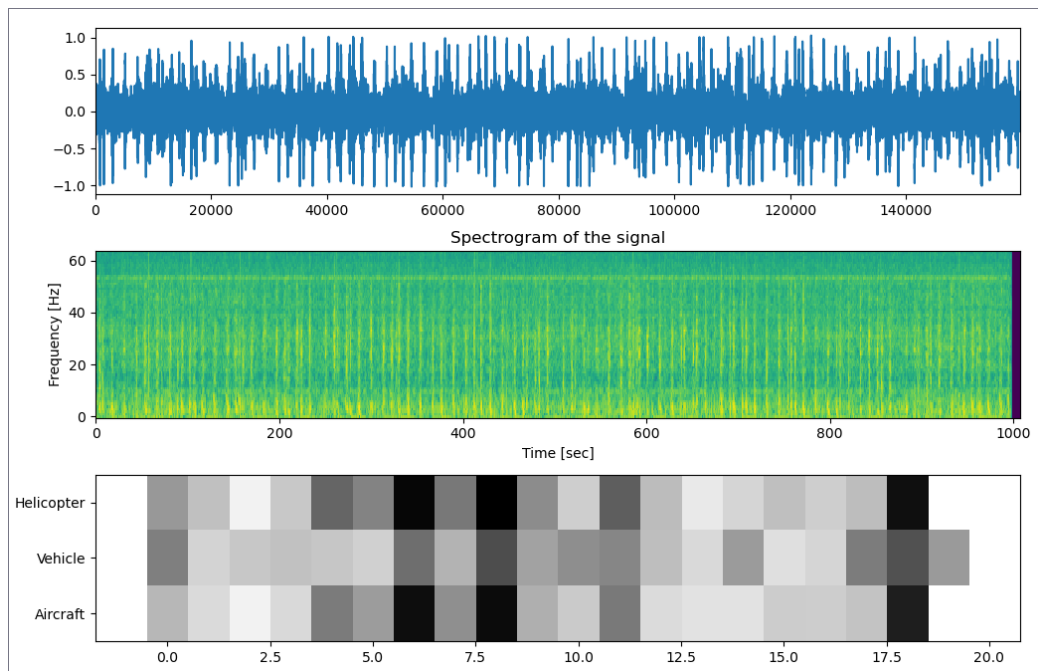


Figure 3.6: Hexacopter Yaw Right Movement Sound Signal (UAV and Helicopter Sound) Spectrogram and Sound Classification Model Prediction

As seen in Figures 3.7 and 3.8, the sound classification model YAMNet was able to recognize the helicopter sound while the Hexacopter was performing Pitch Forward and Pitch Back movements.

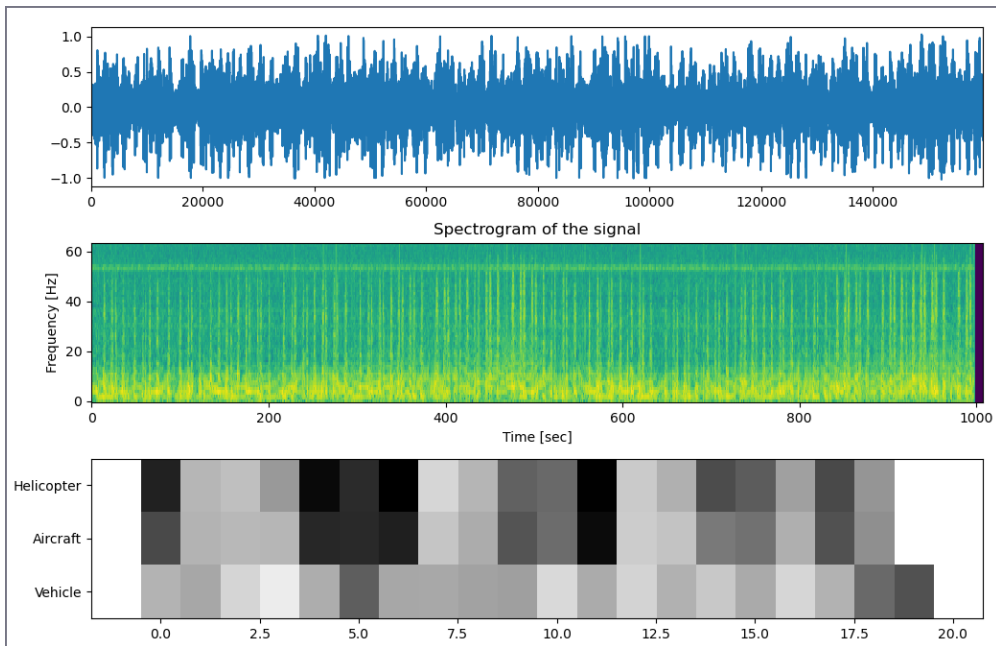


Figure 3.71: Hexacopter Pitch Forward Movement: Spectrogram of Sound Signal (Drone and Helicopter Sound) and Prediction by the Sound Classification Model

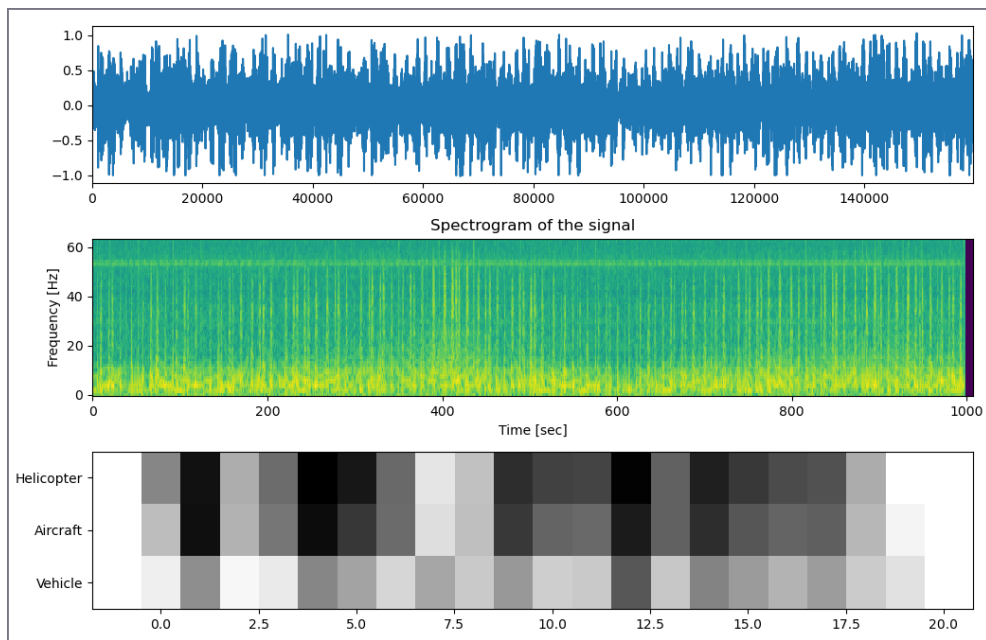


Figure 3.8: Spectrogram of Sound Signal (UAV and Helicopter Sound) during Hexacopter Pitch Back Movement and Prediction by Sound Classification Model

According to the output result of the YAMNet model, the top 3 classes with the highest classification scores are listed. This is determined by the software. Experimental results indicate that the YAMNet sound classification model can detect the helicopter sound in all flight maneuvers.

4. DISCUSSION

There are studies indicating that applications of object detection and classification using deep learning models with audio data are limited and can be more useful as an auxiliary tool in diagnosing diseases, particularly in the medical field [88-95].



This study aimed to use audio data for object detection and classification. This system, equipped with deep learning technology, was deployed as an embedded system on a UAV platform and tested. The sound classification model was designed to detect the helicopter object as a specific task. However, due to legal regulations for UAV flights, such experimental studies were not permitted, so the test experiments were simulated in a closed sports hall.

The data obtained from the tests provide significant evidence for object detection using sound data. These data demonstrate that the system is successful in real-world applications and can reliably detect objects under different flight conditions. Consequently, based on the experimental results, this study successfully achieved its goal of developing a system capable of object detection using sound data. This presents a wide range of potential applications and could be a significant step forward both in military and technological domains.

5. CONCLUSION

In this study, an embedded system capable of real-time detection using audio data with the YAMNet model, which is based on deep learning convolutional neural network architectures, was introduced to endow UAVs with autonomous decision-making capabilities for object detection and classification tasks. Throughout the study, the model was trained using the transfer learning method with hyperparameter values, and the impact of hyperparameter values was optimized to ensure successful predictions.

The system was designed to perform real-time analysis because capturing sound in the field using a microphone and analyzing it in the cloud may not always be feasible. Therefore, its operation as an embedded system is of paramount importance.

There are two main reasons for selecting helicopter sound as the target task in the sound classification model. Firstly, the widespread use of UAVs, commonly referred to as drones, especially in military applications, motivated this choice. Secondly, selecting helicopter as the military object makes the necessary sound data more accessible when creating the dataset for training the sound classification model. The experimental results indicate that the sound classification model can be used in UAVs.

Further optimization can be done in deep learning models to improve the efficiency of the system, and better hardware support (such as using a microphone capable of more precise sound detection) can be provided. Proper training and continuous updating of deep learning models are important for the successful operation of the system.

It is believed that the system can improve existing platforms for object detection and classification. Research and development efforts for object detection with UAVs are still ongoing.

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AUTONOMOUS UNMANNED AERIAL VEHICLE WITH DEEP LEARNING-BASED IMAGE PROCESSING TECHNOLOGY

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ABSTRACT

This study aims to introduce an Unmanned Aerial Vehicle (UAV) platform capable of real-time object detection and classification using deep learning-based computer vision techniques, enabling autonomous decision-making. The UAV's image processing capabilities allow it to gather information about its surroundings and perform analysis. During flight, the UAV can visually perceive objects in its environment and conduct object recognition and classification processes, enabling it to automatically execute defined tasks.

Previous scientific research indicates that image processing technology has been used for various purposes in object detection and classification. To endow the UAV with autonomous decision-making capabilities and the ability to detect and classify objects from recorded images in real-time, an embedded artificial intelligence module is necessary. The UAV's ability to utilize deep learning-based image processing technology through embedded systems significantly enhances its object detection and classification capacity, providing it with a significant advantage. This enables the UAV to be used more effectively and reliably in various missions.

In the proposed approach, image processing was embedded onto the UAV using a Raspberry Pi 4 mini-computer and a camera. Additionally, a 4G/LTE modem kit compatible with Raspberry Pi was used to provide remote intervention capability, and a Coral Edge TPU auxiliary processor was used to increase object detection speed. The TensorFlow Library and SSD MobilNetV2 convolutional neural network model were used for image processing. The SSD MobilNetV2 neural network model was trained using transfer learning method on NVIDIA A100 GPU in Google Colab. According to test data, the model was able to detect and classify military tanks with 97.4% accuracy.

Keywords: Unmanned aerial vehicle, Computer vision, Deep learning, Image processing, Object detection, Convolutional neural network, Raspberry Pi.

1. INTRODUCTION

An unmanned aerial vehicle (UAV) is an unmanned aircraft that can be controlled by a ground control center. UAVs have been widely used in recent years in various fields such as search and rescue [1], logistics [2], agriculture [3], healthcare [4], military [5], and many others. As UAV applications become more widespread, advanced autonomy is required to ensure safety and operational efficiency and to perform defined tasks. Ideally, an autonomous UAV should primarily have sensors, microprocessors, and most importantly, embedded artificial intelligence for safe navigation. Current civilian and military UAVs use some sensors along with a flight control system to perform flight missions [6] and have limited embedded artificial intelligence. In most cases, UAVs use sensors for global positioning system (GPS) for flight operation, obstacle detection, and collision prevention [7, 8]. These types of UAVs use flight control systems with algorithms that modify position, speed, and altitude data to achieve operational autonomy [9]. However, UAVs equipped with such systems have limited capabilities to perform complex tasks. The autonomy of UAVs in decision-making and executing specific tasks beyond flight planning is only possible when the system can perform binary functions in computer vision, namely detection and classification, which are respectively called object detection and recognition [10-13]. These tasks are natural for humans but are abstract and complex for machines to perform on their



own. Therefore, computer vision technology in the field of artificial intelligence plays a vital role in realizing many autonomous UAV applications [14].

In general, artificial intelligence represents the imitation of any human behavior by a machine or system. Machine learning is a subclass of artificial intelligence [15]. Advances in machine learning have facilitated the development of increasingly powerful methods in the field of computer vision, a subclass of machine learning, and have made progress in this area more accessible. Computer vision attempts to mimic tasks performed by the human visual system, such as object recognition, facial recognition, and even emotion recognition, all of which are possible through the use and training of artificial neural networks in the architecture of deep learning, another subclass of machine learning. All these fields and technologies are interconnected. Figure 1.1 illustrates the connections between artificial intelligence technologies. Object detection is a computer vision technique used to identify objects in images. Object detection involves detecting and classifying objects in image data. By examining the characteristics of the detected object, it is inferred to which predefined class the object belongs; this process is called object classification. Object detection and classification are among the most fundamental applications of artificial intelligence systems.

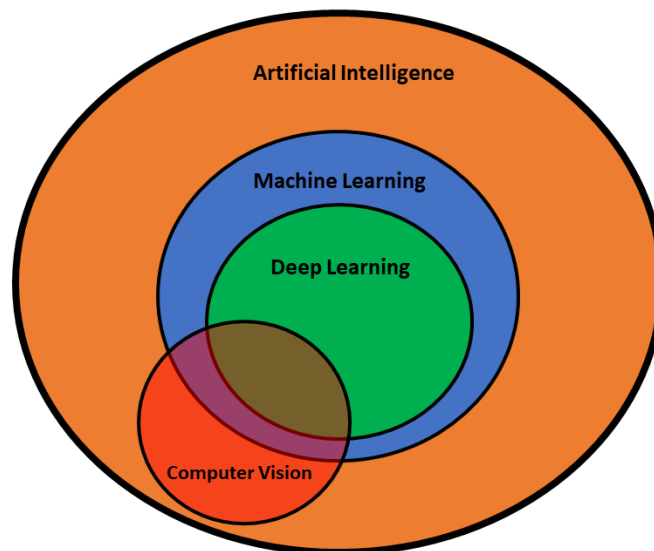


Figure 1.1: Artificial Intelligence, Machine Learning, Deep Learning, and Computer Vision Relationship [16]

One of the most significant challenges encountered in integrating artificial intelligence (AI) and machine learning (ML) into autonomous UAV operations is the inability to perform real-time or near-real-time object detection and classification tasks due to processing speed and accuracy issues. One of the aims of this study is to develop deep learning-based software using convolutional neural network algorithms to detect and classify objects in real-time from raw data using image processing techniques.

Deep learning has begun to be used in recent research to perform object detection and human perception in image content, parallel to the development of Graphics Processing Units (GPUs) [17] and Tensor Processing Units (TPUs) [18]. Deep learning allows us to train networks based on training examples to detect specific typical objects or objects in real-time. Customized neural networks have been created in deep learning architecture to detect patterns in images used as input, which are called convolutional neural networks. These networks perform convolution operations with specific filters to detect complex features present in images, such as human bodies, cars, buildings, animals, and others. Various methods are used in current studies to process images obtained with UAVs. In one method, recorded images are sent to a ground control station via Wi-Fi for actual processing [19], while in another method, recorded images are sent to a cloud-based (virtual) center via the internet [20], and image data is processed remotely, with the results transferred to the UAV. Unfortunately, such systems are both slow and cannot be used over large areas.



The proposed and implemented method in this study is to perform image processing embedded on the UAV itself. This requires a mini-computer to be placed on the UAV so that video and image information obtained from the camera are fed directly into this mini-computer for image processing. The Raspberry Pi 4 B Model version of the Raspberry Pi mini-computer was selected for this study, compatible with the deep learning model and library to be used. What enables Raspberry Pi 4 to run deep learning models is the development of the TensorFlow Lite open-source machine learning platform for the Internet of Things (IoT) [21].

As previously mentioned, one of the problems encountered in autonomous UAV operations is the inability to perform detection and classification tasks in real-time or near-real-time. To solve this problem, the Single Shot Multibox Detector (SSD) object detection method and the SSD MobilNetV2 deep learning model, which includes convolutional neural network architecture, were selected. The deep learning-based convolutional neural network architecture allows the UAV to interpret object information in its immediate vicinity as abstract information that can be interpreted by machines without human intervention. Based on the available information, machines can perform real-time decision-making. Integrating image processing technology with deep learning-based convolutional neural networks into the UAV's flight control system can significantly enhance the UAV's autonomous decision-making capability and flight safety. Compared to other machine learning methods, the main advantage of convolutional neural network algorithms is their ability to detect and classify objects in real-time with faster and superior performance in terms of computation. The convolutional neural network algorithm used in this study is based on the combination of advanced TPU technology [22] with deep learning algorithms.

Since the UAV has built-in computing and image processing capabilities, it can process image data captured by the camera without the need for a central processing engine, detect objects based on this data, and autonomously make decisions based on pre-transferred information.

In this study, embedded software was developed to perform real-time object detection and classification operations from the images and video data provided by the UAV camera, enabling the UAV to autonomously make decisions and move based on the results of these operations. The TensorFlow Library and SSD MobilNetV2 convolutional neural network architecture were used for object detection and classification tasks.

This model was trained and customized from scratch for a specific task. The deep learning model trained using the transfer learning method was later converted to the "TensorFlow Lite" format to run on the Raspberry Pi with the Edge TPU auxiliary processor. The application area of the UAV platform was designed with a focus on military use, given the preference for UAVs, commonly referred to as drones, in the military domain. The goal was to enable the UAV platform to detect the "Leopard" military tank using image data.

The innovative aspect of this study is its aim to introduce an embedded system capable of real-time object detection and classification using deep learning-based computer vision techniques and managing the UAV based on the results of these operations. This platform has advanced capabilities in processing and understanding images, enabling it to automatically perform defined tasks.

The UAV platform is equipped with real-time object detection and classification capabilities using computer vision techniques. The UAV's camera continuously records images during flight and processes these images with deep learning algorithms. This enables the platform to detect, classify, and track objects in the flight area.

In conclusion, this UAV platform can perform various automated tasks by combining deep learning and computer vision techniques for image processing. This makes it applicable in research, security, search and rescue, and especially military applications. Thanks to its capabilities, the UAV can perform complex tasks without human intervention, thereby enhancing efficiency and effectiveness in various fields.



The focus of the study is to retrain and optimize the deep neural network model for the detection of specific objects, creating an artificial intelligence module capable of processing image data and recognizing objects using these models. This module will continuously scan the UAV's surroundings and identify potential threats, targets, or other objects. As a result, the UAV will be able to make decisions autonomously or perform specific tasks. This will enable the UAV to move autonomously and perform its tasks more effectively. There are numerous fields and studies in the literature where computer vision techniques are utilized.

Tighkhorshid and colleagues [23] developed a system aiming to prevent the spread of respiratory diseases such as Covid-19 by using image processing to classify the wearing conditions of face masks into three categories: no face mask, correct wearing of face masks, and incorrect wearing of face masks. For this purpose, they utilized the SSD MobileNetV2 neural network and experimented with various hyperparameter adjustments on the model for achieving the best possible accuracy. They implemented the proposed neural network on a Raspberry Pi 3 device.

Latina and colleagues [24] presented a deep learning-based method using the SSD MobileNetV2 model to determine whether glass bottles are suitable for recycling by detecting macro and micro-level defects in glass bottles. They achieved up to 98.07% overall system accuracy in detecting glass bottle defects using transfer learning and data augmentation techniques.

Fairuzi and Zülkifli [25] developed a security system capable of real-time detection of foreign objects on airport runways that could potentially damage aircraft and cause accidents. They utilized SSD MobileNetV2 and YOLOV4 models, stating that SSD and YOLO are the most commonly used methods for real-time detection due to their high FPS and accuracy performances, and compared the two models.

Junior and Suharjito [26] proposed a real-time approach based on object detection and video data sets to determine the maturity level of palm oil, using the YOLOV4 neural network architecture. They compared the results of the YOLOV4 model with SSD MobileNetV2 FPN and EfficientDet-D0 to validate the YOLOV4 model's performance.

In the literature, it is observed that in object recognition studies conducted with UAVs, the selected model is trained on data sets, and there is no specific modeling work for a particular task. Moreover, in image object detection studies, UAVs are only used for aerial imaging purposes, where the data is processed either at the ground center after the flight or the UAV sends real-time data to the center.

In this study, as a result of image object detection and classification, an embedded system enables the UAV to send task-specific commands to the control center and gives the UAV the ability to make autonomous decisions.

Currently, unmanned aerial vehicles (UAVs) are used in various application areas such as surveillance, reconnaissance, healthcare, logistics, and agriculture. However, there is a need for new technologies to enhance the capabilities of UAVs and enable them to perform more complex tasks. This study aims to improve the capabilities of UAVs using deep learning-based image processing technology. To this end, the following main objectives have been identified within the scope of the study:

Image Processing Technology: Using deep learning networks to give UAVs image recognition and classification capabilities and customizing the networks for task-specific purposes. The UAV can analyze images, identify objects, and classify the properties of these objects.

Autonomous Task Execution: Enhancing the UAV's ability to autonomously perform predefined tasks using these capabilities. The UAV can perform complex tasks without human intervention, such as finding missing persons in search and rescue operations or automatically scanning defined military air-land vehicles in combat zones.

This study aims to make a significant contribution to enhancing the functionality of UAVs in the defense industry. The use of deep learning-based image processing technology can provide significant benefits by enabling UAVs to work more effectively, efficiently, and autonomously.



Before providing further details about this UAV platform equipped with computer vision technology, some fundamental information about artificial intelligence, machine learning, deep learning, neural networks, and related topics will be provided in Chapter 2. Chapter 3 will describe the methodology. The discussion will be addressed in Chapter 4, and finally, Chapter 5 will conclude the study.

2. ARTIFICIAL NEURAL NETWORK (ANN), MACHINE LEARNING, AND DEEP LEARNING

In this section, information about artificial neural networks, machine learning, and deep learning topics is provided.

2.1 Artificial Neural Network (ANN)

Artificial intelligence has become increasingly popular in recent years due to its ability to perform tasks inherent to the human mind. Today, artificial intelligence, also referred to as machine intelligence, is implemented using neural networks [27]. Neural networks are specialized software models that can be trained to perform various tasks. They are used for complex tasks such as image classification, speech recognition, text translation, and autonomous vehicle control. There are various types of neural networks, but convolutional neural networks are the most commonly used for image detection and computer vision [28].

Inspired by the human nervous system, a neural network is an artificial intelligence system capable of processing information, similar to biological neurons (Figure 2.1 (a)) [29] (Figure 2.1 (b)).

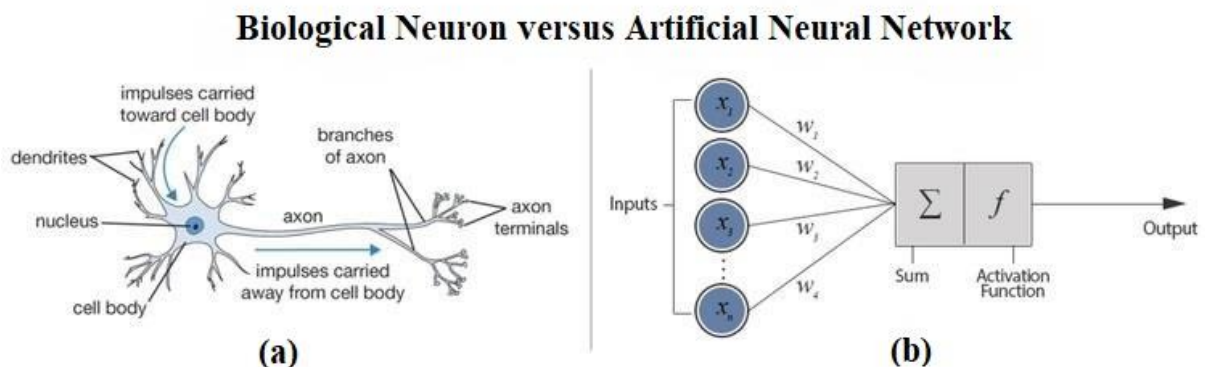


Figure 2.5: (a) Biological Neuron ve (b) Artificial Neural Network [30]

Optimization, parallel computation, matrix algebra, and signal processing are successfully applied in various problem domains. Neural networks are primarily divided into neurons and connection links. Neurons are processing units connected to each other through connection links called synapses. A traditional neural network consists of an input layer, hidden layers, and interconnected neurons forming the output layer, as illustrated in Figure 2.2 [28]. The more hidden layers there are between the input and output layers of a network, the deeper the neural network is.

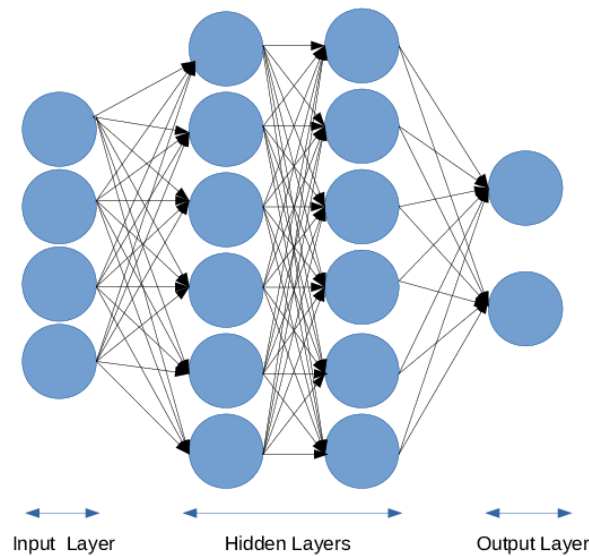


Figure 2.6: An example of a neural network with two hidden layers [31]

A neural network model for image recognition is illustrated in Figure 2.3. This example demonstrates how a neural network can recognize a digit from a specific image with an eight by eight (8x8) pixel resolution. All the pixels of the image are fed into the model as input neurons. Depending on the weights assigned to the connections, different sets of hidden layers can be activated. The activation of a particular neuron determines the output. Before performing such complex tasks, each neural network needs to be trained. Training can be defined as the process of finding the weights of the connections between neurons that minimize the loss function.

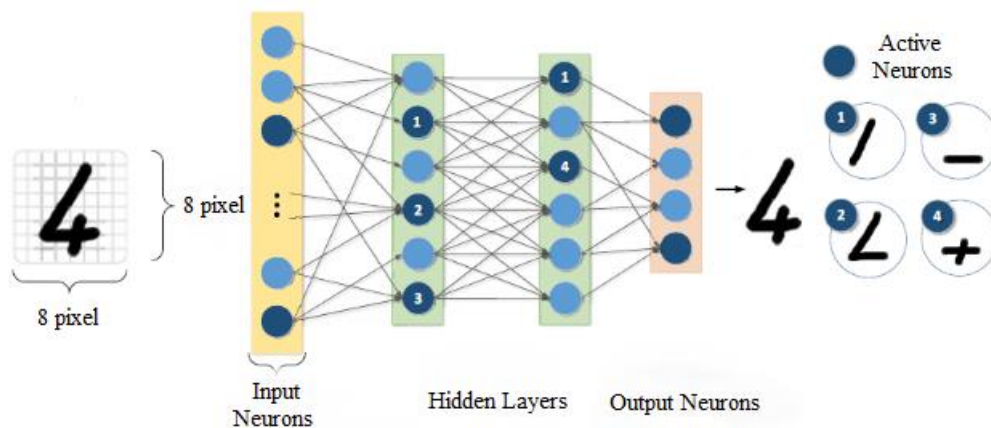


Figure 2.7: Image Detection Principle Realized with Neural Network Model

In a neural network model, input neurons represent the data to be used for training. As in the example above, if the input is an image, the input neurons can represent the values for each pixel. Neurons hidden in the middle layers typically perform mathematical calculations. The connections between neurons are parameterized with weights that determine the significance of the input value [28]. Input neurons receive the input and send it to the hidden layer for processing through connections. These processed cells are then either sent to other hidden layers (if any) for further processing or to the output layer. The input can be a numerical value, string, or an image [32].

A basic artificial neuron consists of four different elements (Figure 2.4):

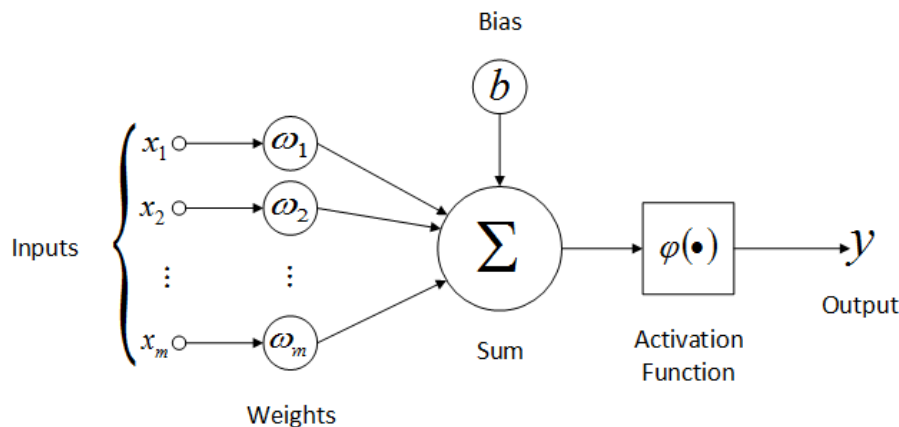


Figure 2.8: Basic Artificial Neuron Model [33]

Inputs: Inputs are numerical values that can come from sensors, features, or other neurons.

Weights: There is a weight for each input. These weights are multiplied by the input value to help the neuron decide which inputs are important and which are not [34].

Biases: Biases are used to regulate the neuron's output independently of the inputs [34].

Activation function: It is used to generate the output of the neuron. Activation functions are typically non-linear functions used to allow the neural network to learn non-linear relationships between inputs and outputs [35].

Activation functions are generally non-linear functions [36]. They are one of the fundamental building blocks of neural networks because they regulate the outputs of neurons and typically decide whether or not they should fire [37]. These functions take input signals and apply a non-linear transformation to them. This allows neural networks to learn more complex and flexible relationships rather than simple linear relationships. Thus, activation functions enable neural networks to gain flexibility and better understand complex patterns and features in the data. This non-linear transformation allows neural networks to learn a wider range of data and enables the model to perform better. Some common activation functions include [35]:

Sigmoid function: Commonly used for classification problems.

Hyperbolic tangent function (tanh): A scaled version of the sigmoid function but with a stronger gradient.

Rectified Linear Unit function (ReLU): One of the most popular activation functions, considered the default approach. It is more efficient computationally compared to the other two.

2.2 Machine Learning

Machine learning has its roots in pattern recognition theory and the theory that computers can perform certain tasks without explicit programming [38]. Machine learning is a data analysis method that can automatically generate an analytical model [39]. It is also an algorithm that allows software applications to predict outcomes more accurately without explicit programming. Machine learning algorithms can automatically and rapidly create models across a wide range, capable of analyzing large and complex data sets and providing accurate results quickly [40].

2.3 Deep Learning

Deep learning is an artificial intelligence method that allows computers to learn from examples, much like humans, and enables machines to acquire skills through experiential learning without human intervention. Most deep learning models utilize neural network architecture, hence deep learning models are often referred to as deep neural networks [41]. Although deep learning is a subset of machine



learning [42], it is a relatively unique form of machine learning. For example, in the context of image classification, the deep learning process does not require manual intervention, and the algorithm automatically extracts features from the image. Compared to traditional algorithms, the advantage of deep learning is that as the amount of available data for training increases, the algorithm's results can be continuously improved [40].

Deep learning differs from algorithms that perform specific tasks in that it possesses a machine learning method capable of self-improvement based on learning data. The most significant feature of deep learning methods is their ability to automatically learn feature representations, thus preventing a great deal of time loss. Traditional machine learning relies on shallow networks, which consist of an input and an output layer, with no more than one hidden layer between them. Deep learning, on the other hand, is characterized by networks with more than three layers, including both input and output layers. Therefore, when a network has more than three layers between its input and output layers, it is considered deep. Generally, any neural network with three or more hidden layers is referred to as a deep neural network. Some popular deep neural network algorithms used today include Convolutional Neural Networks (CNN), Recurrent Neural Networks (RNN), Restricted Boltzmann Machines (RBM), and Autoencoder algorithms [43].

The success of a deep learning model is closely related to the hyperparameters determined before the model's training and used during the training process [44]. It is necessary to determine these hyperparameters before training the model, and once determined, these hyperparameters remain unchanged throughout the training process. The biggest challenge when working with deep learning algorithms is adjusting and controlling hyperparameter values [45]. This process is technically referred to as hyperparameter tuning or hyperparameter optimization. Hyperparameters control many aspects of deep learning algorithms. Some of these include:

- They can decide the time it takes to run the algorithm and the computational cost involved.
- They can define the structure of the neural network model
- They affect the model's prediction accuracy and generalization ability.

In other words, hyperparameters control the behavior and structure of neural network models.

2.3.1 Convolutional Neural Network

Convolutional Neural Network (CNN) is a deep learning architecture used in computer vision applications and has been studied by various researchers in recent years [46]. A Convolutional Neural Network is a popular architecture used for tasks such as image classification, image segmentation, object recognition, and face recognition. It consists of an input layer and an output layer, with multiple convolutional and pooling layers between the input and output layers (Figure 2.5).

Convolutional layers allow the extraction of features from the image. The outputs of these features are called "feature maps" [47]. Pooling layers reduce the size of the feature maps and facilitate feature learning. Then, fully connected layers use these feature maps to produce the final output class (classification).

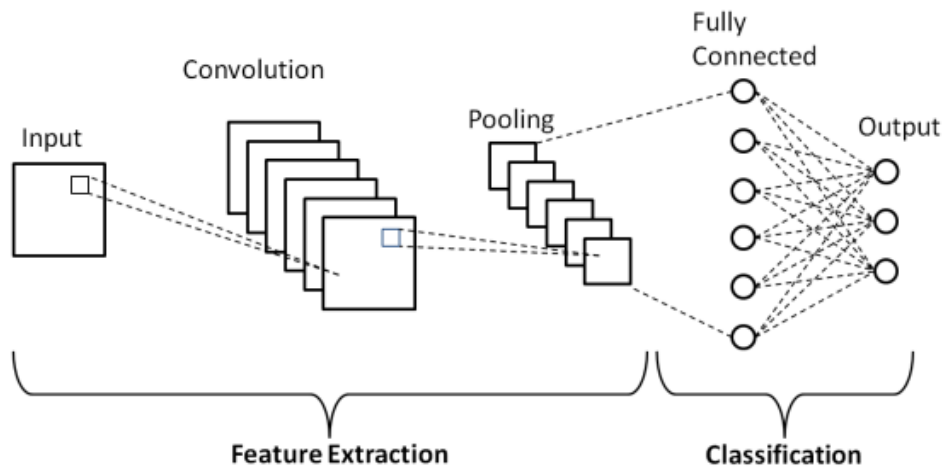


Figure 2.9: Basic Convolutional Neural Network (CNN) Architecture [48]

2.3.2 The Impact of Hyperparameters on Deep Neural Networks

Classification algorithms like deep neural networks have a set of hyperparameters that can significantly influence the prediction performance of the models they generate [49]. The hyperparameters of a neural network are variables that determine the architecture and behavior of the network during training. Before running deep learning algorithms, it's necessary to adjust the hyperparameters. This adjustment involves determining the number of layers, the number of neurons in each layer, the number of epochs, activation functions, learning rate, batch size, optimizer selection, loss function, classification function, and other hyperparameters. Tuning hyperparameters is crucial to optimize the performance of the neural network. These hyperparameters can be manually configured by the user or some hyperparameter optimization techniques can be used for the best prediction performance [50].

Neuron Number: The adjustable first hyperparameter is the number of neurons in each hidden layer. The number of neurons should be adjusted according to the complexity of the task. For tasks with a high level of complexity, the model requires more neurons to achieve high prediction accuracy [51].

Activation Function: Another important hyperparameter in model training. In a neural network, input data are processed from the input layer to hidden layers and then to the final output layer. The input values passing from one layer to another continue to change according to the activation function. The activation function decides how the input values of a layer will be computed into output values [52]. The output values of a layer are then transferred as inputs to the next layer. This process iteratively continues. Activation functions in the layers, which determine how the input is computed, can significantly affect the learning ability of the model. There are different activation functions used in deep neural networks (Figure 2.6).

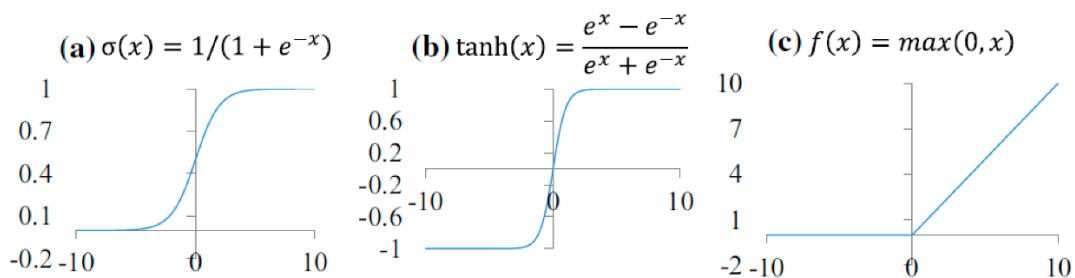


Figure 2.10: Commonly Used Three Activation Functions: (a) Sigmoid, (b) Tanh and (c) ReLU [53]

Each activation function has its own formula (graph) for computing input values. For example, ReLU (Rectified Linear Unit) and Sigmoid functions can yield different results for the same model.



Learning Rate: One of the hyperparameters that ensures the model's optimization is the learning rate. The learning rate determines how large or small the update steps of the model will be in each training iteration [55]. In other words, it controls the step size required for a model to reach the minimum loss function. A high learning rate can facilitate fast learning but may lead to overfitting issues. A low learning rate increases the likelihood of finding the minimum loss function [56].

Number of Epoch: Epoch refers to the number of times a complete dataset passes through a neural network model [57]. Too few epochs may result in the neural network not utilizing its learning potential and ending up with insufficient learning. On the other hand, too many epochs may lead to overfitting, where the model can predict the training data very well but cannot predict new image data well enough. The number of epochs should be adjusted to achieve the optimum result.

Batch Size: Batch size refers to the number of samples that are passed to the neural network at once [58]. It is used to process training data in small groups. Batch size can affect memory and computational efficiency. Larger batch sizes can provide faster training times but require more memory.

Number of Step: Like the number of epochs, the "number of steps" is a parameter related to training the model and is often confused with the number of epochs. In a typical deep learning training cycle, the training dataset is processed in small batches. Each small batch completes forward and backward propagation in the neural network. Forward propagation calculates the model's predictions, while backward propagation evaluates how mismatched these predictions are with the actual values and directs the network's parameters to reduce this mismatch. After processing a small batch, the model parameters are updated.

In other words, during one epoch, the model's parameters (weights) are updated based on the training data to minimize loss or error. The number of updates made during the model's training is expressed as the "number of steps."

The number of steps is calculated based on the size of the training dataset, batch size, and number of epochs. The calculation can be performed using Equation (2.1) [58]:

$$\text{The Number of Steps per Epoch} = \frac{\text{Dataset Number}}{\text{Batch Size}} \quad (2.1)$$

An example illustrating the relationship between epochs, the number of steps, and batch size:

If you have a dataset of 1600 images to train your model and you set the mini-batch size to 4:

This means that 4 images will be processed for training in 1 step, and after processing, the model parameters will be updated. Processing the entire dataset will be completed in $1600/4 = 400$ steps. We can say that one epoch is completed when the model has processed the entire dataset. If the predetermined number of epochs before training the model is set to 10, then the training will be completed in $10 \times 400 = 4000$ steps.

In summary, an epoch represents a complete pass over the training data, and the step count represents the updates within each epoch, indicating how the model parameters are updated. The total number of steps in training depends on the epoch count, batch size, and the size of the training dataset.

Optimizer Algorithms: Optimization algorithms are algorithms used during training to optimize the parameters used by the network, thereby improving the model's prediction accuracy. Stochastic Gradient Descent (SGD), Momentum, Adam, RMSProp are among the most preferred optimization algorithms [60].

Model Mimarisi: The number of layers, the depth of the layers, the number of neurons, and the types of layers (convolutional, fully connected, etc.) affect the capacity and capabilities of the model.

These hyperparameters can greatly influence the performance of the model, and therefore, optimal values are often found through trial and error methods.



3. METHODOLOGY

Object detection and classification applications with UAVs are mostly performed by modifying commercially available off-the-shelf unmanned aerial vehicles [61, 62]. In these systems, hardware and software interventions are limited. Therefore, the UAV platform used in this study is designed from scratch with hardware equipped with open-source software (Figure 3.1).



Figure 3.1: Hexacopter Unmanned Aerial Vehicle

In this section, the artificial intelligence technologies used during the development of the embedded artificial intelligence module of the UAV platform are described. These include deep learning-based computer vision technologies for object detection and classification methods, retraining the neural network model using transfer learning, embedded system design, and detailing the software architecture developed for autonomy.

3.1 Computer Vision

Currently, computer vision techniques are being applied in UAV platforms [63-70]. The development of computer vision algorithms and the reduction of errors in these algorithms have enabled UAVs equipped with sensors and microcontrollers to be used in complex applications. After images and videos are captured by the camera on the UAV, many actions, including changing the UAV's attitude and position, can be performed by analyzing these raw data with image processing techniques and algorithms [14].

To implement object detection and classification functions, it is necessary to first train a neural network that will recognize the object to be detected. The training of algorithms with deep neural network architecture consists of several steps. To use object detection algorithms, we first need to define input data. The input data, also known as the dataset, is a set of images where the object to be detected is found, marked, and labeled.

The dataset should be divided into two parts for training and testing purposes. This is a fundamental requirement to avoid overfitting. After training, the neural network model is tested. If these tests are done with the training data, the model performs very well. However, it may not perform as well on new images. Therefore, it is not a good idea to use the same data for both training and testing the neural network because it is necessary to know how the model will perform on test data that was not used for



training. Proper separation of the dataset can be achieved by using approximately 75% of the images for training and 25% for testing [28].

3.3.1 Object Detection and Classification

Object detection is a computer vision task that identifies the class and location of objects within a given image. Object detection is performed by scanning each part of an image to detect parts that match the photometric or geometric features of the target object in the training database. This can be accomplished by scanning a template of an object across an image at different positions, scales, and rotations, and if the similarity between the template and the image is sufficiently high, a detection is reported. The detected object is described with a bounding box having a specific class label (Figure 3.2).



Figure 3.2: Detection of the Detected Object with Bounding Box and its Class

Recent studies have utilized deep learning for object detection. Convolutional Neural Network (CNN) is a representative of such deep learning methods for object detection [69].

3.3.2 Object Detection with SSD-Based MobileNetV2 Neural Network Architecture

SSD MobileNetV2 is a deep learning model consisting of a combination of Single Shot Multibox Detector (SSD) [70] and MobileNetV2 [71] deep learning algorithms. SSD MobileNetV2 is designed to detect multiple objects or multiple instances of objects in real-time and is a pre-trained model on the MS COCO dataset [72]. This model is the most efficient and accurate model used in lightweight devices such as mobile devices and mini-computers like Raspberry Pi [73]. SSD MobileNetV2 is a deep neural network architecture that can be developed and optimized using TensorFlow.

SSD MobileNetV2 is one of the Convolutional Neural Network (CNN) architectures. Convolutional neural networks are a method used in computer science to develop artificial neural networks by emulating human neural networks for the purpose of object recognition and detection [74]. SSD MobileNetV2 utilizes depth-wise convolution and point-wise convolution [75]. Figure 3.3 illustrates the stages of object detection and classification with MobileNet-SSD.

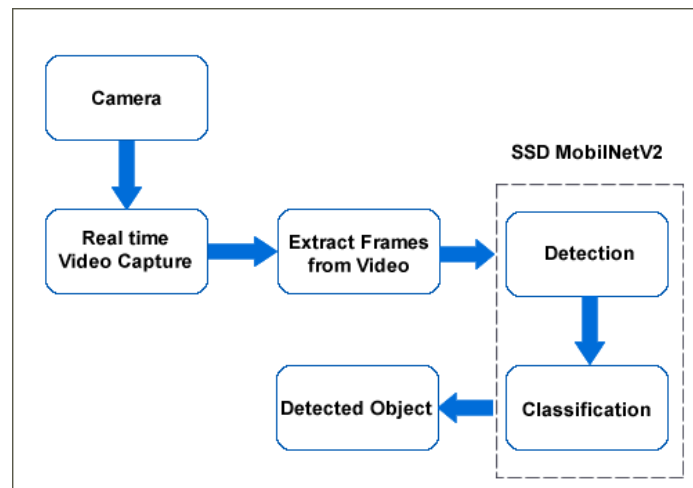


Figure 3.3: Object Detection and Classification with SSD MobileNetV2 Model

3.2 Training of the SSD MobileNetV2 neural network using transfer learning method

The success of the neural network model used for object classification task is usually dependent on model parameters and hyperparameters. Model parameters are characteristics such as weights and biases. Hyperparameters, on the other hand, are features that guide the training process and need to be determined before training the model. Proper determination of hyperparameters according to the data and the task significantly improves the model's performance.

The ability of a neural network model to recognize a specific class is directly proportional to the number of labeled image data used for that class. This indicates how well the model can learn and recognize this class. More labeled data typically leads to better classification results. In computer vision, adapting a pre-trained deep neural network model to a specific target using the transfer learning method is commonly performed.

Transfer learning is a method of using the knowledge gained by a trained model to learn another dataset. This technique aims to improve learning in the target domain by transferring the accumulated knowledge of an existing model to a new learning task [76].

Assuming the task assigned to the UAV is the detection of a specific object through imagery, the SSD MobileNetV2 convolutional neural network model was retrained using the transfer learning method and optimized with hyperparameter settings tailored to the task. The UAV has a specific task in object recognition and classification: to detect the Leopard military tank. The stages of the training process are detailed below in subheadings.

In the training of the SSD MobileNetV2 neural network, a total of 927 images of the military Leopard tank were used as training, validation, and test data, obtained from the internet with different distances and perspectives. Each of these images was labeled as the "Leopard" class using the open-source labeling software LabelImg.

To create an optimal model for a specific object detection task, hyperparameters need to be adjusted in a way that improves the accuracy of the neural network model. Hyperparameter optimization is an intensive process applied based on trial and error and is usually performed for a specific dataset and model pairing, resulting in obtaining the most suitable settings for that specific pairing [77].

In this study, the SSD MobileNetV2 deep learning model was used, and the goal was to retrain it with the transfer learning method for the recognition of the Leopard military tank as a specific object. In this context, the anticipated model hyperparameter settings, taking into account the dataset, neural network architecture, number of classifications, and task definition, were determined prior to training. The training and testing process was conducted on the Google Colab [78] NVIDIA Tesla A100 GPU machine. During the training process, the Tensorboard visualization tool was used. The main purpose



of using Tensorboard is to observe the training process, model architecture, hyperparameter configuration, and provide insights about various metrics [79]. The effects of the initially anticipated hyperparameter values on the model were analyzed through Tensorboard during the training process. Based on the analysis results each time, attempts were made to determine the necessary hyperparameter adjustments for the model to make correct predictions.

As a result, with the step count of 48,000, ReLU activation function, and other hyperparameters set to the values in Table 3.1, it was determined that the loss values were significantly low and the accuracy of the model in recognizing the Leopard military tank increased with these parameters, as seen in Figure 3.4.

Table 3.1: Hyperparameter Values of the SSD MobileNetV2 Model

Parameters	Values
Activation Function	ReLU
Classifier	Softmax
Optimizer	Stochastic Gradient Descent (SGD) + Momentum
Batch Size	16
Number of Step	48000

```
'learning_rate': 0.00039724825}
INFO:tensorflow:Step 47900 per-step time 0.501s
I1026 23:53:07.075680 139865454527104 model_lib_v2.py:705] Step 47900 per-step time 0.501s
INFO:tensorflow: {'Loss/classification_loss': 0.01599799,
'loss/localization_loss': 0.0022612966,
'loss/regularization_loss': 0.046048004,
'loss/total_loss': 0.06430729,
'learning_rate': 0.00036200762}
I1026 23:53:07.076752 139865454527104 model_lib_v2.py:708] {'Loss/classification_loss': 0.01599799,
'loss/localization_loss': 0.0022612966,
'loss/regularization_loss': 0.046048004,
'loss/total_loss': 0.06430729,
'learning_rate': 0.00036200762}
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'loss/localization_loss': 0.0015258541,
'loss/regularization_loss': 0.046046715,
'loss/total_loss': 0.06420147,
'learning_rate': 0.00032839776}
I1026 23:53:56.283937 139865454527104 model_lib_v2.py:708] {'Loss/classification_loss': 0.016628899,
'loss/localization_loss': 0.0015258541,
'loss/regularization_loss': 0.046046715,
'loss/total_loss': 0.06420147,
'learning_rate': 0.00032839776}
```

Figure 3.4: Loss and Learning Rate Values at the End of Training for the SSD MobileNetV2 Model

During the customization of the model, the number of steps (indirectly, the number of epochs) is determined by examining the performance of the neural network through a series of trials. Additionally, determining the activation function in the neural network, which is one of the hyperparameters of the network, according to the model task is an important point. The activation function used in this model, ReLU, has a significant contribution to the high accuracy of the prediction success of the model. To



understand its contribution, it is necessary to examine the role of the activation function in the neural network and the contribution of ReLU mathematically.

In a neural network, each neuron within processes the output values of the neurons in the previous layer as input and passes the processed value to the next layer, transferring information. In a multi-layer neural network, inputs are processed by the "activation function". Figure 3.5 shows the structure of a general activation function.

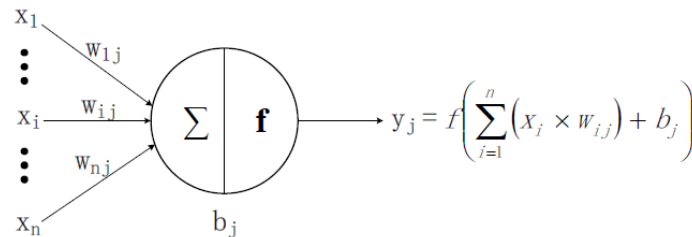


Figure 3.5: Structure of a General Activation Function

In Figure 3.5, x_i represents the input feature; n features simultaneously input into neuron j ; w_{ij} represents the weight value of the connection between input feature x_i and neuron j ; b_j represents the internal state of neuron j , i.e., the bias value; and y_j represents the output of neuron j . $f(\cdot)$ is the activation function, which can be one of the three commonly used activation functions such as the sigmoid function, $\tanh(x)$ function, rectified linear unit (ReLU) function, as shown in Figure 3.6 (Table 3.2)..

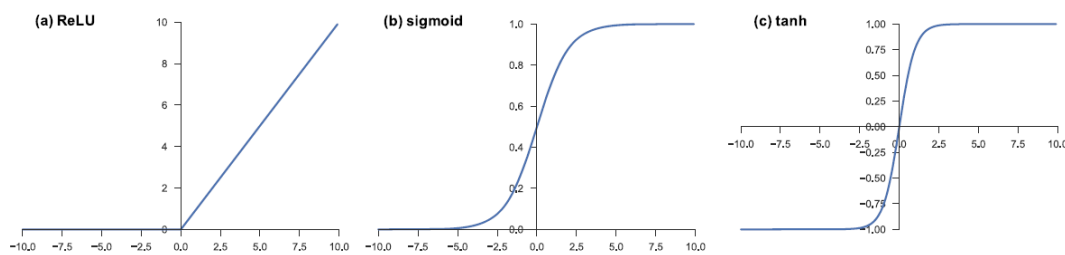


Figure 3.6: Three Commonly Used Activation Functions: (a) ReLU, (b) Sigmoid and (c) Tanh [80]

Table 3.2: Equations of ReLU, Sigmoid, and Tanh Functions [81]

Functions	Equations	Derivatives
ReLU	$f(x) = \max(0, x)$	$\frac{df(x)}{dx} = \begin{cases} 0, & x < 0 \\ 1, & x \geq 0 \end{cases}$
Sigmoid	$f(x) = \frac{1}{1 + e^{-x}}$	$\frac{df(x)}{dx} = \frac{e^x}{(1 + e^x)^2}$
Tanh	$f(x) = \frac{\sinh(x)}{\cosh(x)} = \frac{e^x - e^{-x}}{e^x + e^{-x}}$	$\frac{df(x)}{dx} = 1 - f(x)^2$

Rectified Linear Unit (ReLU) is the most commonly used activation function in deep learning models. The ReLU function returns 0 as output when it receives any negative input value and returns the same value for any positive x value [54]. Therefore, it can be represented by Equation (3.1) [81] or Equation (3.2) [82] as follows:



$$f(x) = \begin{cases} 0, & x < 0 \\ x, & x \geq 0 \end{cases} \quad (3.1)$$

or

$$f(x) = \max(0, x) \quad (3.2)$$

ReLU, Sigmoid, and Tanh functions are the three widely used activation functions in many deep learning models, particularly in tasks like image processing, convolutional neural networks (CNNs). These functions play a crucial role in enhancing the performance of CNNs due to the following reasons:

Accelerated Training: ReLU speeds up the convergence of gradients. Other activation functions, such as sigmoid or tanh, tend to make gradients very small within certain value ranges. This can lead to slow progress in training as gradients need to contribute to weight updates. However, ReLU sets the gradient to 1 for positive inputs, leading to faster convergence of gradient-based optimization algorithms [83].

Prevent Vanishing Gradient Problem: Some activation functions like sigmoid or tanh can lead to the "vanishing gradient" problem in deep neural networks. This occurs when gradients become very small or derivatives become very small in deep layers. ReLU, by setting the gradient to 1 for positive inputs, reduces the likelihood of such problems.

Reduces Computational Complexity: ReLU produces an output of 0 for negative inputs, causing many neurons to become inactive, meaning only some neurons in a certain layer become active. This reduces the computational complexity of the network, making it more efficient. Additionally, neurons that become inactive with low weights can help the network cope with irregularities.

Increases Learning Capacity: ReLU provides more learning capacity, especially when trained on large datasets. By making negative values inactive and linearly passing positive values, it captures more patterns and complexity.

In conclusion, the ReLU activation function helps to accelerate training, prevent the vanishing gradient problem [81], reduce computational complexity, and increase learning capacity in CNNs and deep learning in general. Therefore, it has become a common preference in deep learning, especially in image processing applications.

Another hyperparameter determined during model customization is the optimization algorithm (optimizer). A common challenge encountered during the training of neural network architectures is achieving the highest prediction accuracy in a short time [84]. To increase the accuracy of neural networks, various approaches are used, including increasing or decreasing the number of layers, changing the number of neurons, adding different types of neural network layers (such as convolutional neural networks, long short-term memory layers), and so on. However, these approaches are not generalized for all models [84].

The optimizer is used to improve the training of neural networks and optimize the loss function of the neural network. The loss function measures the difference between actual and predicted values during the training of a machine learning model and helps determine how well or poorly the model performs. The loss function is used to optimize the parameters (weights, biases, etc.) of the model.

For model training, the "Stochastic Gradient Descent (SGD) + Momentum" optimizer was used. Stochastic gradient descent (SGD) is a commonly used optimization algorithm for machine learning and particularly for deep learning models [86]. This algorithm is preferred to accelerate the training process. At each step, SGD calculates the gradient of the current training example and updates the model parameters using this gradient. This allows training with random samples instead of the entire dataset, which can be more efficient computationally. This method uses gradient descent to approach a minimum while reducing sudden fluctuations or skipping to achieve faster convergence. Momentum was added to SGD to increase the convergence rate and stability of the optimization process [87]. By tracking the direction and speed of previous gradients, it provides more consistent and stable updates.



The hyperparameter value known as the "learning rate" is crucial during neural network training. The learning rate controls how much the weights of a neural network will be changed during each step of training. Weight updates are changes made to the neural network to better fit the training data.

The learning rate determines how much the network's weights will change at each step during training. If the learning rate is too high, the network can quickly adapt to the training data, but this may increase the risk of overfitting. If the learning rate is too low, training of the network may be more stable but may take longer.

Generally, the learning rate α is represented by the character α and is defined between 0 and 1. The mathematical equation for the decrease in the learning rate is expressed as follows [88]:

$$\alpha = \frac{1}{1+(\text{decay rate} \times \text{epoch number})} \alpha_0 \quad (3.3)$$

It is expressed as in Equation (3.3). In Equation (3.3):

α (Alpha): The learning rate, which determines the step size during optimization,

α_0 (Alpha naught): The initial learning rate set at the beginning of training,

Epoch number: The current epoch count during training, typically starting from 1 and incremented by one (+1) after each complete pass through the dataset,

Decay rate: The parameter that determines the rate at which the learning rate decreases.

The optimal learning rate is determined through trial and error, and by adjusting the number of epochs according to Equation (3.3), the optimal learning rate can be obtained. Generally, the learning rate is an important hyperparameter to control the training of neural networks and prevent undesirable outcomes. A good learning rate can help the network learn quickly and effectively. Table 3.3 provides the values of the learning rate at six different numbers of steps, and Figure 3.7 reflects the values of the learning rate at all steps.

Table 3.3: Learning rate values dependent on the number of steps

Number of steps	Learning Rate
1.000	0.08
5.000	0.078691795
10.000	0.07352352
20.000	0.053814
30.000	0.028618898
48.000	0.00032839776

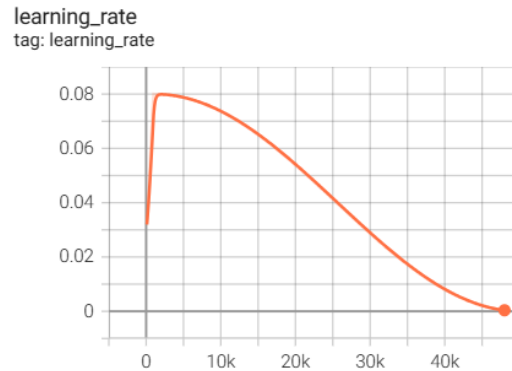


Figure 3.7: Graph of Learning Rate Values for SSD MobileNetV2 Model According to the Number of Steps During Training

When examining the learning rate values in Figure 3.7, it can be observed that the learning rate decreases as the number of steps increases. This indicates that the network trained to recognize the Leopard military tank remains stable throughout the training process.

A neural network model has parameters such as weights and biases, which define the mathematical operations that transform input data into output. To measure the performance of the model, a loss function is used. This function measures how far the model's predictions are from the true labels [89]. If the predictions are perfect (i.e., if the loss is zero), it means the model has made no errors. The model is trained iteratively on the training data, providing input data to the model and then comparing the model's predictions to the true labels.

During training, the model's weights and biases are updated to minimize the loss function. These updates are made to reduce the value of the loss function, so the model adjusts its weights and biases where it makes errors. The training process may require many iterations. The model improves its weights and biases by making multiple passes over the dataset. The loss function is an important measure of how successful the model is, and minimizing its value is one of the primary goals for model improvement. Table 3.4 shows the change in total loss values of the SSD MobileNetV2 neural network model, retrained for detecting the Leopard military tank, corresponding to step counts from 0 to 48,000.

The "total_loss" values corresponding to the 10,000th, 20,000th, 30,000th, 40,000th, and 48,000th steps are presented in Table 3.4. Based on these data, it can be said that the model performs successfully..

Tablo 3.4: Adım Sayısına Bağlı Toplam Kayıp Değerleri

Number of Steps	Total_Loss
10.000	0.16384342
20.000	0.125279
30.000	0.078427136
40.000	0.06357694
48.000	0.052923125

In studies like this where the model is specifically intended to classify a particular object, values such as "classification_loss" and "localization_loss," in addition to "total_loss" and "learning_rate," are also crucial. The graphs and values associated with these losses provide insights into how well the model is performing in terms of classification and localization tasks.



In the case of the SSD MobileNetV2 model trained for the Leopard military tank, the changes in classification_loss and localization_loss values over the number of steps are presented in Table 3.5. It can be observed from the table that as the number of steps increases, the loss values decrease and approach zero towards the end of the training. Table 3.5 displays the "classification_loss" and "localization_loss" values at the end of 48,000 steps.

Table 3.5: Step Counts Dependent Classification_Loss and Localization_Loss Values

	Number of Steps	Loss Values
classification_loss	6.500	0.051840156
classification_loss	48.000	0.016628899
localization_loss	6.500	0.119747505
localization_loss	48.000	0.001525854

These values indicate the success of the SSD MobilNetV2 model trained with the transfer learning method in classifying the Leopard military tank.

The SSD MobilNetV2 model was converted to the TensorFlow Lite (TFLite) format at the end of the entire process. TensorFlow Lite is a lightweight version of TensorFlow designed for mobile and embedded devices. The TensorFlow Lite format enables the model to run lightweight and fast, allowing effective object detection tasks for UAVs with limited processing capacity. TensorFlow Lite models can be further compressed and made more efficient through quantization, which converts 32-bit parameter data into 8-bit representations (required for Edge TPU). A model cannot be trained directly with TensorFlow Lite. First, a TensorFlow model is trained, and then the trained model is converted from a TensorFlow file (such as a .pb file) to a TensorFlow Lite file (.tflite) using TensorFlow Lite conversion steps.

Figure 3.8 illustrates the basic process of creating a model compatible with Edge TPU. Standard TensorFlow tools are used in the model creation process. A TensorFlow Lite model is converted to an Edge TPU-compatible (edgetpu.tflite) file using the Edge TPU compiler.

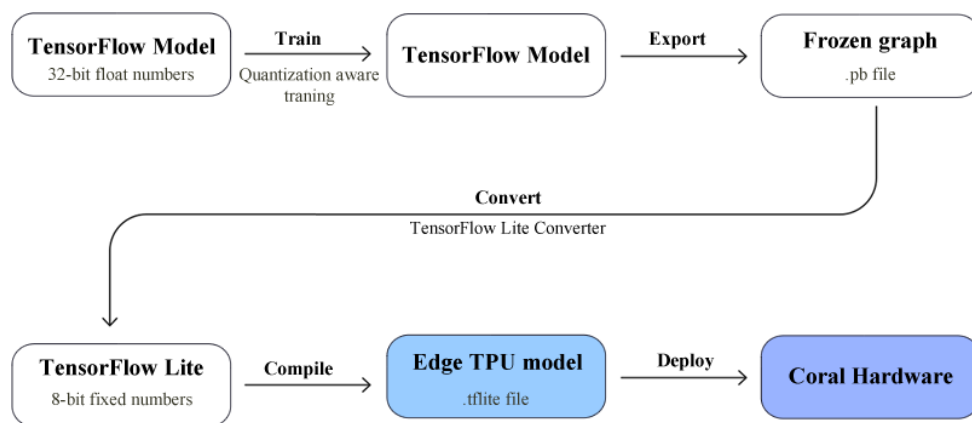


Figure 3.8: The basic process for creating an Edge TPU model

At the end of the training, the SSD MobilNetV2 model was converted into an Edge TPU .tflite model to work with the Coral Hardware (Edge TPU accelerator). This enabled the creation of a fast model suitable for use in the embedded system on the UAV platform.

In conclusion, the SSD MobilNetV2 model was first trained using transfer learning to classify Leopard military tanks, with model parameters customized for the task. Subsequently, a TensorFlow Lite model



was generated. The success of object classification by the model is closely related to the amount of data used in training. More visual data generally leads to higher accuracy. After training, tests conducted with Leopard military tank images not used during training showed that the model has the ability to detect Leopard military tanks with high accuracy (Figure 3.9 and 3.10).



Figure 3.9: SSD MobilNetV2 Model's Test Result at the End of Training-2



Figure 3.10: SSD MobilNetV2 Model's Test Result at the End of Training-2

As seen in Figures 3.9 and 3.10, the SSD MobilNetV2 neural network model can detect and classify the Leopard tank in test images with high accuracy, reaching up to 96% and 99%.

The training performance of the neural network model is evaluated by analyzing the graphs of "classification_loss," "localization_loss," "total_loss," and "learning_rate" during and after training. Adjustments to hyperparameters were made by analyzing all the graphs during the model's training. The evaluations of all the graph values post-training, as analyzed separately above, demonstrate the model's success in classification.

The model can accurately detect the Leopard military tank from video footage recorded by the UAV camera in real-time and during flight. The UAV's image recognition model can be customized for other



objects to be detected using the same approach. Thus, the UAV can be utilized in various fields such as military operations or security applications.

3.3 Embedded System Design and Software Architecture

Image-based object detection and classification applications with UAVs are mostly achieved by modifying commercially available ready-to-fly UAVs [20, 90, 91]. In these systems, hardware and software interventions are limited. Therefore, the UAV platform used in this study was designed from scratch with hardware featuring open-source software. The process of object detection, classification, and autonomous decision-making with UAVs consists of three stages. The first stage involves acquiring image data. The processes of acquiring and processing image data are synchronized. During flight, image data is obtained by the Raspberry Pi camera. The second stage is the analysis of image data. Image data is processed in real-time by the embedded artificial intelligence system. Finally, the autonomous decision-making process begins by overlapping the image-derived data (analysis results) with pre-entered data for specific tasks in the system. The entire process is completed within seconds, resulting in instant task execution. The crucial parts of the process are the second and third stages. The system needs to detect and classify surrounding objects in real-time and then transmit commands to the flight control board to execute the defined task (Figure 3.11).

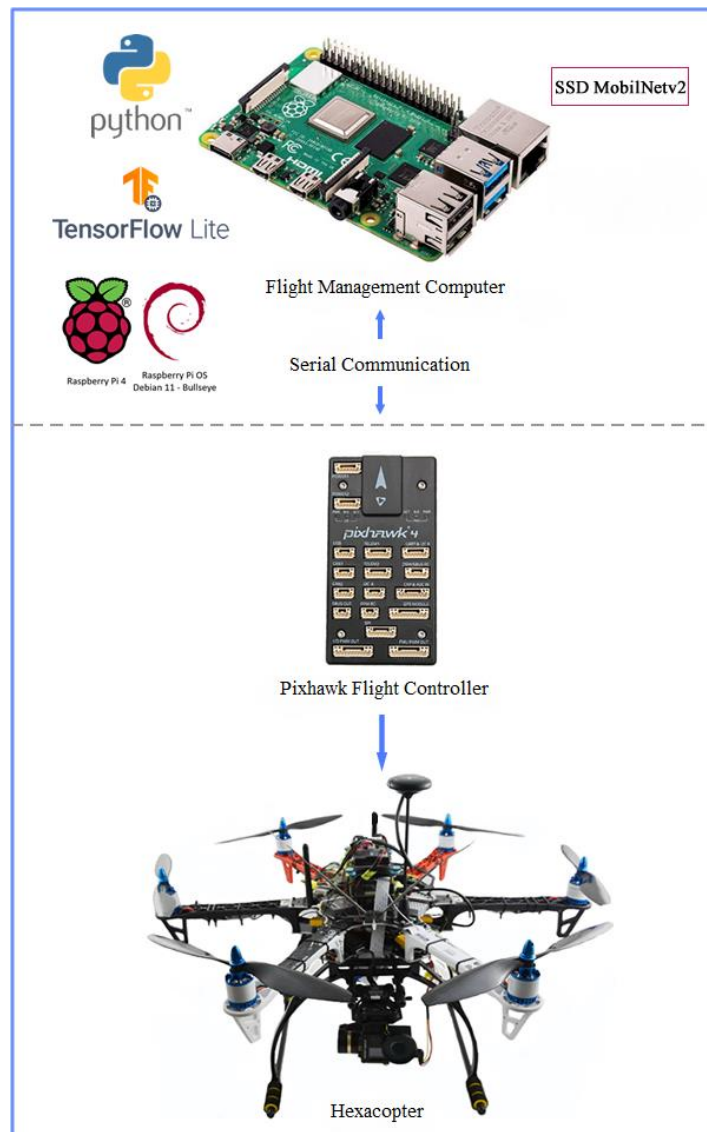


Figure 3.11: The recommended embedded system UAV



In this system, the deep learning-based SSD MobileNetV2 convolutional neural network architecture, which has been retrained and customized using the transfer learning method to detect and classify a specific object from image data, is capable of detecting multiple objects in an image or frame. The model detects the location of each object and provides the name of the object as output along with bounding box coordinates.

The pre-trained SSD MobileNetV2 deep neural network on the MS COCO dataset has the capacity to classify 90 different objects. This neural network model was loaded onto the Raspberry Pi after being retrained and customized using the transfer learning method for use in detecting and classifying objects with the UAV. Several Python scripts were coded to perform the defined tasks of object detection and classification with the UAV. For the scripts to synchronize and start working with the UAV when power is supplied to the entire system and the Raspberry Pi 4 starts up, they need to automatically start at the boot-up of the Raspberry Pi 4. To achieve this, a bash script was created to establish the virtual environment in which the scripts will run and to initiate the scripts. The Raspberry Pi 4 was configured to run the bash script when it receives power and boots up. The scripts, written in the Python programming language, incorporate deep learning techniques. Image data is analyzed through pre-trained models or custom models. Subsequently, the Raspberry Pi mini-computer sends commands to the Pixhawk flight control board based on the obtained data and the mapping of the necessary data for the task, initiating the UAV's autonomous movement process.

4. DISCUSSION

Before embarking on this study, extensive research was conducted in the literature on deep learning models used for object detection and classification, as well as their applications in various fields. In particular, investigations were made into the use of image-based object detection and classification methods in UAV platforms, examining their applications and purposes in agriculture [93, 94], search and rescue [95-97], geographic information systems [98, 99], urban planning [100], monitoring of energy transmission lines [101, 102], military [91, 103], and many other areas.

In this study, the SSD MobileNetV2 model was retrained and customized using transfer learning for a specific task. The model was integrated into an UAV platform as an embedded system. The model is capable of detecting the Leopard tank object as a specific task. However, experimental flights or test flights could not be conducted due to legal regulations prohibiting UAV flights in military areas. The data obtained at the end of the training indicates that the system could be successful in real-world applications and reliably detect objects under different flight conditions.

5. CONCLUSION

In this study, an embedded system and UAV platform capable of real-time detection based on image data with the deep learning-based convolutional neural network architecture SSD MobileNetV2, which will provide autonomous decision-making capability to the UAV, were introduced for object detection and classification tasks. Throughout the study, the deep learning model was trained using the transfer learning method with different hyperparameter values, and the object classification success of the model was analyzed. The effect of the hyperparameter values of the model was optimized to reach the optimal level.

According to experimental results, the accuracy value found for the Leopard tank in object detection with images is 97.4%, proving the feasibility of this study. These values are directly related to the resolution quality of the camera used by the UAV and the size of the dataset. Tests were conducted on video footage featuring the Leopard military tank using only the Raspberry Pi 4 and with the Raspberry Pi 4 along with the Coral Edge TPU auxiliary processor. It was observed that there was an 8-fold difference between the FPS (Frames Per Second) value obtained when only the Raspberry Pi 4 was used and the FPS value obtained when the Raspberry Pi 4 and Coral TPU auxiliary processor were used together. The SSD MobileNetV2 deep learning model, which was retrained and customized using the transfer learning method and then converted to the TensorFlow Lite format, was observed to be a model



with fast and good detection accuracy when used with an Edge TPU auxiliary processor on a device with limited capacity like the Raspberry Pi.

The deep learning-based image classification model SSD MobilNetV2 was specifically optimized for the task of correctly classifying tank objects based on image data and retrained using the transfer learning method. The system was designed to perform real-time analysis because capturing images in the field and analyzing them in the cloud may not always be possible. Cloud-based analysis may increase privacy concerns due to the possibility of third-party intervention and also cause significant delays. Therefore, working as an embedded system provides significant advantages.

The obtained test results demonstrate that the object detection and classification model can be used in UAVs. Further optimization can be done in deep learning models to improve system efficiency.

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PROMOTING THE USE OF AUGMENTED REALITY FOR EDUCATION AMONG STUDENTS WITH HEARING IMPAIRED: A SYSTEMATIC REVIEW

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ABSTRACT

The rapid evolution of technology in education has profoundly impacted teaching and learning. The growing usage of technology has piqued the interest of experts in studying its efficiency. In recent years, augmented reality for education (ARE) has become more prevalent in educational settings. One reason for ARE's growing appeal among SwHI is its ability to help teachers develop creative and engaging teaching-learning methods. However, the possibilities and challenges of these tools for students with hearing impairment SwHI have yet to be studied well. Using the above-stated criteria, this review gathers all available data on the impacts of ARE on SwHI education and their relevance. Given this new understanding, the study's overarching goal is to determine whether teachers are ready to include ARE in their lessons. Digital information in the form of live video of an individual user's surroundings is sometimes known as ARE. Positively, ARE is presently functioning at several schools. Create an intelligent campus by integrating technology into current education facilities. In higher education, students who bring their tech equipment to class must have access to course materials, including attendance records, schedules, and online learning environments—a perfect opportunity to showcase technical capabilities, including ARE. ARE technology can benefit many situations because of its adaptability and unique features. However, more research is needed to pinpoint how ARE aids children's learning. Since it has a proven ability to improve students' mental, emotional, social, and physical well-being, ARE has recently grown in popularity among learners in higher education, particularly those majoring in social work and health information. However, the research will cover every single manner in which SwHI is now used in educational institutions. This literature review examines the goals, execution, and outcomes of ARE in SwHI tutoring. This research aims to explore the AR educational system from the perspective of SwHI. From 2014 to 2022, more than twenty-five papers were reviewed. Specifically, this study examines the various forms of SwHI, the platforms and tools teachers use for ARE in the classroom, and the benefits and drawbacks of integrating ARE into SwHI. Addressing the need to encourage learners and teachers to embrace ARE as a tool to enhance learning; it provides a valuable discussion for legislators, educational institutions, and teachers on integrating ARE into modern educational systems.

Keywords: Promotion, Use, Augmented Reality, Education, Students with Hearing Impaired, and Systematic Review

Introduction

Evidence shows that technology enhances instruction and knowledge retention, leading to its extensive adoption in schools. By utilizing technology in a planned manner, students with HI can improve their motivation and classroom retention. Previous studies have shown that for technology to facilitate passive learning, it should not encourage active cognitive processes like making sense of the world, thinking critically, or performing cognitive functions. No one has ever doubted that Augment Reality (AR) can change the way we learn. The rationale is that modern innovation allows users to interact with virtual



and real-time applications seamlessly. Academics have recently begun to see AR as a potential tool for enhancing the learning experience by immersing students with HI in realistic scenarios (Saidin et al., N, 2015). Students who draw firm conclusions from their reading engage in accurate, autonomous reading. That is why reading comprehension is essential for the academic success of students with HI in modern educational systems.

As shown by Güldenöğlü (2014), students with HI have delayed and less extensive skill development, regardless of the severity of their condition. Ineffective communication, reception of new knowledge from others, and engaging thought processes are additional barriers to learning. People who are deaf may take longer to learn new things since they may find it harder to do so. As per Passing and Eden (2000), children who are deaf or hard of hearing sometimes lose interest, motivation, or intelligence. AR presents a unique potential for students who are hard of hearing to enrich their educational experiences. AR has the potential to significantly improve the educational experience for students with HI by supplementing traditional, static course materials with dynamic, interactive, and convincing digital experiences. Several studies have shown that AR has its uses in the classroom. This is because students might be captivated by fresh ideas and improve their visualization abilities using augmented reality's lifelike qualities. Teachers can also use the features to help students understand complex concepts. AR has been well-received by students with HI who have shown an interest in its use in the classroom. When students react positively and enthusiastically to HI, they are motivated to use technology in the classroom. The technology is still in its early phases of development. Therefore, specific constraints exist on how it may be used in the school. The study shows that technical considerations contribute to some limits; however, there are still others. It hopes these limitations will be considered in future research on AR in the classroom. The potential of AR for enhancing students with HI learning and teachers' methods is only going to grow as more information about AR's potential is made public in modern educational systems.

Students with Hearing Impaired

A child's growing hearing loss worsens when loved ones, teachers, and neighbours show no concern. In social, practical, and material ways, going about one's everyday life becomes more challenging for someone with hearing loss. Does anyone have any idea how to stop this from happening? With your colleagues' help, you can achieve your goal. You are killing it right now. Whether or not a child uses supportive listening devices, their academic performance will be negatively impacted by a profound inability to hear speech, a hallmark of hearing loss. The medical disease is characterized by a profound impairment or lack of hearing. Total hearing loss is not always present in those who have hearing loss. According to the National Institute on Hearing Loss and Other Communication Disorders, almost 30% of the population, or 30 million people, deal with some hearing loss. Any hearing loss, whether permanent or temporary, that impairs a child's ability to learn is not considered hearing loss for this provision. You were meant to fix every problem in your last class. Well, you can only change one this time. As you can see, being deaf is not a significant obstacle. Innovations in technology have been a boon to the industry that works with disabled children. Higher enrolment and graduation rates are associated with the widespread adoption of policies and practices. Children who have difficulty hearing can study and succeed in school with the support of their teachers and parents. Ignorance is often the root cause of insensitivity and the violation of the rights of the hard of hearing and deaf. Prejudice towards children who are hard of hearing or deaf does not go away just because there are communication hurdles that allow for the disparaging labelling of these youngsters as dumb in modern educational systems.

There needs to be more schools, speech therapists, qualified teachers, and innovative pedagogical approaches in Hawaii, which poses significant challenges for students who wish to enhance their language and reading skills. These facilities do their best to meet the needs of children with special needs, but they often need more funding. It has a tremendous effect on their capacity to understand and express themselves. It breaks my heart that some children with HI cannot go to school because their families cannot afford it. According to Dandashi et al. (2015), they pass up the opportunity to achieve financial independence. No further details are required. This training curriculum and accompanying



materials are primarily designed to help participants acquire these supplementary skills and knowledge. Furthermore, the majority of the current curriculum provides sufficient coverage of particular education positions. You can encounter parents, teachers, and students who need help understanding the unique problems that HI students face as partnerships with mainstream schools become more prevalent. Helping individuals with HI is something you will do when you care about the health of the students with HI at your school. For that reason, we made this module of service to you. Screening technology has advanced rapidly, and neonatal screening programs have been widely adopted, leading to a significant rise in the early diagnosis of hearing loss in children. Although distraction testing is still helpful for evaluating behaviours when done by qualified individuals, visual reinforcement audiometry is a more controlled and advanced approach that can create a complete audiometric profile of a new born as early as six months old (Sirimanna et al., 2001).

Only people with empathetic hearing can make out the vibrations produced by a mechanical device that the general population employs to mimic the sound. Those who are deaf have a diminished capacity for hearing. It could be hard to tell if a child is deaf without asking them directly or seeing them with a hearing aid. Hearing aids that are implanted or worn behind the ear are instances of invisible amplification technologies. Amplification may only sometimes be required for individuals with hearing loss. Disabilities in hearing, understanding, and language are characteristic of this condition. The fact that this illness can prevent a person from ever hearing their native tongue makes no difference in whether their language is innate or acquired later in life. Accordingly, they lack the inherent ability to understand or employ spoken language. A person's vocal communication skills may remain impaired, even if they improve their writing abilities. People are more connected to one another when they are deaf than blind, Henry Morton stated, interpreting Helen Keller. Every child, including those with HI, has the right to an excellent education and equal chances to be included in all aspects of society. Their ability to see and relate to the environment is likely innate. They had better results when they worked independently rather than relying on others. All of their online activities must be entirely under their control. Their ability to communicate and study should be substantially enhanced by accessing the internet and mobile devices like iPads, iPhones, etc. Throughout the design process, the demands of users, especially children with HI, are thoroughly considered for the proposed solution.

The Concept of Augmented Reality Technology

Using AR, a new technology, in the classroom has potential. The potential uses of augmented reality in schools have received less attention than technology. The increasing efficacy of AR has led to an increase in the number of studies that specifically target this technology. AR has found applications in several academic disciplines. Modern technology has enabled mankind to make great strides forward. Technology is an integral part of any human history lesson for students with HI since they always adapt to new situations. It is an inevitable by-product of all technical advancement. For this reason, technology has the potential to accomplish both good and bad. We are now in AR. While it is just a fad right now, it has the potential to become the standard in the future when many individuals take it. Singhal et al. (2012) noted that augmented reality visually represents efficient and cost-effective models. As stated by Singhal et al. (2012), two further advantages of AR are the utilization of a tactile interface metaphor for item handling and the seamless integration of virtual and real-world environments. Students with HI may learn self-sufficiency skills through AR. This study aimed to determine the effect of different constraints on users' capacity to acquire new practical skills through AR for educating students with HI in modern educational systems.

Looking at it from this angle, many schools have recently started using apps and other mobile technologies. Thanks to the proliferation of mobile devices, users can access an ever-expanding array of services through new media settings characterized by enhanced engagement. Those supplying AR technologies give one setting that permits this engagement, combining virtual and physical commodities. We can now superimpose digital items on top of physical ones, all because of these developments. The AR technology includes a computer network, a marker, a camera, and real-world items (Yildiz, E. P., 2021). In general, AR can empower students with HI by facilitating the development of open and accessible learning environments that use students' visual skills while improving their



communication, understanding, and engagement skills. The educational sector is rapidly embracing AR technology due to its promising future. Many famous brands are starting to see the potentials of AR in making their products more exciting and realistic for consumers. Businesses and the government continuously seek fresh perspectives on pressing matters, such as technological advancement, from people who can think outside the box. AR might provide these services to the education sector in this setting using its technological advances in modern educational systems.

Augmented Reality Applications Used in Education

The educational sector is one of the most visible consumers of AR. Through simulating real-world collaboration and knowledge sharing, augmented reality apps facilitate the teaching-learning of complex concepts. The literature also supports the idea that these settings suit students' learning. Another critical point was that augmented reality makes learning more interactive, increasing students' motivation, improving their experiences, and making it easier to apply what they have learned in the digital realm to real-world situations. After the study's success was proven, one of the most significant suggestions was to employ AR across all grade levels and subjects (Yildiz, E. P., 2021). With AR, users can look at virtual information in any indirect view of the natural world, like a live television feed, or in front of them, making their lives much more accessible. Users' perceptions and interactions with the natural world are enhanced by augmented reality. By superimposing digital components and signals over one's real-time surroundings, AR technology increases a person's perception of reality. People are interested in AR because it could lead to a future where they can design their worlds and go inside their thoughts. Simultaneously altering our physical world and building mixed-reality simulations and technological advancements that allow us to beautify, enrich, and bring our creativity to our living area. Using the opportunities given by AR, particularly in the realm of education, is our generation's duty. Since there are ready-made AR programs, these technologies are now within reach of classrooms. Using AR, our society could experience a significant improvement in this area as we transition from an information economy to a knowledge economy. Find out if the original publication can be found. Li/Been-Lirn (2013) states that the main objective of AR is to superimpose digital visuals over real-world ones. Utilizing AR, users can simulate an AR experience that combines the real world with digital components. According to Kitper and Rampolla (2013), AR exists to supplement, not substitute, the real world. We will go over the basics of AR in the following section. The most popular AR apps and prominent AR devices are described in detail. So, it is an excellent way to test AR for educating students with HI in modern educational systems.

Using technology in the classroom is essential to providing a good education (Pierson, 2001). AR transforms the real world by superimposing digital images, sounds, and other sensory information on top of it. The ever-evolving landscape of business apps and mobile computing is ensnaring an increasing number of enterprises. While information gathering and processing continue to expand, one of the main goals of AR is to draw attention to specific physical world structures, make them stand out, and supply innovative, easily accessible images for use in real-world presentations. Among the several advantages of gathering such massive amounts of information are learning about the spending habits of HI students and educating the administration of organizations. It is evident, however, that these students' grades are falling. Reading lessons for typically developing students begin in the first grade. Still, those with HI start in the fourth grade, reported to the Centre for Assessment and Demographic Studies (1993). Now that AR systems have matured to a certain point in the classroom, a mountain of studies proving their benefits has accumulated. There have been several academic assessments on this new technology's opportunities, hazards, and classroom trends. Adding insult to injury, only some of those studies offer practical solutions to the problems that AR systems encounter. We still have a few issues to resolve to make the most of this technology and ensure the correct usage of AR in the classroom. Although AR technologies promise to change education and open up new application domains, most of its potential must be explored. Given the existing situation, this paper suggests five ways to structure future studies on using AR in classrooms (Garzón J. et al., 2017). Currently, no solution allows deaf or hard-of-hearing students to catch up academically to their hearing classmates. AR allows users to improve their practice by integrating visual, auditory, or other sensory input into the real world in modern educational systems.



With the strategic use of technology in the classroom, students with HI can be motivated to put in more effort and, more importantly, positioned for future academic achievement. Access to expert knowledge will only be possible once technological waste encourages risk-taking, meaning-making, and mental processes. For AR to realize its promise of improving education by integrating more interactive, genuine, and expressive elements, it is crucial to ensure the security of the design. Its innovative design allows users to go about their daily lives while interacting with real-life and virtual apps. Because of AR's potential to inspire students with HI to engage in real-world activities, its use in the classroom has recently seen a spike in academic interest. Studies performed by Karasu et al. (2012) found that students' reading comprehension and decoding abilities were enhanced by using more advanced hearing aids. Therefore, we must work to level the playing field so all pupils can succeed academically. According to E.P. Yılmaz (2021), next-generation technology has been employed in numerous ground-breaking investigations within this domain. Thanks to technological advancements, students with HI can now participate in all aspects of their schooling on par with their typically hearing classmates. Virtual and AR technology offers a straightforward solution to this educational challenge. Here, the two technologies work well together, and their combined strengths become even more apparent when put to good use. Our study aims to create an educational tool that may be used with current courses. To help children who are deaf or hard of hearing succeed academically, AR is used to educate students with HI in modern educational systems.

Augmented Reality for Students with Hearing Impaired

Using AR, students could equally grasp more complex concepts with their teachers. Studies found that children with HI might gain an advantage in any classroom utilizing AR, from elementary school to university. Despite AR's numerous applications, experts believe it will be most useful in school, especially for teaching complex scientific ideas to students (Nischelwitzer et al., 2007; Medina et al., 2007; Liu et al., 2007; Saidin et al., 2015). AR is a low-cost technology that combines 3D computer-generated pictures with a single identifier or marker. HI students' trouble grasping scientific concepts when presented in broader contexts is supported by other studies conducted in deaf schools (Cawthon, 2010; Quinsland & Van Ginkel, 1990; Zainuddin et al., 2009). Milgram et al. (1995). Rosenblum (2000) and Azuma (1997) agree that the user can see and interact with the virtual three-dimensional item in real life. There has been much progress with AR recently in modern educational systems.

Several fields have much to gain from AR's many uses (Yu et al., 2009; Mekni & Lemieu, 2014). Research on the use of AR by people who are deaf or hard of hearing has also been extensive; for instance, see Parton et al. (2005) and Nishioka (2002). Students can examine their real-world environments more closely using AR applications incorporating digital content such as images, videos, and typefaces (Wu et al., 2013). Technology integration in the classroom is lacking, particularly for deaf students. Even though most students have smartphones, only some have used them for educational purposes. Plus, most classrooms only have access to two pieces of technology: a computer and a projector. This initiative uses AR to provide deaf students a more immersive learning environment. By incorporating more visual aids and animations into a prototype, experts will improve the learning experience for students with difficulty hearing. Thanks to the introduction of innovative technology that facilitates better two-way communication between teachers and students, this initiative has revolutionized how we approach education. This technique shows promise for assisting all children in today's technologically sophisticated classrooms, but further research is needed to confirm this. Most individuals can easily locate and download augmented reality apps and materials online. Making sure that students who are deaf can access the information is especially important in the field of education. However, deaf students are regularly gaining access to classroom apps and other kinds of technology in modern educational systems.

AR can completely change how people who are deaf or hard of hearing perceive the world around them. AR can assist deaf students in the classroom. The immersive experience that AR provides to students can help them better visualize the topic. Students and teachers can also use AR to communicate better (Rusli & Ibrahim, 2022). Consideration of customer happiness as an important usability component should be prioritized while building courseware for end users. It is impossible to compare the pleasure



levels of deaf pupils to those of normally developing students since they use sign language and have different learning styles. To discover the answer, we leverage specific software designed to aid deaf students in their learning inside modern educational systems.

One-way educational programs could be enhanced is by integrating AR, a more advanced form of reality. Wu, Lee, Chang, and Liang (2013) state that when coupled with other technologies, the system can be used for various purposes. Decisions on using AR in the classroom to aid students with special needs in reaching their educational goals should be based on further research into AR's literary potential. The assertion is made by Bronack (2011). According to studies (Marschark et al., 2017; Ibrahim et al., 2016), children with HI and developing teenagers sometimes have different learning styles. According to studies (Silver, 1977; Passig & Eden, 2000), the objective is to assist students in developing a better capacity for abstract reasoning. Art and design classes are open to all students, regardless of hearing ability; that's the sole distinction. Every single one of my students adds something unique to our modern classrooms.

We can improve our children's chances of success and help them attain their full potential by guiding, supporting, and educating them. Hartman (2007) noted that the field of education for people who are hard of hearing is dynamic and ever-evolving. The art curriculum, in particular, is an area where deaf education might use some work. Assisting deaf students in developing their creative vocational skills, showcasing their personalities, increasing their employability, and progressing toward their professional goals are all essential outcomes of comprehensive art education. More information on using AR in mainstream classrooms for students with HI needs to be provided. Although most AR uses do not occur in the school, many teachers might benefit from being aware of the technology's dual use. This study brings attention to using AR technology in the classroom for students who are deaf or hard of hearing for the first time. One of the main draws of AR is how it combines digital elements with our experience of the physical world. More than just showing numbers, this is about integrating immersive feelings that fit with modern educational systems.

Sign Language and Augmented Reality

The constant two-way flow of information significantly impacts every part of our lives. Communicating with hearing people is challenging for those who are hard of hearing. For these people, sign language is crucial. Nonetheless, it remains a mystery to everyone conversing with sign language. There is just one alternative practical choice: to develop spoken and written forms of sign language. This area focuses on studying signals. A person can communicate with one another through sign language by using nonverbal cues such as body language, hand gestures, and facial expressions. Decoding hand gestures has been the main focus of research due to the wealth of information they communicate in modern classrooms.

Lots of people can talk about what is on their minds. Deaf and hard-of-hearing people can only communicate through sign language. Everyone, even those who do not have trouble hearing, has their special way of expressing themselves through sign language while they are deaf. They rely on sign patterns instead of auditory cues (Krishnan et al., 2023). Sign language relies heavily on non-verbal clues like body language and eye contact to convey meaning. The deaf and hard of hearing are the main target users of this visual language because there is no generally acknowledged written form (Bragg, 2020). A large number of individuals around the world rely on sign language as their primary mode of communication due to hearing loss or other sensory impairments. While sign and spoken language differ, they both verbalize the same concepts. The app is the way to go, but it may benefit from some modern touches to entice children of today and keep their interest in the classroom.

Communicating with a wider audience may be extremely difficult for the deaf and hard of hearing. People who have difficulty expressing themselves verbally made up its core user base. Good news for those with hearing loss: the layout is easy to navigate. When engaging with those who do not share their language, persons who are deaf or hard of hearing depend on sign language. Sign language relies heavily on non-verbal cues, such as body language, instead of spoken language. You can use all your joints, including your hands, face, legs, eyes, and more. For anyone who wishes to engage with the deaf community or teach pupils who are deaf, knowing sign language is a must. As the number of people



who are deaf or hard of hearing continues to rise, the significance of sign language becomes even more apparent. Deaf and hard-of-hearing people can communicate more easily with it. A native speaker of the target language is no longer a prerequisite for employment as a sign language translator in modern educational settings.

Over the past 20 years, AR's use for real-time interaction with virtual environments has surged. The rapid advancement of AR is due to the abundance of devices capable of realizing AR's promise. Integrating virtual and real-world elements is one of AR's main selling advantages. Studies suggest that this potent trait can improve learning outcomes across various domains. Using computer-generated mental input, people can interact with items in the actual world using AR, according to Aggarwal and Singhal (2019). Engaging all four senses—sight, hearing, touch, and smell—may make this task easier. Historically, AR was mostly used to teach surgical and aerospace engineering techniques (Thomas et al., W. M., 1992; Bajura, M., 1993). Deaf youngsters can improve their visual literacy using AR. Since AR is a more interactive and engaging medium, academics teach sign language online. This initiative could enhance communication for students with HI, their families, and society. Those working in helping professions, such as teachers, social workers, counsellors, and translators, may also find sign language useful in modern educational settings.

Every day, those who are deaf encounter enormous obstacles when attempting to communicate. They find it challenging to communicate with those who are hard of hearing through sign language. Issues arise in the household, the workplace, and the educational institution. Emerging channels of communication made possible by technological advancements might prove to be an indispensable asset in meeting these difficulties head-on. Hearing people and the deaf can communicate more easily with sign language recognition. According to Goyal (2023), developing a trustworthy system for sign language recognition is the first step in becoming fluent in written or spoken Indian Sign Language. With that in mind, this initiative could enhance communication for students with HI, their families, and society. Those working in helping professions, such as teachers, social workers, counsellors, and translators. They have decided to build an AR software for smartphones that uses sign language to teach the alphabet and numbers. After scanning the sign language materials, you can utilize the augmented reality function to show the 3D model's contents. To create AR experiences, Hirokazu et al. (2001) built The Magic Book, which mixed physical book pages with digital overlay models. Using a head-mounted display, the software streamlines the process of going from an AR picture to a completely immersive virtual reality experience. This Sign Language book is an excellent tool for children with HI to enhance their literacy abilities, learn to read and comprehend performance signals and practice reading and writing. The Sign Language book may have every letter of the alphabet and pictures of animated characters making different signs. Teaching students to decipher written language is a major tenet of modern classrooms.

A person's cognitive talents can be enhanced with the use of MagicBook. A three-dimensional digital version of any page in the book can be accessed by scanning it. Evidence shows that sign language can help people who are deaf or hard of hearing overcome language barriers (Noor-Un-Nissah et al.; M. H., 2019). This technology renders human translators obsolete by enabling users to incorporate AR into text. Utilizing Natural Feature Tracking, the connected smartphone app allows the 3D objects to float atop real-life images. The educational system is the backbone of any nation's development, and learning media are tools that can help that system thrive. The majority of instructional media nowadays integrates some form of technology. However, these educational materials were not created specifically for the deaf community; their target demographic is far broader. AR might be a huge boon to the app developers working on the sign language smartphone software. Consumers get the best of both worlds with AR, which blends computer-generated graphics with real surroundings. To improve their features and the user experience, many smartphone apps now integrate AR into modern educational systems.

Conclusion

Technological progress has allowed humanity to thrive. Adapting to new situations requires the capacity for creative thinking and the ability to express the technological progress that humanity has achieved



clearly. However, the unpredictable character of technological innovation may produce good and harmful results. Using technology-assisted learning led to improvements in students' academic and extracurricular performance, according to this study. It was also noted that students' intrinsic motivation had grown. Careful consideration of the project's significant scientific issues is necessary because there are no AR-compatible treatments for HI children. This study could reveal the best training method. Opportunities in special education have expanded thanks to augmented reality technology. Even after all this time, the technology is still fascinating and has great potential in special education. AR crosses a divide between the digital and physical worlds, making learning more engaging and accessible for children with HI. This study aimed to describe the process of developing an activity for children with HI that used AR software and mobile learning devices. With AR, any student has a better chance of succeeding in class. The student's excellent satisfaction scores on the assessment demonstrated that they clearly understood multiple themes. Based on the study's results, AR may help students with HI better use technological tools. This could have far-reaching consequences for augmented reality in elementary, secondary, and tertiary education. For students in higher education and college to fully grasp and visualize abstract ideas, an immersive learning environment is essential. There may be institutions of higher learning that cannot employ AR due to safety concerns. AR is an innovative technology that is gaining traction in language learning. We have become experts in utilizing AR to support the language development of children with HI in modern educational systems.

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SEEDLING MORPHOLOGY AND QUALITY IN ARIZONA CYPRESS AND MEDITERRANEAN CYPRESS

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ABSTRACT

Mediterranean cypress (*Cupressus sempervirens* L. var. *horizontalis* (Mill.) Gord.) and Arizona cypress (*Cupressus arizonica* Greene) are used widely in forestry practices and landscape planning in Turkey. These practices and planning are getting importance of seedling morphology and quality of the species.

Height, root-collar diameter and sturdiness index of 1+0 and 1+1 year container seedlings of Mediterranean cypress and Arizona cypress were examined based on seedling morphology and quality of the cypresses to contribute seed technology, nursery and afforestation practices, and landscape planning of the species.

Averages of seedling height and root-collar diameter of 1+0 and 1+1 year seedlings were 21.7 cm and 2.94 mm, 25.8 cm and 3.07 mm in Mediterranean cypress, while they were 24.4 cm and 3.43 mm, 24.9 cm and 3.21 mm in Arizona cypress, respectively.

Seedling groups of the species were generally similar ($p>0.05$) for seedling height and root-collar diameter, while they had significant difference ($p<0.05$) for sturdiness index.

Seedling height and root-collar diameter showed positive and significant ($p<0.05$) relations in seedling groups and species.

All of the seedlings of the species were in quality class for classes of Turkish Standard Institute for root-collar diameter. However, percentages of quality seedlings were 90% in Mediterranean cypress, and 49% in Arizona cypress for seedling height. 1+0 year seedlings had better quality than 1+1 year seedlings for sturdiness index in Mediterranean cypress opposite to Arizona cypress.

Results of the study were discussed based on nursery technique, plantation forestry and other forestry practices in these species.

Keywords: Diameter, Height, Nursery.

INTRODUCTION

Mediterranean cypress (*Cupressus sempervirens* L. var. *horizontalis* (Mill.) Gord.) which is native tree species of Turkey, and Arizona cypress (*Cupressus arizonica* Greene) which is egzotic tree species of Turkey are important forest trees for afforestation practices and landscape planning in Turkey. Mediterranean cypress has two varieties (*C. sempervirens* L. var. *horizontalis* (Mill.) Gord.) and (*C. sempervirens* L. var. *pyramidalis* Nym.) (Anşin and Özkan, 1993). Mediterranean cypress occupy at Taurus mountains and western part of Turkey, and Gemlik, İzmit, Datça and Reşadiye up to 1800 m. (Figure 1, Kayacık, 1966; Özalp, 1991; Anşin and Özkan, 1993). It grows up to 43 m height, 2.1 diameter at breast height and 1030 years (Özçelik, 2006). Arizona cypress occupy at Texas, North Arizona and North Carolina (Figure 1, Anşin and Özkan, 1993). It grows 10-15 m height and sometimes up to 25 m at between 1000 m-2650 m (Anşin and Özkan, 1993).

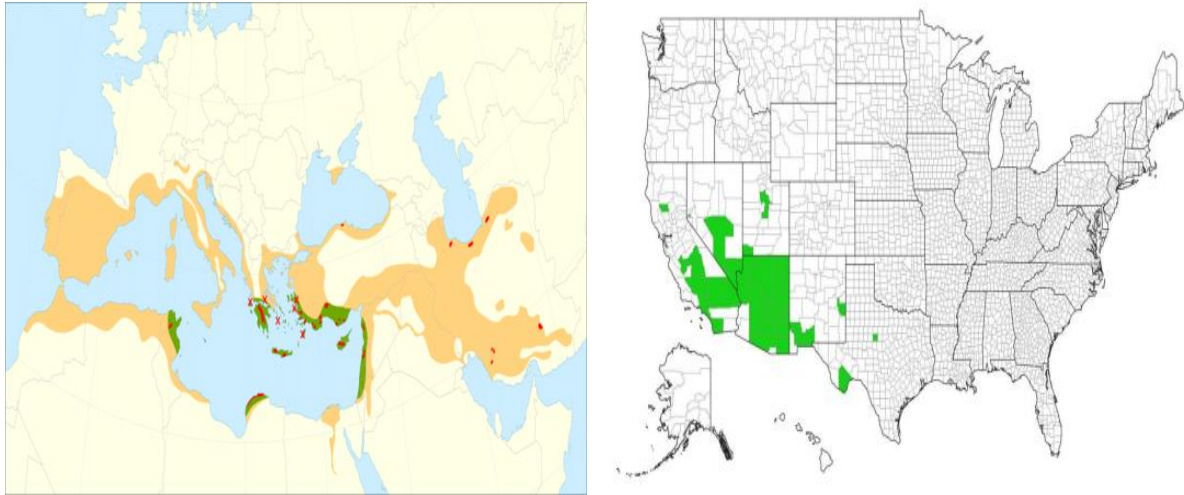


Fig. 1. Natural distributions of Mediterranean (left side) and Arizona cypresses (right side)

While many advantages and different utilizations of the species (Kayacık, 1966; Allemand, 1989; Anşın and Özkan, 1993), limited studies were carried out on seedling characteristics and nursery practices of the species (Civek, 2019; Uslu and Bilir, 2020; Ayan *al.*, 2020). Height, root-collar diameter and sturdiness index on 1+0 and 1+1 year container seedlings of Mediterranean cypress and Arizona cypress grown at Muğla Forest Nursery were examined based on seedling morphology and quality of the species to contribute seed technology, nursery and afforestation practices, and landscape planning.

MATERIAL AND METHODS

Seedling height (**SH**) and root collar diameter (**RCD**) data were collected from 1+0 and 1+1 year container seedlings grown Muğla Forest Nursery of Mediterranean cypress and Arizona cypress (Figure 2). 100 seedlings were sampled randomly from each age group and species in the nursery, and totally 400 seedlings at end of 2022. The seedlings were classified according to the quality classes of Turkish Standard Institute (TSI) (Table 1 Anonymous, 1988). The seedlings were also classified for sturdiness index (**SI**) (Aphalo and Rikala, 2003) as: Sturdiness index (**SI**) = [SH (mm) / RCD (mm)]. They were first class (**SI**<50), second class (**50**<**SI**<**60**) and cull (**SI**>**60**) (Aphalo and Rikala, 2003).



Fig. 2. Sampled Mediterranean cypress (left side) and Arizona cypress (right side)



Table 1. Seedling quality classes of Turkish Standard Institute in the species

Quality classes	Seedling height (SH, cm)	Root collar diameter (RCD, mm)	SH+RCD
1 + 0 year			
First class	18 ≤	2 ≤	18 ≤ SH + 2 ≤ RCD
Second class	18 > SH ≥ 15	2 ≤	18 > SH ≥ 15 + 2 ≤ RCD
Cull	15 >	2 >	15 > SH + 2 > RCD
1 + 1 year			
First class	40 ≤	2 ≤	40 ≤ SH + 2 ≤ RCD
Second class	40 > SH ≥ 30	2 ≤	40 > SH ≥ 30 + 2 ≤ RCD
Cull	30 >	2 >	30 > SH + 2 > RCD

The species was compared for the characteristics by following linear model of analysis of variance to at SPSS (SPSS, 2011).

$$Y_{ij} = \mu + P_j + e_{ij} \quad (1)$$

Where Y_{ij} is the observation from the j^{th} seedling of the i^{th} species, μ is overall mean, P_i is the random effect of the i^{th} species, and e_{ij} is random error.

Phenotypic correlations (r_p) between the pairs of seedling height and root collar diameter were estimated in each species as (Falconer, 1989):

$$r_p = \frac{COV_{f(x,y)}}{\sqrt{\sigma^2_{f(x)}} \sqrt{\sigma^2_{f(y)}}} \quad (2)$$

Where $COV_{f(xy)}$ is the phenotypic covariance between characteristics x and y, $\sigma^2_{f(x)}$ and $\sigma^2_{f(y)}$ are the phenotypic variances for characteristics x and y, respectively.

RESULTS AND DISCUSSION

1+1 year seedlings of Arizona cypress showed higher seedling height (24.9 cm and 24.4 cm) than 1+0 year opposite to root collar diameter (3.43 mm and 3.21 mm). However, 1+1 year seedlings of Mediterranean cypress showed higher growth performances for both characteristics, while individual seedlings showed large differences within age group of both species (Table 2). For instance, there are about three times differences among individuals of same age group within species (Table 2). Similar variations were also reported in one year bare-root seedlings in Mediterranean cypress (Uslu and Bilir, 2020), and other forest tree species (i.e., Dilaver *et al.*, 2015; Çercioglu and Bilir, 2016; Çetinkaya and Bilir, 2019; Bilir, 2019). Averages of varieties of one year bare-root seedlings of Mediterranean cypress



were 84 cm and 78.9 cm for seedling height, and 8.7 mm and 8.2 mm for root collar diameter (Uslu and Bilir, 2020). These results emphasized importance of individual selection in seed harvesting for seedling production in nursery practices.

Table 2. Averages, ranges and coefficient of variations (CV%) of the characteristics for the species

	1+0 year		1+1 year		Total	
	SH (cm)	RCD (mm)	SH (cm)	RCD (mm)	SH (cm)	RCD (mm)
Mediterranean cypress						
Average	21.7	2.94	25.8	3.07	23.8	3.00
Min.-Max.	9.0-33.0	2.0-5.0	16.0-40.0	2.0-5.0	9.0-40.0	2.0-5.0
CV (%)	20.3	28.9	17.8	27.3	20.4	28.0
Arizona cypress						
Average	24.4	3.43	24.9	3.21	24.7	3.32
Min.-Max.	13.0-33.0	2.0-5.0	16.0-51.0	2.0-5.0	13.0-51.0	2.0-5.0
CV (%)	16.6	27.1	21.3	28.0	19.0	27.7

There were positive and significant ($p \leq 0.05$) phenotypic relations between seedling height and root collar diameter in both species and age groups. Similar relations were also found in cypress (Civek, 2019; Uslu and Bilir, 2020), and other forest tree species (i.e., Dilaver *et al.*, 2015; Çercioglu and Bilir, 2016; Bilir, 2019; Ayan *al.*, 2020).

The species were similar ($p > 0.05$) for seedling height opposite to root collar diameter and sturdiness index ($p < 0.05$) in age groups based on results of variance analysis. Dilaver *et al.* (2015) reported significant differences ($p \leq 0.05$) among seedling type and seed source in *Pinus brutia* by results of variance analysis. Similar results were also found in *Cedrus libani* by Çetinkaya and Bilir (2019).

Distribution of seedlings to quality classes of sturdiness index (SI) were given in Table 3. More than 75% of seedlings were in cull class in species and age groups, while it was 99% in 1+1 year of Mediterranean cypress (Table 3).

Table 3. Distribution (%) of seedlings to quality classes of sturdiness index (SI)

	Mediterranean cypress			Arizona cypress		
	First class (SI≤50)	Second class (50<SI≤60)	Cull (SI>60)	First class (SI≤50)	Second class (50<SI≤60)	Cull (SI>60)
1+0	4.0	20.0	76.0	2.0	23.0	75.0
1+1	-	1.0	99.0	2.0	11.0	87.0
Total	2.0	10.5	87.5	1.0	16.5	82.5



All seedlings were in first class for root collar diameter according to the quality classes of Turkish Standard Institute, while it changed for seedling height in species and age groups (Table 4).

Table 4. Distribution (%) of seedlings to quality classes for species and age groups

	1+0 year			1+1 year			Total		
	SH	RCD	SH+RCD	SH	RCD	SH+RCD	SH	RCD	SH+RCD
Mediterranean cypress									
First class	83.0	100.0	83.0	98.0	100.0	98.0	90.5	100.0	90.5
Second class	15.0	-	15.0	2.0	-	2.0	8.5	-	8.5
Cull	2.0	-	2.0	-	-	-	1.0	-	1.0
Arizona cypress									
First class	96.0	100.0	96.0	2.0	100.0	2.0	49.0	100.0	49.0
Second class	3.0	-	3.0	14.0	-	14.0	8.5	-	8.5
Cull	1.0	-	1.0	84.0	-	84.0	42.5	-	42.5

Similar results were also found in cypress (Civek, 2019; Uslu and Bilir, 2020), and other forest tree species (i.e., Dilaver *et al.*, 2015; Çercioglu and Bilir, 2016; Çercioglu and Bilir, 2016; Çetinkaya and Bilir, 2019; Bilir, 2019; Ayan *al.*, 2020). These results emphasized importance of morphological characteristics and classification type in seedling quality.

CONCLUSIONS

Age group and seedling type should be taken into consideration in plantation practices of the species. New studies should be carried out by new characteristics such as fresh and dry weights of the species in different forest nurseries.

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AN EXAMINATION IN SEED STANDS OF ANATOLIAN BLACK PINE

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ABSTRACT

This study is carried out on Anatolian black pine [*Pinus nigra* Arnold. subsp. *pallasiana* (Lamb.) Holmboe] which is an economically and ecologically forest tree species by 4.1 million ha natural distribution which of 18% of Turkish forest area. However, 41% of Turkish forest area and 31% of the species are unproductive. Seed source such as seed stand is an important factor in conversion of unproductive forest to productive. The studied species has 73 selected seed stands at about 9376 ha. In this study, these seed stands were examined for areal, altitudinal, aspectual, age, tree height and diameter to contribute establishment and management of seed sources of the species.

Averages of area and altitude were 54.1 ha and 1188 m, while age, diameter and tree height were 100 years, 25.8 cm and 39.2 m, respectively. The seed stands showed large differences for the characteristics. For instance, areas were between 5.4 ha and 124.5 ha, and age ranged from 65 years to 160 years. 32.9% of the stand areas were between 20 and 40 ha, 61.6% of the stands were between 1000 m and 1500 m. Besides, 30.1%, 5.5%, 8.2%, 11.0% and 45.2% of the stands were in north, south, east, west and other (i.e., northwest) aspects, respectively.

Results of the study showed that the seed stands covered the natural distribution area of the species for the characteristics.

Keywords: Age, Altitude, Aspect, Silviculture.

INTRODUCTION

Turkey has 23.3 million ha forest area which of 41% is unproductive, while Anatolian black pine [*Pinus nigra* Arnold. subsp. *pallasiana* (Lamb.) Holmboe] has 4.1 million ha natural distribution which of 31% is unproductive according to the latest inventory (Table 1, OGM, 2023; Figure 1, Atalay and Efe, 2012). Anatolian black pine is an economically and ecologically forest tree species by the large natural distribution in Turkish forestry. It is also an important forest tree species of “National breeding programme” (Koski and Antola, 1993).

Table 1. Forest area of Anatolian black pine and Turkey

[1]Species	[2]Productive (ha)	[3]Degraded (ha)	[4]Total (million ha)
[5] <i>P. nigra</i>	[6]2.8 (68%)	[7]1.3 (32%)	[8]4.1
[9]Turkey	[10]13.7 (59%)	[11]9.6 (41%)	[12]23.3

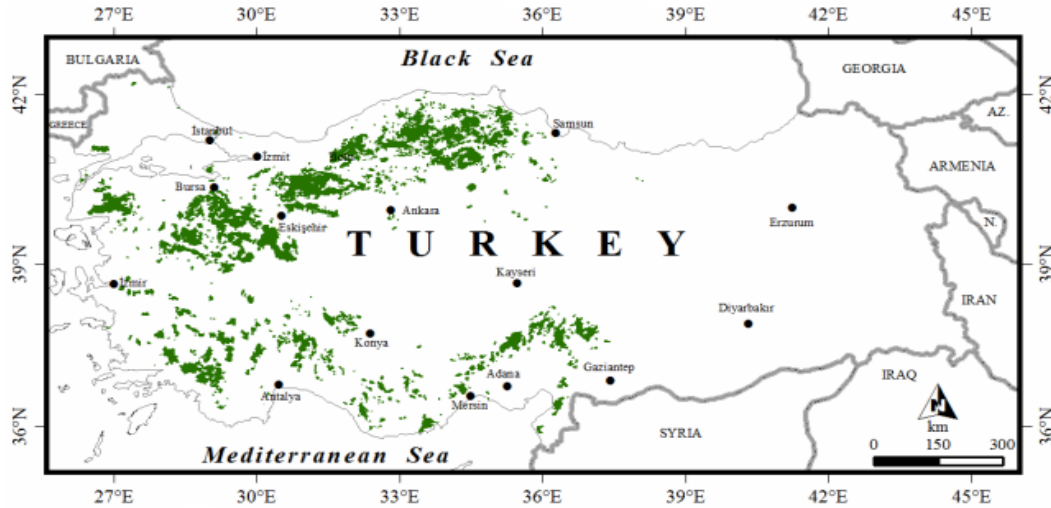


Fig. 1. Natural distribution of the species in Turkey

Anatolian black pine is used widely in afforestation practices (Ayan *et al.*, 2017) for conversion of unproductive forest area to productive area because of large distribution area mainly between 400 and 2100. The species grows up to 40 m height and more than 1 m diameter (OGM, 2009). The seed stands of the species which are 73 selected seed stands at about 9376 ha (ORTOHUM, 2021, Figure 2) are important roles in forestry practices and economical importance of the species.



Fig. 2. A Seed stand and individual tree of the species

These seed stands were examined for growth (age, tree height, diameter) and geographic (area, altitude and aspect) characteristics to contribute establishment and management of seed sources of the species in this study.

MATERIAL AND METHODS

Seed stands are selected based on area, altitude, latitude, longitude, and other geographic characteristics together with growth traits (Zobel and Talbert, 2003). Based on these characteristics, 73 seed stands at about 9376 ha were selected in the species (ORTOHUM, 2021). These seed stands were group geographically for areal (A_{rea} ; $20 \text{ ha} \leq A_{rea}$; $20 < A_{rea} \leq 40$; $40 < A_{rea} \leq 60$; $A_{rea} > 60$ ha), altitudinal ($A_{ltitude}$; $500 \text{ m} \leq A_{ltitude}$; $500 < A_{ltitude} \leq 1000$; $1000 < A_{ltitude} \leq 1500$; $A_{ltitude} \geq 1500$ m), aspectual (N, S, W, E, and others such as Northwest, South east and flat), age (A_{ge} , $A_{ge} < 120$ years; $A_{ge} \geq 120$ years), and other growth traits (tree height, diameter) of the species in the study.



RESULTS AND DISCUSSION

Averages and ranges of area, altitude, age, diameter and tree height of the stands were given in Table 2.

Table 2. Averages and ranges of the characteristics in the seed stands

[13]Characteristics	[14]Averages	[15]Minimum	[16]Maximum
[17]Area (ha)	[18]54.1	[19]5.4	[20]124.5
[21]Altitude (m)	[22]1188	[23]160	[24]1800
[25]Age (year)	[26]100.0	[27]65.0	[28]160.0
[29]Diameter (cm)	[30]25.8	[31]17.0	[32]35.0
[33]Tree height (m)	[34]39.2	[35]25.0	[36]65.0

Averages of the characteristics were close to selection criteria of seed stands in the species (Saatcioglu, 1976; Zobel and Talbert, 2003) while there were large differences among the seed sources for the characteristics (Table 1). For instance, areal differences were more than 23 times (5.4 ha and 124.5 ha) among the seed stands (Table 1).

Averages of age, diameter and tree height were 100 years, 25.8 cm and 39.2 m, respectively (Table 1). 83.6% of the seed stands were lower than rotation age which was 120 years (Saatcioglu, 1976) opposite to 16.4%.

Aspectual distribution of the seed stands were given in Figure 3. The highest percentages of seed stands were in north (30.1%) and other (45.2%) aspects, while southern aspect (5.5%) was the lowest distribution (Figure 2), were well accordance with silvicultural characteristics of the species (Saatcioglu, 1976). For instance, competition ability for light of the black pine was low, semi-light tree. Aspects/exposure, and direction of the mountain ranges were criterions in main natural occurrence areas of the Anatolian black pine (Atalay and Efe, 2012). It was also know that aspect was also related to many other ecological characteristics such as humidity, soil activity.

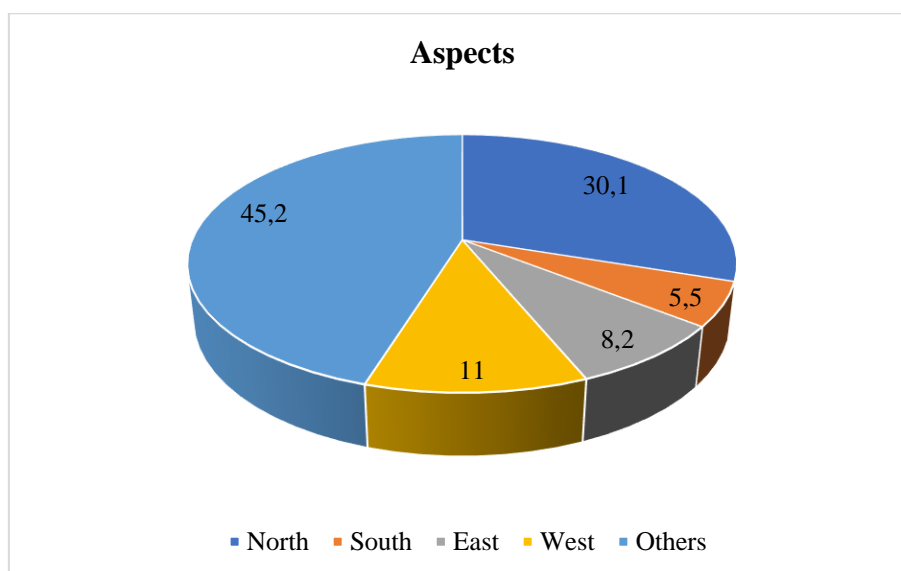


Fig. 3. Aspectual distributions (%) of the seed stands



Selected seed stands were generally at between 20 and 40 hectares (32.9%), while their altitudes of the stands ranged from 1000 m to 1500 m (61.6%) (Table 2, Figure 4).

Table 2. Areal and altitudinal distributions of the seed stands

[37]Areal class (ha)	[38]%	[39]Altitudinal class (m)	[40]%
[41] $20 \leq A_{rea}$	[42]8.2	[43] $500 \leq A_{ltitude}$	[44]4.1
[45] $20 < A_{rea} \leq 40$	[46]28.8	[47] $500 < A_{ltitude} \leq 1000$	[48]17.8
[49] $40 < A_{rea} \leq 60$	[50]32.9	[51] $1000 < A_{ltitude} \leq 1500$	[52]61.6
[53] $A_{rea} > 60$	[54]30.1	[55] $A_{ltitude} \geq 1500$	[56]16.4

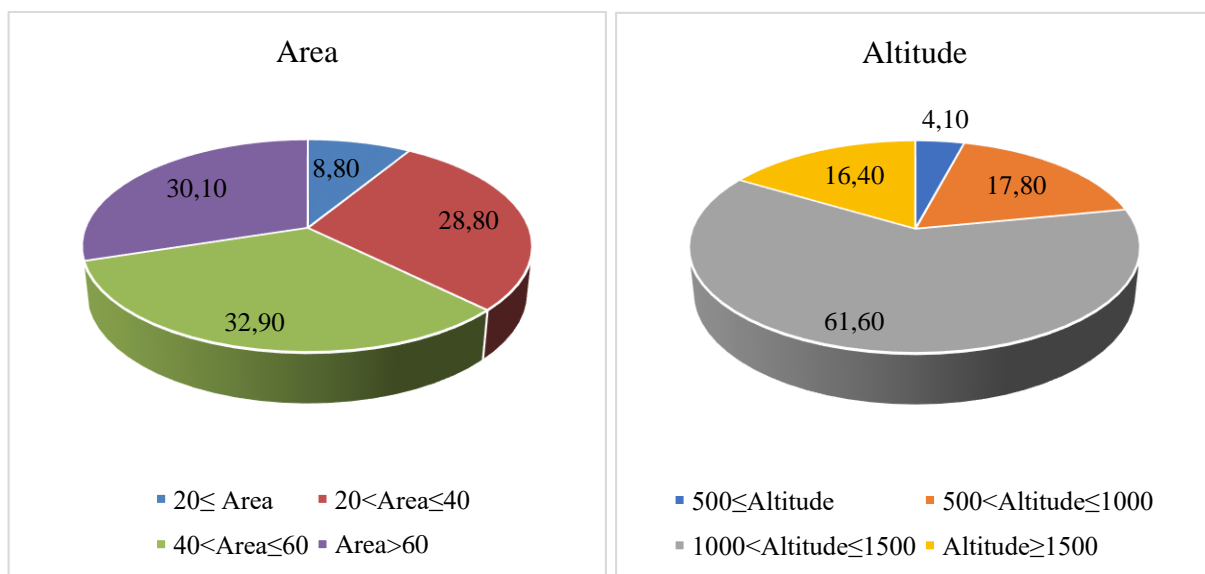


Fig. 4. Aspectual and altitudinal distributions (%) of the seed stands

The species occupied in different ecological conditions by large natural distribution which was 4.1 million ha (OGM, 2023). However, the species mainly occupied between 400 m and 1400 m/ 2100 m (Saatcioglu, 1976; OGM, 2009). Besides, altitude was a restricted factor in the species (Atalay and Efe, 2012). It could be said that altitudinal distribution of the seed stands (Table 2, Figure 4) was accordance with silvicultural characteristics of the species (Saatcioglu, 1976).

CONCLUSIONS

Results of the study showed the seed stands were mostly suitable for selection criterions of the species. The results could be used in selection and cancelation of seed stands in the species. However, new studies could be carried out by different characteristics.

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ACIL DURUM VE AFETLERDE GÖRÜLEN RUHSAL BOZUKLUKLAR MENTAL DISORDERS SEEN IN EMERGENCIES AND DISASTER

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ÖZET

Acil durum ve afetler kişilerin ve toplumun hayatında kesintilere hatta durmalara neden olabilecek olaylardır. Bu olaylar insan ruhunda normal dışı süreçleri tetikler ve günlük hayatında sıkıntı oluşturabilecek ruhsal bozukluklara neden olurlar. Yüksek seviyeli tehdit ve sevilen şeylerin kaybı insan yaşamının normal süreçleridir fakat insandan insana farklılık gösterebilecek belli bir eşik seviyesinden sonra algı, duyum, hafıza, duygusal ve bilişsel deneyim gibi temel fonksiyonlar güvenilir hale gelir ve travmatik olayın düzen, tahmin edilebilirlik ve güvenliğe dair ilk seviyedeki tehdidini yükseltir. Temel inançlar, irtibatlar, kişinin kendi şahsı ve çevresi hakkındaki düşünceleri kalıcı olarak farklılaşabilir. Acil ve afet olayı sonrası anlamdaki farklılaşmalar bazı önemli tehditlere neden olabilir ve sonuçları da yıkıcı olabilir. Acil durum ve afete veya travmaya maruz kalan ya da tanık olan insanların büyük kısmı iyileşse de, genelde çoğu tedavi görmeden bunu başaramaz. Tedavi görmeden veya tedavisi başarısız olarak yaşamlarına devam edenler, hayatlarını travmatik vakalarla birleştiren insanlar olarak müdahaleci, rahatsızlık verici anılar ve bu anılardan kaçınma girişimleri döngüsünde sıkışırlar. Travmadan sonra gerçekleşen korku, kaygı, öfke, utanç ve suçluluk gibi yoğun duygular hissetmek çok dayanılmaz hale gelebilir. Travmanın anlamını tanımlayacak ve açıklayabilecek kelimeler dile getirilemez hale gelebilir. Çoğu insan, bir kriz olayından sonra bir miktar kaygı yaşar, depresyona girer veya olayı zihninde yeniden yaşar. Genellikle bu reaksiyonlar yavaş yavaş kaybolur ve sonunda görülmeyebilir. Ancak bazı bireylerde bu reaksiyonların daha uzun bir süre devam ettiği ve daha da kötüleştiği görülebilir. Bu durum ciddi bir psikolojik sorunun gelişmesine yol açabilir ve sonrasında profesyonel yardıma ihtiyaç duyulur. Acil durum ve afetlerin ardından genellikle rastlanılan ruhsal bozukluklar; anksiyete, depresyon ve travma sonrası stres bozukluğudur. Bu ruhsal bozukluklar benzer bazı göstergelere sahiptir ancak tedavileri farklılık gösterir. İhtiyaç duyulan uzmanlık hizmetlerinin sağlanması için denetimin yanı sıra daha uzun vadeli eğitim gereklidir

Bu çalışmanın amacı acil durum ve afetlerde görülen ruhsal bozukluklara eğilerek, bunların tanısı, iyileştirme süreçlerinde kullanılacak araçları ve bu olayların kişisel ve toplumsal etkilerini literatür taraması şeklinde aktarmaktır.

Anahtar Kelimeler: Acil durum, Afet, Ruh Sağlığı

ABSTRACT

Emergencies and disasters are events that can cause interruptions or even halts in the lives of individuals and society. These events trigger abnormal processes in the human psyche and cause mental disorders that can cause problems in daily life. High levels of threat and the loss of loved ones are normal processes in human life, but after a certain threshold level, which may differ from person to person, basic functions such as perception, sensation, memory, emotional and cognitive experience become unreliable and the initial threat of the traumatic event to order, predictability and security becomes more prevalent. Basic beliefs, contacts, and thoughts about one's own person and the environment may change permanently. Differences in meaning between emergency and post-disaster events can cause some significant threats and the consequences can be devastating. Although the majority of people who experience or witness emergencies and disasters or trauma recover, most generally do not do so without treatment. Those who



continue their lives without treatment or with unsuccessful treatment become stuck in a cycle of intrusive, disturbing memories and attempts to avoid these memories, as people who associate their lives with traumatic events. Feeling intense emotions such as fear, anxiety, anger, shame, and guilt that occur after trauma can become overwhelming. The words that would describe and explain the meaning of the trauma may become unspeakable. Most people experience some anxiety, depression, or relive the event in their mind after a crisis event. Often these reactions disappear gradually and may eventually not be seen. However, in some individuals, these reactions may persist for a longer period of time and become worse. This situation can lead to the development of a serious psychological problem and then professional help is needed. The three most common disorders after emergencies and disasters are anxiety, depressive disorder and post-traumatic stress disorder. These disorders have some symptoms in common, but the focus of treatment differs. Longer-term training as well as supervision is required to provide the specialist services needed.

The aim of this study is to focus on mental disorders seen in emergencies and disasters, to describe their diagnosis, tools that can be used in recovery processes, and the personal and social effects of these events in the form of a literature review.

Key Words: Emergency, Disaster, Mental Health

GİRİŞ

Psikolojik travma, doğası gereği insanın ruhunu sıkır. Aşırı tehdit ve kayıplar insan hayatının alışılabilir olgularıdır. Algı, duyum, hafıza, duygusal ve bilişsel yapılar, güvenilmez hale gelir. Bu durum travmatik olayın düzen, tahmin edilebilirlik ve güvenliğe dair ilk tehdidini daha fazla artırır. Temel inançlar, ilişkiler, bireyin kendi şahsı ve çevresi hakkındaki varsayımları bazen değişmez şekilde dönüşebilir. Bazı insanlar açısından travma, sonunda hayatın daha büyük bir değerlemesi ve daha derin bir anlam duygusu ile nihayetlenir (Evces, 2015: 9-10).

Travmadan sonra travmaya maruz kalan birey, kendi başına sağlıklı başa çıkma stratejileri geliştirebilir. Travmaya maruz kalan birey uygun yöntemlerle destek almadığı için çok uzun süre acı çekerse travmanın oluşturacağı semptomlar kompleks hale gelir. Dolayısıyla kişinin iyileşme süreçleri de o kadar karmaşık ve zor olur. Travmalardan sonra insanlar genelde travma geçirdiğinin ya farkında olmaz veya destek almayı kabul etmeyerek kendi kendine bazı uygun olmayan yöntemler uygular. Bunun sonucu alkol veya uyuşturucu kullanımı, aşırı çalışma veya işi terk etme, beslenme düzeninde farklılıklar, kendine zarar verme, ilişkilerin bozulması, izolasyon, saldırganlık ve riskli davranışlar görülebilir. Çoğu insan travmayı doğal yollarla atlatsa da, belirtiler dört ila altı haftadan uzun sürerse uzman travma terapisi uygulanması gereklidir (Dunkley, 2018: 24-25).

Afetler sonrasında oluşan psikolojik ve duygusal tepkilerin hepsi olumsuz olarak nitelendirilemez. Bazen bu tepkiler afetzedelerin yaşama tutunmalarını sağlayarak hayatta kalma şanslarını yükseltebilmektedir. İnsanlar afetlerden sonra geçmiş yaşamları, deneyimleri, karakterleri gibi farklı faktörlerden dolayı aynı deneyimi birebir yaşamazlar. Ama afet sonrasında etkilenenlerin çoğunluğu tarafından deneyimlenen benzer tepkiler vardır. Afetlerden sonra afetzedelerde görülebilen bu ortak tepkiler aşağıdaki gibidir. Duygusal göstergeler: aşırı üzüntü, gereksiz korku, çabuk paniğe kapılma, sık sık şoka uğrama, sebepsiz kızgınlıklar, abartılı öfke ve suçlu hissetmek. Psikosomatik göstergeler: Midenin bulanması, vücutta devamlı gerginlik, düzensiz uyku, çarpıntı, migren benzeri geçmeyen baş ağrıları, vücut boşaltma sisteminde sıkıntılar, nefes almakta güçlük çekmek. Bilişsel göstergeler: hatırlama sorunları, aynı düşüncenin tekrar tekrar akla gelmesi, kötü rüyalar, odaklanma sıkıntıları ve bir şeye karar vermede sıkıntı yaşama. Davranışsal göstergeler: insanlarla ilişkilerde sıkıntı yaşama, düşük güdülenme, hayattan ümidi kesme ve kendini miskin hissetmek (Satapathy, 2011: 427).

Meyers ve Wee (2005)'e göre afetlerden sonra meydana gelebilecek akıl sağlığı bağlamında bazı ilkeler ve varsayımlar vardır. Bunlar:



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- ✓ Bir acil duruma, afete veya travmatik bir olaya maruz kalan insanlar bunlardan bir şekilde farklı derecelerde mutlaka etkilenirler.
- ✓ Acil durum ve afetlerden etkilenen bireylerin duygusal ve bilişsel tepkileri, afetin ve acil durumun neden olduğu yaşamsal sıkıntılardan kaynaklanabilir.
- ✓ Afet ve acil durum sonrasında ortaya çıkan ruhsal ve bilişsel tepkiler ciddi ve yıkıcı psikolojik bozukluklara sebep olabilir.
- ✓ Akıl ve ruh sağlığı çalışanlarının geleneksel metotları değil bilimsel metotları uygulaması gereklidir.
- ✓ Acil durum ve afetlerden sonra gerçekleştirilecek olan müdahalelerin afetin veya acil durumun bulunduğu aşamaya uygun olması gereklidir.
- ✓ Afetlerden sonra gerçekleştirilecek psikososyal destek yöntemleri ve süreçleri eski hale dönüş ve iyileşme için gereklidir.
- ✓ Afet ve acil durumlardan sonra vuku bulabilecek travmanın iki farklı yönü vardır: bireysel travma ve kolektif travma.
- ✓ Afet ve acil durumlar sonrası gerçekleşebilecek stres tepkisi anormal bir olaya gösterilen normal bir tepki olarak ele alınması gerekir.
- ✓ Bazı afet ve acil durum müdahaleleri ve destekleri neticesinde oluşan sonuçlar ikinci afet olarak ifade edilebilir.
- ✓ Afet ve acil durumlar sonrasında afetzedeler afet esnasında ve sonrasında bir araya gelerek görevlerini ve bu görevle ilgili fonksiyonlarını yerine getirmeye çalışırlar ancak bu fonksiyonların etkinliğinde belirgin azalmalar ve bozulmalar gözükür.
- ✓ Genelde çoğu afetzede, acil durum ve afet sonrasında ruh sağlığı desteğine gereksinimi olduğunu kabul etmeyecek ve bu konuda yardım istemeyecektir.
- ✓ Afetzedelerin bazı özel veya kültürel sebeplerden dolayı kendilerine verilen her türlü afet desteğini geri çevirebilme ihtimali vardır.

Çoğu insan, bir acil durum ve afetten sonra bir miktar kaygı, üzüntü, korku yaşar, depresyona girebilir veya olayı zihninde yeniden canlandırır. Afetlerden sonra görülebilen bazı olumsuz duygulanımlar genellikle yavaş yavaş kaybolur ve sonunda görülmeyebilir. Ancak bazı bireylerde bu reaksiyonların daha uzun bir süre devam ettiği ve daha da kötüleştiği görülebilir. Eğer afet sonrası görülebilecek olağan olumsuz duygulanımlar çok uzun süre devam edecek olursa bu durum ciddi bir psikolojik sorunun gelişmesine yol açabilir ve sonrasında profesyonel yardıma ihtiyaç duyulur (IFRC, 2003: 32-33).

Afet ve acil durumlar gibi travma oluşturabilecek olaylardan sonra duygusal dengesizlik, stres tepkileri, kaygı, travma ve diğer psikolojik bozukluk tepkileri yaygın olarak görülmektedir. Bu psikolojik bozukluklar, kişiyi ve aynı zamanda kişinin içinde bulunduğu toplumu büyük oranda olumsuz etkiler. Dayanıklılık ruhsal bozukluklarla baş etmede hayati bir rol oynar ve etkili bir önlemdir. Afet ve acil durumlardan etkilenen kişilerin çoğu, doğru ve etkili müdahale sonrasında, kendi bireysel güçlerinin de yardımıyla zamanla iyileşirler. Bazı durumlarda ve vakalarda ruhsal iyileşme tam olarak gerçekleşmez ve genellikle doğası gereği şiddetli olan bir takım kalıcı psikotik sorunlara neden olur. Travma sonrası stres bozukluğu, anksiyete, depresyon ve diğer davranışsal ve psikolojik bozukluklar ile birlikte en çok görülen ruhsal sorunlardır (Makwana, 2019: 3094).

Yıkımı yüksek olan bir afet sonrasında afetzedelerin %30-50 civarında orta veya yüksek düzeyde ruhsal bozukluklar oluşabilir. Hafif ve orta düzey ruhsal sıkıntılarının oranı %5-10 civarında, ağır sıkıntılarının ise %1-2 seviyesinde artış gösterir (O'Hanlon ve Budosan, 2015: 44-45).

Acil durum ve afetlerde, ruh sağlığına dikkat edilmeli ve özel bazı tedbirler alınmalıdır. Tedbir almanın 3 nedeni vardır. Bunlar; ruh sağlığı bozukluklarında artış, ruh sağlığı altyapısının güçsüzleşmesi ve ruh sağlığı ve bozuklukları alanında faaliyet gösteren örgütlerin koordinasyonunda oluşan aksaklıklardır.



Acil durum ve afetler sonucunda ruh sağlığı bozukluklarındaki artış oranları Tablo 1’de görülmektedir. Bugüne kadar gerçekleştirilen saha çalışmaları sonucunda elde edilen bulgulara göre depresyon ve travma sonrası stres bozukluğu afetlerden sonra en sık görülen bozukluklardır. Bu ruh bozukluklarına ek olarak anksiyete, şizofreni, bipolar bozukluk, alkol ve uyuşturucu kullanım artışı da afetlerden sonra sıkça görülebilmektedir (WHO, 2013: 16-17).

Tablo 1. Dünya Sağlık Örgütü'nün acil durum ve afetlerden etkilenen yetişkin insanlardaki ruhsal bozukluklara ilişkin tahminleri

	Acil Durum Öncesi 12 aylık yaygınlık	Acil Durum Sonrası 12 aylık yaygınlık
Yüksek seviyede bozukluk (psikoz, şiddetli depresyon, engelleyici anksiyete)	%2-3	%3-4
Hafif veya orta seviyede zihinsel bozukluk (Hafif ve orta dereceli depresyon ve anksiyete bozuklukları, hafif ve orta şiddette TSSB)	%10	%15-20
Normal bozukluk (Bozukluk yok)	Oran yok	Büyük oranda

Kaynak: (WHO, 2013: 16-17).

Travma Sonrası Stres Bozukluğu

Travma sonrası stres bozukluğu, hayatı yavaşlatan veya engelleyen travmatik bir olayın ardından meydana gelebilecek bir tür anksiyetedir. Travma sonrası stres bozukluğu her yaşta oluşabilir ve kaybı yüksek acil bir durum, afet, savaş gibi travmatik olaylardan sonra görülebilir. Travma sonrası stres bozukluğu, insan beyninin sınırları arasında bilgi getirip götürülen hormonları ve kimyasalları tetikleyerek insan bedeninin strese karşı tepkisini farklılaştırır. İnsanların travma sonrası stres bozukluğu maruziyet durum göstergeleri, vuku bulan olayın yeniden deneyimlenmesi, kaçınma ve uyarılmadır. Travma sonrası stres bozukluğunun fiziksel emareleri ise baş dönmesi, bayılma, yüksek ateş ve baş ağrısıdır (Action Contre La Faim, 2020: 21-22).

DSM5 (2013)’ten (The Diagnostic and Statistical Manual of Mental Disorders, Mental Bozuklukların Tanısal ve Sayımsal El Kitabı) önceki versiyonlarında, travma sonrası stres bozukluğu, anksiyete kapsamında benzer etkiler gösteren bir akıl bozukluğu şeklinde gruplandırılmıştı. Daha sonraki çalışmalarda ise travma sonrası stresin belirtilerinin hem anksiyete hem de depresyondan daha farklı olduğu tespit edilmiş ve bundan dolayı ayrı bir ruh bozukluğu olduğu kanısına varılmıştır. DSM-5’te travma sonrası stres bozukluğu yeni bir gruplandırma altına dahil edilmiştir: travma ve stresle ilişkili bozukluklar (Lehrner, Yehuda, ve Pratchett, 2015: 100).

Travma sonrası stres bozukluğunun sebepleri arasında afetler, yüksek düzeyde zarar veren kazalar, cinsel suiistimal, terör olayları, savaş ve akran zorbalığı vardır. Travma sonrası stres bozukluğu tarihte farklı isimlerle bilmeden anılmıştır, 1. Dünya Savaşı sonrasında kabuk şoku ve 2. Dünya Savaşı'ndan sonra savaş yorgunluğu şeklinde değişik adlarla isimlendirilmiştir. Travma sonrası stres bozukluğu her yıl Amerika Birleşik Devletlerinde yetişkin nüfusun %3,5’inde görülmektedir. 13-18 yaş grubundaki ergenlerde yaygınlığı %8’dir. Başka bir şekilde söylenecek olursa ABD’de her on bir bireyden birine hayatları süresince travma sonrası stres bozukluğu teşhisi konulmaktadır. Kadın olanların travma sonrası stres bozukluğu görme riski erkek olanlardan iki kat daha fazla düzeydedir. Bunun nedenleri kadınların erkeklerden daha hassas duygusal algılamalara sahip olmasıdır (American Psychiatric Association,



2023: 1). Her afet ve acil durum yaşayan birey travma sonrası stres bozukluğuna yakalanmayabilir. Travma sonrası stres bozukluğunun meydana gelmesinde çok farklı etmenler yer alır. Bu etmenlerden bir kısmı olaydan önce vardır; diğerleri olay esnasında veya olay sonrasında ortaya çıkabilir.

Travma sonrası stres bozukluğunun görülme riskini artırabilecek risk etmenleri aşağıdaki gibidir (National Institutes Of Health, 2023: 1):

- Travmatik olaydan önce çocukluk ve ergenlik döneminde travmatik olaylara maruz kalmak,
- Travma sonrası yaralanmak veya diğerlerinin yaralandığına veya öldüğüne şahit olmak,
- Travma meydana getiren olaydan sonra müdahale kapsamında sosyal desteğin çok az alınması veya hiç olmaması,
- Travmatik olay neticesinde değer verilen birinin ölümü, yaralanması, hastalanması veya iş/ev kaybı benzeri fazladan stres faktörleriyle karşı karşıya kalmak,
- Şahsi veya ailevi ruhsal bozukluklara veya madde kullanımı geçmişine sahip olmak,

Travma sonrası stres bozukluğunun görülme riskini azaltabilecek faktörler ise aşağıdaki gibi sınıflandırılabilir (National Institutes Of Health, 2023: 1):

- Travmatik olay sonrasında dostlardan, aileden veya diğer destek unsurlarından destek almak,
- Travmatik bir olaya cevap olarak kişinin daha önceden kendi çabalarıyla iyi olmayı öğrenmiş olması,
- Travmatik olaydan önce böyle durumlarda başa çıkma stratejilerini biliyor olmak ve travmatik olayın sonuçları hakkında bilgi sahibi olmak,
- Korkuya rağmen sıkıntılı olaylar vuku bulduğunda hazırlıklı olmak için gerekli tedbirleri almış olmak.

Travma sonrası stres bozukluğunun iyileştirilmesi mümkündür. Travma sonrası stres bozukluğunun tedavileri konuşma terapisi, ilaçlar veya her ikisi birdendir. Travma sonrası stres bozukluğu insanlar üzerinde farklı sonuçlara neden olur. Dolayısıyla her birey için aynı tedavi uygun olmayabilir. Travma sonrası stres bozukluğu belirtilerinin olması durumunda, en uygun tedaviyi görmek amacıyla mutlaka bir akıl sağlığı uzmanına gidilmesi gereklidir. Konuşma terapisi veya psikoterapi semptomlar konusunda bilgi verebilir. Travma sonrası stres bozukluğu için çeşitli konuşma terapisi türleri bulunmaktadır. İlaçlar travma sonrası stres bozukluğu sonuçlarının olumsuz yansımalarını kısmen de olsa engelleyebilir. Antidepresanlar üzüntü, endişe, öfke ve uyuşmuş hissetme benzeri sonuçları kontrol etmeye fayda sağlayabilir. Diğer farklı ilaç türleri de uyku bozukluklarına ve kötü rüyalara engel olabilir (MEDLINEPLUS, 2023: 1).

Depresyon

Depresyon ruhsal sıkıntılar arasında insanlar tarafından en fazla duyulan ve insanlar arasında en yüksek düzeyde görülen bir ruhsal sıkıntıdır. Depresif bir durumda kişi uzun süre yaptığı işlerden zevk alamaz veya ilgi odağını toplayamaz. Daha önce yaptığı faaliyetlerden duyumsadığı duyguları hissedemez olur veya farklı hisseder. Depresyon, devamlı görülebilen insanın ruh durumu farklılaşmalarından daha değişik semptomlar gösterir. Aile, dostlar ve halkla irtibat da dahil olmak üzere yaşamın tüm alanlarında farklı düzeylerde de olsa etkisini gösterebilir. Depresyon her bireyin karşılaşılabileceği bir akıl hastalığıdır. İstismar, değer verilen insanların ölmesi veya diğer stres meydana getiren olaylar insanların depresyona yakalanma olasılığını artırabilir. Değer verilen şeyler canlı veya cansız fark etmez kişi için yaşamın anlamını ifade eder, bunların kaybı ise anlam yokluğuna neden olur. Kadın olanların bu ruhsal sıkıntıya yakalanma ihtimali erkek olanlara göre daha olasıdır. Genel anlamda Dünya’da yaşayan bireylerin %3,8’i, olgun bireylerin %5’i ve 5 yaşından büyük bireylerin %7,6’sı depresyon sıkıntısına yakalanmaktadır (WHO, 2023: 1).

Depresyon bireyin ruhsal olarak kendini kötü hissetmesinden veya rahatsız bir gün yaşamasından daha fazlasıdır. Her insan farklı bir gün yaşayabilir ve bu farklılıklar insanın hoşuna gitmeyebilir. Sonuç



olarak olumsuz duygular oluşabilir. Fakat bunlar insan yaşamının normal sürecidir. Fakat kişi gerekmediği bir yerde veya gerektiğinden farklı duygusal tepkiler vermeye başladığında ruhsal sıkıntı olma ihtimali görülebilir. Depresyonun kesin sebepleri henüz tam olarak tespit edilememiştir. Depresyon genetik, biyolojik, çevresel ve psikolojik etmenlerin farklı birleşimlerinden oluşabilir. İnsanlar birçok yönden birbirlerinden farklıdırlar, fakat bazı ortak faktörler vardır ki bireyin depresyona yakalanma olasılığını artırabilir. Daha önce depresyona yakalanmış biriyle kan bağına sahip olmak. Değer verilen birisinin kaybı, cinsel suistimal, veya parasal sıkıntılar benzeri stres meydana getiren olaylara maruz kalmak. Birey daha önce tahmin etmiş ve planlamış olsa da büyük bir hayat koşulu farklılığı yaşamak. Kanseri, felç veya kronik ağrı gibi tıbbi bir sorunla karşılaşmak (Centers For Disease Control And Prevention, 2023: 1).

Genel anlamda bazı göstergeler depresyona yakalanmış olma ihtimalini gösterir. Bunlar: (UNICEF, 2023: 1).

Fiziksel:

- ✓ Kişi fiziksel olarak rahatlarken veya dinlenirken bile yorgunluk veya düşük enerji hisseder,
- ✓ Bireyde huzursuzluk veya olaylara, düşüncelere konsantrasyon güçlüğü meydana gelir,
- ✓ Kişi günlük faaliyetlerini yerine getirirken zorluk yaşar,
- ✓ Bireyde iştah veya uyku düzeninde değişiklikler görülür,
- ✓ Bireyde sebebi belli olmayan ağrılar baş gösterir.

Duygusal ve zihinsel:

- ✓ Kişide devamlı bir keder, kaygı veya asabılık durumu vardır,
- ✓ Kişi gerçekleştirdiği faaliyetlerde ve normalde zevk aldığı olaylarda ilgi kaybı yaşar,
- ✓ Kişi diğer insanlardan çekinme duygusu yaşar ve yalnızlıktan hoşlanmaz,
- ✓ Kişi kendini değersiz hisseder, umutsuzluk veya suçluluk duygularını deneyimler,
- ✓ İnsan normal hayatında almayacağı riskleri almaya başlar,
- ✓ Kişi kendine zarar verebilir ve intihar fikirlerini duyumsar.

Ruh hastalıklarından biri olan depresyon, umutsuzluk, hüznün, yalnızlık, asabılık, güvensizlik, değersiz hissetme, duygu sömürsü ve kendini suçlama duygularının bazı fiziksel göstergelerle birlikte vuku bulmasıyla ortaya çıkabilir. Depresyon gören bireylerin genellikle günlük yaşam işlerini yapmada sıkıntı yaşadıkları görülür. Depresyonda olan kişiler, yorgunluk, uyku sorunları, ağrı, cinsel aktiviteye karşı ilgi kaybı veya birden fazla, kalıcı, belirsiz semptomlar gibi depresyon göstergelerine sahip olduklarını belirtmelerine rağmen depresyonda olduklarını fark etmeyebilirler (Action Contre La Faim, 2020: 21).

Anksiyete

İnsanlar kendilerini normal hayatlarında bazı sebeplerden dolayı sıkıntılı ve kaygılı hissedebilirler ama anksiyete bozukluğuna maruz kalan insanlar genellikle gereksiz ve aşırı yoğun bir sıkıntı ve kaygı duyumsarlar. Yoğun ve negatif duygulara genellikle fiziksel rahatsızlıklar ve diğer davranışsal ve bilişsel göstergeler eşlik eder. Kontrol altına alınması zordur, önemli sıkıntılara sebep olur. Anksiyete rahatsızlığı günlük aktiviteleri engelleyebilir ve kişinin aile, sosyal ve okul hayatını dengesiz hale getirebilir. Dünya nüfusunun %4'ü anksiyete rahatsızlığına maruz kalmaktadır (WHO, 2023: 1).

Anksiyete bozukluğu sıkıntılı hissetme, huzur duymama ve sinirli ruh hali ile kendini gösterebilen, insanı rahatsız edip günlük işlevlerine sekte vuran bir duygusal rahatsızlıktır. Normal korkunun belli bir mantıklı nesnesi bulunur, fakat anksiyete bozukluğunda nesne tam olarak belli değildir, bu açıdan anksiyetede duyulan korku normal insan davranışında görülen korku ve kaygıdan ayrılır (IFRC, 2003: 32).



Anksiyete rahatsızlığına maruz kalan insanlar sebep sonuç ilişkilerinde tutarsızlık yaşadıklarından gereksiz aşırı korku ve kaygı durumu gösterirler. Dolayısıyla bu korku veya kaygının mantıklı olup olmadığı, aşırıya kaçıp kaçmadığının çevresel, kültürel ve durumsal faktörler dikkate alınarak bir uzman tarafından ele alınması gereklidir. Anksiyete bozukluğunun temel etkenlerinin kaynakları çocukluk ve ergenlik dönemlerine kadar uzanırlar (DSM5, 2013: 189).

Anksiyete bozukluğu durumunda, kişi normal bir insanın doğal karşılayacağı durumlarda bile korku ve kaygı hissederler. Normal olayların olağandışı sonuçlarının olabileceğini ve bunların kendilerine ve çevrelerindeki sevdiklerine zarar verebileceklerine inanırlar. Bu durumları dolaylı olarak vücutlarına yansır ve kalp çarpıntısı, terleme gibi sonuçlar oluşur. Korku ve kaygı normal sınırlar içinde ve normal sebep sonuç ilişkileri bağlamında duyumsandıklarında insan yaşamında faydalı olan duygulardır. İnsanın kendini korumasını sağlarlar. Fakat sebep sonuç ilişkilerinin ötesine geçerek, herhangi bir sebebin olası olmayan bir sonucuna karşı verilen aşırı bir korku veya öfke kişiye zarar verir ve günlük yaşamlarını sekteye uğratır. Anksiyete bozukluğu durumunda görülebilen bazı durumlar aşağıdaki gibi sıralanabilir (Cleveland Clinic, 2023):

- Kişinin hayatını devam ettirmesi için gerekli fiziksel ve ruhsal fonksiyonlarında aksama,
- Herhangi bir duygusal uyarılda bile aşırı ve gereksiz tepkisel davranış,
- Olaylar veya durumlarda gösterilen tepkilerin kontrol edilememesi durumu oluşur.

Anksiyete bozukluklarının farklı türlerinin olması ve diğer ruhsal bozukluklarla ortak göstergeleri bulunmasına rağmen genelde iki tür tedavi yöntemi kullanılmaktadır. Bunlar; psikoterapi ve ilaç kullanımıdır. Bazen her iki yöntem beraberce kullanılabilir. Kişinin daha öncekinden daha farklı düşünebilmesi, karar verebilmesi, davranış göstermesi için bir nevi olumlama konuşması olan bilişsel davranışçı terapi uygulanabilir. Diğer taraftan ilaç kullanımı ise anksiyeteyi tedavi etmez ama olumsuz sonuçlarını engelleyebilir. Antidepresanlar kısa süre için verilebilen ve anksiyete tedavisinde en çok kullanılan ilaç türleridir. Beta blokerler benzeri ilaçlarda anksiyetenin fiziksel göstergelerinin azaltılması amacıyla kullanılabilir (American Psychiatric Association, 2023).

Anksiyete sıkıntısı olan bireylerin bazı durumlarda diğer insanlara göre daha fazla korku ve kaygı duyumsadıkları bilinmektedir. Bu durumlar diğer insanların önemsemedikleri olaylar olabilir. Fakat anksiyete bozukluğu olan bireyler normale yakın olaylarda bir korku ve kaygı hissedebilirler ve bu hisler uzun süre devam edebilir. Sonuç olarak takıntılı bir korku ve kaygı hali oluşur. Anksiyete sıkıntısına maruz kalan bireylerde görülen bazı ortak göstergeler aşağıdaki gibidir (WHO, 2023):

- Herhangi bir konuya veya olaya odaklanamama,
- Karar verilmesi gereken konularda çekinme ve kararsız kalma,
- Devamlı suretle bir tehdit, tehlike algısı yaşama,
- Fiziksel bağlamda vücudun belli bölgelerinde titreme ve terleme (özellikle ellerde),
- Devamlı suretle Kalp vuruşu hissetme,
- Ruhsal durum anlamında huzursuz, gergin ve sıkıntılı hissetme,
- Devamlı suretle midenin bulanması veya meydana gelen rahatsız edici karın ağrısı yaşamak,
- Uyku düzeninde sorunlar yaşamak veya uyuyamamak.

Anksiyete sıkıntısının oluşmasında bazı faktörler daha fazla etkilidir. Bunlar aşağıdaki gibi sıralanabilirler (Mayo Clinic, 2023):

Deneyim: Çocukluk veya ergenlik sürecinde hayatın anlamını sorgulatacak travmatik olayların yaşanması veya yakın bir süreçte insan psikolojisinin kaldırılamayacağı bir olaya maruz kalınması.

Genetik: Anksiyete genetik vasıtasıyla da nesilden nesile aktarılabilen bir ruhsal sıkıntıdır.



Kişilik: Bazı kişilik özellikleri anksiyeteye yakalanma riskini artırabilir. Sıkılgan, çekingen, korku dolu, negatif düşünceli bireylerin anksiyeteye yakalanma riski daha yüksektir. Olumlu düşünen, cesur, kendine güvenen bireylerin ise bu sıkıntıya yakalanma riski daha düşüktür.

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KAHRAMANMARAŞ DEPREMLERİ SONRASI, BİREYLERİN KANDİLLİ RASATHANESİ DEPREM ARAŞTIRMA ENSTİTÜSÜ (KRDAE) İLE AFET VE ACİL DURUM YÖNETİMİ BAŞKANLIĞI (AFAD) SON DEPREMLER SİTELERİNE OLAN İLGİSİNİN İZLENMESİ: GOOGLE TREND ANALİZİ

MONITORING INTEREST OF INDIVIDUALS IN KANDİLLİ OBSERVATORY EARTHQUAKE RESEARCH INSTITUTE (KRDAE) AND DISASTER AND EMERGENCY MANAGEMENT DIRECTORATE (AFAD) LATEST EARTHQUAKES SITES AFTER KAHRAMANMARAŞ EARTHQUAKES: GOOGLE TREND ANALYSIS

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ÖZET

Dünyanın oluşumundan bu yana, sismik açıdan aktif olarak değerlendirilen bölgelerde depremlerin devamlı olarak meydana geldiği ve sonucunda da canlılar üzerinde olumsuz ekonomik, sosyal ve psikolojik etkilerinin olduğu bilinmektedir. Türkiye de son dönemde gerçekleşen 6 Şubat 2023 tarihli Doğu Anadolu Fay Hattı üzerinde yer alan Kahramanmaraş, Hatay, Adıyaman, Malatya, Gaziantep, Adana, Elazığ, Osmaniye, Şanlıurfa, Kilis ve Diyarbakır illerinde yıkıcı etkilere sahip 2 büyük deprem felaketiyle karşı karşıya kalmış ve önemli ölçüde hasar almıştır. Bu illerin yanı sıra takribi olarak devam eden sismik sarsıntılar nedeniyle ülke genelinde, sismik olaylara karşı ilgi artmakla beraber meydana gelen sismik olayları takip etme eğilimi gelişmiştir. Fakat meydana gelen depremlerin yakından takip edilen bir doğal afet olmasına rağmen, insanlar tarafından bilimsel takibinin izlenmesi yeterli şekilde değerlendirilmemiştir.

Google, internet kapsamında en sık kullanılan arama motorlarından biri olup alt servisi olan Google trendler bu arama özelliklerini analiz etmekte kullanılmaktadır. Bu çalışma ile bireylerin Kandilli Rasathanesi Deprem Araştırma Enstitüsü Son Depremler sayfası ile Afet ve Acil Durum Yönetimi Başkanlığı Son Depremler sitelerine olan ilgi, Google Trend analiz yöntemi aracılığıyla 06.02.2023 ile 31.12.2023 tarih aralığında olan ilgi izlenilmiş ve 2 yaygın kullanılan siteye giriş karşılaştırılmıştır. Çalışmanın sonucunda ise, bu ağ kullanıcılarının Kandilli Rasathanesi Deprem Araştırma Enstitüsü Son Depremler sayfasının Afet ve Acil Durum Başkanlığı Son Depremler sitesine oranla daha fazla tercih edildiği görülmüştür.

Anahtar Kelimeler: Deprem, Kandilli Rasathanesi Deprem Araştırma Enstitüsü, Afet ve Acil Durum Yönetimi Başkanlığı

ABSTRACT

It is known that since the formation of the world, earthquakes have constantly occurred in regions considered seismically active and as a result, they have negative economic, social and psychological effects on living things. Turkey has recently faced two major earthquake disasters with devastating effects in the provinces of Kahramanmaraş, Hatay, Adıyaman, Malatya, Gaziantep, Adana, Elazığ, Osmaniye, Şanlıurfa, Kilis and Diyarbakır, suffered significant damage, located on the Eastern Anatolian Fault Line on dated February 6, 2023. In addition to these provinces, due to the ongoing seismic tremors, interest in seismic events has increased throughout the country, and a tendency to follow seismic events has developed. However, although earthquakes are a closely followed natural disaster, their scientific monitoring has not been adequately evaluated by people.



Google is one of the most frequently used search engines on the Internet, and its sub-service, Google Trends, is used to analyze these search features. With this study, individuals interest in the Kandilli Observatory Earthquake Research Institute's Latest Earthquakes page and the Disaster and Emergency Management Presidency's Latest Earthquakes sites were monitored between 06.02.2023 and 31.12.2023 through the Google Trend analysis method, and 2 widely used sites was compared. As a result of the study, it was seen that the Kandilli Observatory Earthquake Research Institute's Latest Earthquakes page was more preferred by these network users than the Disaster and Emergency Directorate's Latest Earthquakes website.

Keywords: Earthquake, Kandilli Observatory Earthquake Research Institute, Disaster and Emergency Management Presidency

GİRİŞ

Bir doğal afet meydana geldiğinde, devlet kurumları ile halk arasında uygun iletişim kanallarının kurulması, yalnızca etkin acil durum müdahaleleri ve yardım operasyonları açısından değil, aynı zamanda halkı bilgilendirmek ve insanların endişelerini gidermek açısından da hayati öneme sahiptir (Platania, Hernandez, & Arreola, 2022). Bu açıdan incelendiğinde, bir afetten sonra ilk 72 saat içerisinde sosyal medya, radyo ve televizyon, online haber siteleri, gazete ve dergiler gerek mevcut durum için bilgi almak adına gerekse güncel bilgilere ulaşmak için kullanılan araçlardır (Oral ve Turan, 2018: 282-291). Sosyal ağlar, kriz ve afet durumlarında insanların iletişiminde özel bir rol oynayabilir. Bu medyalar ile etkileşimli, dijital veya mobil tabanlı araçlardır. Sosyal medyanın önemi ve özellikle deprem gibi kritik durumlardaki hayati rolü ile ilgilenen bir çalışmaya göre, sosyal medyanın mağdurlar ve diğerleri arasında bilgi almak ve yaymak için bir köprü görevi görebileceğini veya deprem yönetiminde kullanılacak sosyal medyanın bilgiye erişim imkânı, yeni içerik üretme, mevcut içeriği etkileme vb. gibi farklı kapasiteleri bir araç olarak kullanılabilir. Mevcut literatüre göre de bu rolleri; tanımlama, bildirim, talepler ile bilgilerin saklanması ve alınması olmak üzere dört ana bölümde incelenebileceğini savunmuştur (Amiresmaili vd., 2021: 1-7).

6 Şubat 2023 tarihli Doğu Anadolu Fay Hattı üzerinde Kahramanmaraş, Hatay, Adıyaman, Malatya, Gaziantep, Adana, Elazığ, Osmaniye, Şanlıurfa, Kilis ve Diyarbakır bölgelerinde yıkım yaratan 2 büyük deprem meydana gelmiştir (AFAD, 2023). Bu illerin yanı sıra takribi olarak ülke çapında devamlı olan sismik sarsıntılar sebebiyle ülke genelinde, sismik olaylara karşı ilgi artmakla beraber meydana gelen sismik olayları takip etme eğilimi gelişmiştir. Meydana gelen depremlerin insanlar tarafından takibinin izlenmesi çalışmamızın amacını oluşturmaktadır.

KAVRAMSAL VE KURAMSAL ÇERÇEVE

Depremler insanlar için büyük bir sorun olmakla birlikte her yıl binlerce kişinin ölümüne sebebiyet vermektedir (Chen ve Charles, 2003: 1). Bir depremin "büyüklüğünün" veya "şiddetinin" güvenilir ve standartlaştırılmış bir ölçümü, yalnızca sınıflandırma amacıyla değil, aynı zamanda her türlü tektonofizik ve mühendislik uygulamaları için de açık bir ihtiyaçtır. Ancak, sismoloji tarihinde dikkate değer bir gerçektir ki, daha genel olarak uygulanabilir büyüklük ölçekleri, aletli ekipmanların ilk kurulumlarından sonra yarım yüzyıl süre geçene dek geliştirilmemiştir. Bir bakıma bu gecikme, sismik olayların lokalizasyonu ve zamanlamasına yönelik yöntemler ile karşılaştırıldığında büyüklük ölçeklerinin geliştirilmesinde var olan zorlukları göstermektedir (Bath, 1981: 315).

Fakat günümüzde sismik sarsıntıların takibi teknolojinin ve internetin gelişimiyle insanların da kolaylıkla takip edebileceği bir boyut kazanmıştır. AFAD Son Depremler sayfası ve Kandilli Rasathanesi Deprem Araştırma Enstitüsü Son Depremler sayfası bu bağlamda yaygın olarak kullanılmaktadır.



AFAD	Son	Depremler	sayfası	ile;			
Tarih(TS)	Enlem	Boylam	Derinlik(Km)	Tip	Büyükük	Yer	Deprem Id

Şekil 1 AFAD Son Depremler Sayfası ile Erişilebilecek Bilgiler

Kaynak: (AFAD, 2024).

Depremin meydana geldiği tarih ve saat (TS), Enlem, Boylam, Derinlik(km), Tip, Büyükük, Yer ,Deprem ID Detayları (AFAD, 2024).

Kandilli Rasathanesi Deprem Araştırma Enstitüsü Son Depremler sayfası ile ilgiler ise;

```
.....TÜRKİYE VE YAKIN ÇEVRESİNDEKİ SON DEPREMLER.....
.....BÖLGESEL DEPREM-TSUNAMI İZLEME VE DEĞERLENDİRME MERKEZİ HIZLI ÇÖZÜMLERİ.....
.....(YAPAY SARSINTI ANALİZİ YAPILMAMIŞTIR) Son 500 deprem listelenmiştir.....
Büyükük
Tarih Saat Enlem(N) Boylam(E) Derinlik(km) MD ML Mw Yer Çözüm Niteliği
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Şekil 2 Kandilli Rasathanesi Deprem Araştırma Enstitüsü Son Depremler Sayfası ile Erişilebilecek Bilgiler

Kaynak: (Boğaziçi Üniversitesi, 2024).

Depremin meydana geldiği tarih ve saat (TS), Enlem, Boylam, Derinlik(km), Büyükük (MD,ML,Mw), Yer ve Çözüm Niteliği bilgilerine erişim sağlanabilir (Boğaziçi Üniversitesi, 2024).

MATERYAL VE YÖNTEM

Google Trendler, kullanıcı kişilerin belirli bir zamanda belirli bir kelime veya terim ile ilgili olan toplam aratılma sayısının normalleştirilmiş bir sayısı elde etmesine imkan tanıyan, Google tarafınca sağlanan bir hizmet türüdür. Daha spesifik anlamda, belirli bir zamanda seçilen terimin aratılma hacmi göreceli bir sayı olarak döndürülür; burada 100 (Yüz), söz konusu zamanda en yüksek arama sayısı, 0 (Sıfır) ise en düşük arama sayısıdır. Birden çok anahtar kelime arandığında döndürülen hacimler birbirine göre sayılır (Huang, Rojas ve Convery, 2020: 2824).

BULGULAR VE TARTIŞMA

1.AFAD Son Depremler Kavramına Zamansal Olarak ve Alt Bölgelere Gösterilen İlgi

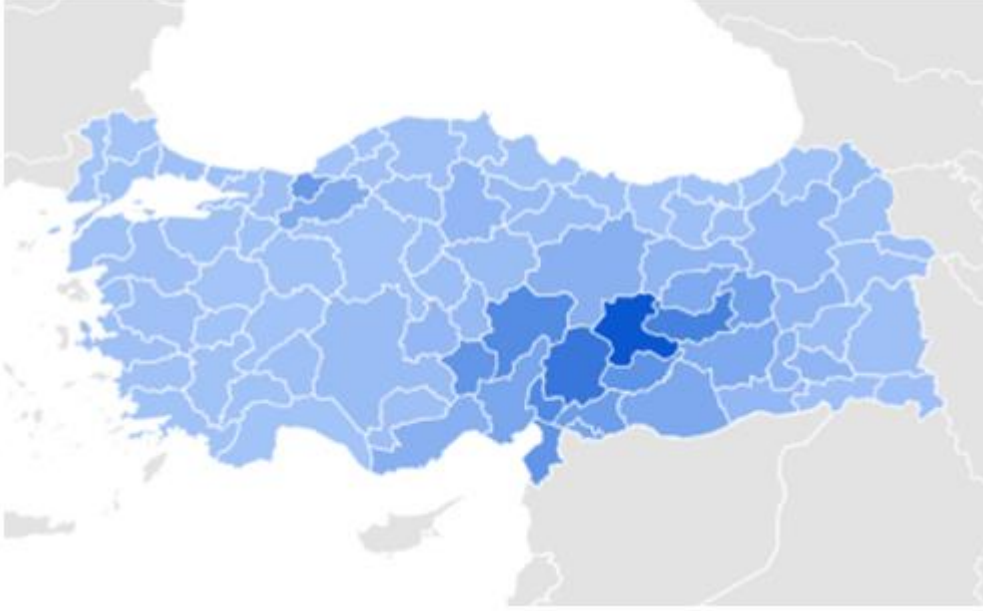


Şekil 3 AFAD Son Depremler Kavramına Zamansal Olarak ve Alt Bölgelere Gösterilen İlgi

AFAD Son Depremlerin, Google Arama Motorunda zamansal olarak aratılmasının en yoğun olduğu dönemin depremin meydana geldiği Şubat ayı içerisinde olduğu görülmektedir. Bu ilgi zaman içerisinde inişli çıkışlı bir hal almış olup grafikte zaman zaman yükselmelere zaman zaman alçalmalara sebep olmuştur.



● AFAD Son Depremler Arama terimi



Şekil 4 AFAD Son Depremler Kavramına Bölgesel Olarak Gösterilen İlgi

Bölgesel olarak aratılma eğilimi de depremin meydana geldiği bölgelerde yoğunlaştığı haritada görülmektedir. Ayrıca tüm bölgelerin az ya da çok farketmeksizin AFAD Son Depremler sitesine ilgi duydukları haritadan çıkarılabilir.

2. Kandilli Rasathanesi ve Deprem Araştırma Enstitüsüne Zamansal Olarak ve Alt Bölgelere Göre Gösterilen İlgi: (6.02.2023 - 31.12.2023)

● Kandilli Rasathanesi ve Deprem Araştırma Enstitüsü Arama terimi

Zaman içinde gösterilen ilgi

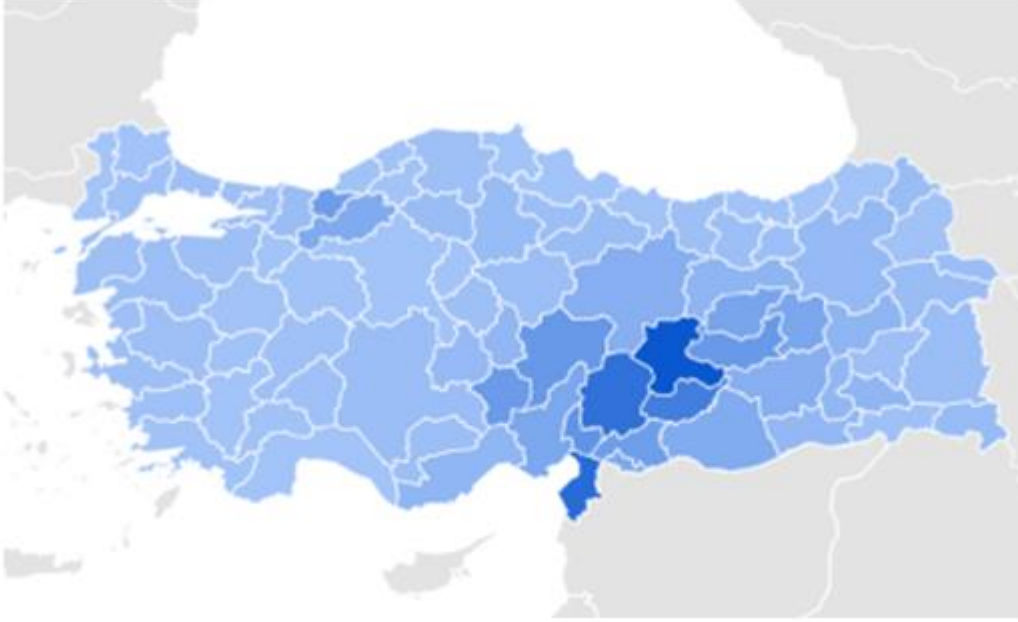


Şekil 5 Kandilli Rasathanesi ve Deprem Araştırma Enstitüsüne Zamansal Olarak Gösterilen İlgi

Kandilli Rasathanesi ve Deprem Araştırma Enstitüsü kavramının da Google Arama Motorunda zamansal olarak aratılmasının en yoğun olduğu dönemin depremin meydana geldiği Şubat ve Mart ayı içerisinde olduğu görülmektedir. Bu ilgi zaman içerisinde inişli çıkışlı bir hal almış olup grafikte zaman zaman yükselmelere zaman zaman alçalmalara sebep olmuştur.



● Kandilli Rasathanesi ve Deprem Araştırma Enstitüsü Arama terimi



Şekil 6 Kandilli Rasathanesi ve Deprem Araştırma Enstitüsüne Bölgesel Olarak Gösterilen İlgi

Bölgesel olarak Kandilli Rasathanesi ve Deprem Araştırma Enstitüsü kavramının aratılma eğilimi de 6 Şubat depremlerinin meydana geldiği bölgelerde yoğunlaştığı haritada görülmektedir. Ayrıca tüm bölgelerin az ya da çok farketmeksizin Kandilli Rasathanesi ve Deprem Araştırma Enstitüsü sitesine ilgi duydukları haritadan çıkarılabilir.

3. AFAD Son Depremler ile Kandilli Rasathanesi ve Deprem Araştırma Enstitüsüne, Alt Bölgeler Bazında Gösterilen İlginin Rakamsal Değeri (06.02.2023-31.12.2023)

Tablo 1 AFAD Son Depremler ile Kandilli Rasathanesi ve Deprem Araştırma Enstitüsüne, Alt Bölgeler Bazında Gösterilen İlginin Rakamsal Değeri (06.02.2023-31.12.2023)

	Alt Bölge	AFAD Son Depremler: (6.02.2023 - 31.12.2023)		Alt Bölge	Kandilli Rasathanesi ve Deprem Araştırma Enstitüsü: (6.02.2023 - 31.12.2023)
1	Kahramanmaraş	100	1	Malatya	100
2	Kayseri	85	2	Kahramanmaraş	78
3	Malatya	83	3	Hatay	77
4	Hatay	81	4	Adıyaman	67
5	Osmaniye	76	5	Osmaniye	47
6	Adana	75	6	Kayseri	44



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7	Elazığ	61	7	Elazığ	42
8	Niğde	60	8	Niğde	40
9	Gaziantep	60	9	Düzce	39
10	Adıyaman	59	10	Gaziantep	35
11	Kilis	59	11	Adana	32
12	Tunceli	44	12	Bingöl	30
13	Şanlıurfa	42	13	Kilis	28
14	Sivas	39	14	Tunceli	28
15	Mersin	39	15	Bolu	26
16	Muş	38	16	Şanlıurfa	24
17	Bingöl	35	17	Diyarbakır	22
18	Diyarbakır	33	18	Sivas	21
19	Aksaray	27	19	Erzincan	16
20	Çorum	26	20	Muş	16
21	Mardin	26	21	Mersin	15
22	Batman	26	22	Siirt	15
23	Nevşehir	25	23	Batman	14
24	Erzincan	24	24	Nevşehir	14
25	Siirt	23	25	Mardin	13
26	Erzurum	20	26	Erzurum	12
27	Yozgat	19	27	Aksaray	11
28	Düzce	16	28	Hakkâri	11
29	Bolu	16	29	Çorum	11
30	Bitlis	16	30	Sakarya	10
31	Çankırı	14	31	Ağrı	9
32	Amasya	13	32	Tokat	9



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33	Kırşehir	13	33	Van	9
34	Bayburt	11	34	Konya	8
35	Konya	10	35	Yalova	8
36	Gümüşhane	10	36	Gümüşhane	8
37	Karaman	10	37	Çankırı	7
38	Tokat	9	38	Balıkesir	7
39	Şırnak	9	39	Karaman	7
40	Van	9	40	Yozgat	7
41	Kırıkkale	8	41	Amasya	7
42	İğdır	8	42	İğdır	7
43	Isparta	7	43	Ardahan	7
44	Ordu	7	44	Giresun	7
45	Balıkesir	7	45	Çanakkale	6
46	Afyonkarahisar	7	46	Kastamonu	6
47	Hakkâri	6	47	Manisa	6
48	Aydın	6	48	Bursa	6
49	İzmir	6	49	Kırşehir	6
50	Giresun	5	50	İzmir	6
51	Samsun	5	51	Afyonkarahisar	5
52	Bartın	5	52	İstanbul	5
53	Sakarya	5	53	Aydın	5
54	Ankara	5	54	Tekirdağ	5
55	Kars	5	55	Şırnak	5
56	Kastamonu	5	56	Isparta	5
57	Ağrı	5	57	Kocaeli	5
58	Yalova	5	58	Bitlis	5



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59	Artvin	5	59	Bayburt	5
60	Trabzon	5	60	Muğla	5
61	Burdur	5	61	Burdur	4
62	Manisa	5	62	Kırklareli	4
63	Rize	4	63	Ordu	4
64	Eskişehir	4	64	Eskişehir	4
65	Muğla	4	65	Trabzon	4
66	Antalya	4	66	Zonguldak	4
67	Çanakkale	4	67	Uşak	4
68	Karabük	4	68	Kütahya	4
69	Tekirdağ	4	69	Sinop	4
70	Kütahya	3	70	Bilecik	4
71	Edirne	3	71	Ankara	3
72	Denizli	3	72	Kars	3
73	Bursa	3	73	Samsun	3
74	İstanbul	3	74	Antalya	3
75	Zonguldak	3	75	Denizli	3
76	Uşak	3	76	Bartın	3
77	Kocaeli	3	77	Kırklareli	3
78	Bilecik	2	78	Karabük	3
79	Sinop	2	79	Artvin	3
80	Kırklareli	1	80	Rize	2
81	Ardahan	0	81	Edirne	1

AFAD Son Depremler kavramına, Google Trendler Alt Bölgeler bazında gösterilen ilginin rakamsal değeri diğer 81 il ile kıyaslandığında: Kahramanmaraş, Kayseri, Malatya, Hatay, Osmaniye, Adana Elâzığ, Gaziantep, Niğde ve Adıyaman illeri ilk 10 sıralamadır.

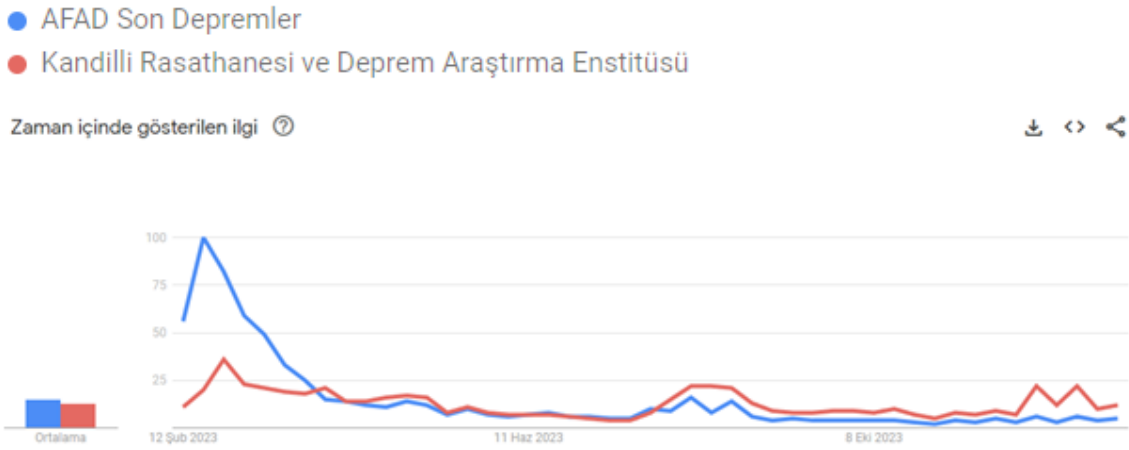


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Diğer taraftan Kandilli Rasathanesi ve Deprem Araştırma Enstitüsünün araştırılma eğilimi de Malatya, Kahramanmaraş, Elâzığ, Kayseri, Osmaniye, Adıyaman, Hatay, Niğde, Düzce ve Gaziantep illerinde yoğunlaşmaktadır.

AFAD Son Depremler kavramı için düşük ilgiye ise Sinop, Kırklareli ve Ardahan illeri sahipken Kandilli Rasathanesi ve Deprem Araştırma Enstitü için Rize ve Edirne illeri en düşük ilgiyi göstermişlerdir.

4. AFAD Son Depremler ile Kandilli Rasathanesi ve Deprem Araştırma Enstitüsüne Zaman İçerisinde Gösterilen İlginin Karşılaştırılması (06.02.2023-31.12.2023)



Şekil 7 AFAD Son Depremler ile Kandilli Rasathanesi ve Deprem Araştırma Enstitüsüne Zaman İçerisinde Gösterilen İlginin Karşılaştırılması (06.02.2023-31.12.2023)

AFAD Son Depremler kavramına olan araştırılma eğilimi ilk başlarda en yüksek eğilime sahip olsa da zaman içerisinde bu ilgi Kandilli Rasathanesi ve Deprem Araştırma Enstitüsüne kaymıştır.

- AFAD Son Depremler
- Kandilli Rasathanesi ve Deprem Araştırma Enstitüsü



Şekil 8 AFAD Son Depremler ile Kandilli Rasathanesi ve Deprem Araştırma Enstitüsüne Zaman İçerisinde Gösterilen İlginin Bölgesel Dağılımı (06.02.2023-31.12.2023)



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5. AFAD Son Depremler ile Kandilli Rasathanesi ve Deprem Araştırma Enstitüsü Kavramlarının Şehirlere Göre Araştırılma Yüzdeleri (06.02.2023-31.12.2023)

Tablo 2 AFAD Son Depremler ile Kandilli Rasathanesi ve Deprem Araştırma Enstitüsü Kavramlarının Şehirlere Göre Araştırılma Yüzdeleri (06.02.2023-31.12.2023)

	Alt Bölge	AFAD Son Depremler (6.02.2023 - 31.12.2023)	Kandilli Rasathanesi ve Deprem Araştırma Enstitüsü: (6.02.2023 - 31.12.2023)
1	Bitlis	%75	%25
2	Yozgat	%73	%27
3	Edirne	%73	%27
4	Mersin	%72	%28
5	Adana	%71	%29
6	Muş	%71	%29
7	Aksaray	%71	%29
8	Çorum	%71	%29
9	Bayburt	%70	%30
10	Kilis	%69	%31
11	Kırşehir	%68	%32
12	Kayseri	%67	%33
13	Mardin	%66	%34
14	Sivas	%65	%35
15	Batman	%65	%35
16	Nevşehir	%65	%35
17	Çankırı	%65	%35
18	Amasya	%65	%35
19	Rize	%65	%35
20	Şanlıurfa	%64	%36
21	Kırıkkale	%64	%36



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22	Bartın	%64	%36
23	Artvin	%64	%36
24	Osmaniye	%63	%37
25	Gaziantep	%63	%37
26	Tunceli	%62	%38
27	Erzurum	%62	%38
28	Şırnak	%62	%38
29	Samsun	%62	%38
30	Erzincan	%61	%39
31	Siirt	%61	%39
32	Ordu	%61	%39
33	Elazığ	%60	%40
34	Niğde	%60	%40
35	Diyarbakır	%60	%40
36	Ankara	%60	%40
37	Kars	%60	%40
38	Karabük	%59	%41
39	Karaman	%58	%42
40	Isparta	%58	%42
41	Antalya	%58	%42
42	Kahramanmaraş	%57	%43
43	Konya	%56	%42
44	Bingöl	%55	%45
45	Gümüşhane	%55	%45
46	Afyonkarahisar	%55	%45
47	Iğdır	%53	%47



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48	Trabzon	%53	%47
49	Tokat	%52	%48
50	Aydın	%52	%48
51	Burdur	%52	%48
52	Eskişehir	%52	%48
53	Hatay	%51	%49
54	Van	%51	%49
55	Denizli	%51	%49
56	İzmir	%50	%50
57	Muğla	%50	%50
58	Balıkesir	%49	%51
59	Kütahya	%49	%51
60	Adıyaman	%48	%52
61	Malatya	%46	%54
62	Giresun	%46	%54
63	Kastamonu	%46	%54
64	Manisa	%45	%55
65	Uşak	%43	%57
66	Tekirdağ	%42	%58
67	Zonguldak	%42	%58
68	Çanakkale	%41	%59
69	Bilecik	%41	%59
70	Bolu	%39	%61
71	Yalova	%38	%62
72	Sakarya	%37	%63
73	İstanbul	%37	%63



74	Hakkari	%36	%64
75	Ağrı	%36	%64
76	Bursa	%36	%64
77	Kocaeli	%36	%64
78	Sinop	%36	%64
79	Düzce	%30	%70
80	Kırklareli	%28	%72
81	Ardahan	%0	%100

TARTIŞMA VE SONUÇ

2004'ten 2016'ya kadar yıkıcı depremlerin ardından Google'da "deprem" terimi için küresel arama ilgisinin nasıl değiştiğini analiz eden bir çalışmaya göre, yıkıcı depremlerin ardından halkın ilgisinin katlanarak arttığını ve ardından azaldığını gözlenmiştir. Ayrıca halkın artan ilgisinin süresi, ölüm ve hasarlarla birlikte sistematik bir şekilde de artmaktadır (Tan ve Maharjan, 2018).

Benzer bir şekilde çalışmamız sonucunda da, meydana gelen son depremler ile ilgili Google Arama Motoru aracılığıyla AFAD Son Depremler ve Kandilli Rasathanesi ve Deprem Araştırma Enstitüsü Kavramlarının sismik sarsıntılar meydana geldiği zaman aralığında diğer dönemlere oranla yoğun aratılması ve yüksek ilgi gösterildiği görülmüştür.

Ayrıca meydana gelen son depremler ile ilgili Google Arama Motoru aracılığıyla AFAD Son Depremler ve Kandilli Rasathanesi ve Deprem Araştırma Enstitüsü Kavramlarının da bölgesel olarak depremin meydana geldiği bölgelerde yoğun olduğu görülmektedir.

Google arama sorguları dünya nüfusunun gerçekten rastgele ve tarafsız bir örneğinden gelme de, deprem gibi doğal afetler de dahil olmak üzere çeşitli konulara yönelik halkın ilgisini niceliksel olarak tahmin etmemiz için değerli bir araç sağlamaktadır. Bu, bilim iletişimi ve afet yardımı için bağış toplama çabalarında karar vermeye yardımcı olabilecek yararlı bilgiler sağlayabilir (Tan ve Maharjan, 2018).

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OBSTRUKTİF UYKU APNESİNDE AEROBİK VE YÜKSEK YOĞUNLUKLU ARALIKLI ANTRENMANIN GÜNDÜZ UYKULULUK HALİ VE SEÇİCİ DİKKAT ÜZERİNDEKİ ETKİSİ

THE EFFECT OF AEROBIC AND HIGH-INTENSITY INTERVAL TRAINING ON DAYTIME SLEEPINESS AND SELECTIVE ATTENTION IN OBSTRUCTIVE SLEEP APNEA

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ÖZET

Bu çalışma; Obstruktif Uyku Apnesinde (OUAS) Aerobik ve Yüksek Yoğunluklu Aralıklı Antrenmanın (YYAA) gündüz uykululuk hali ve seçici dikkat parametreleri üzerine etkisini incelemek amacıyla tasarlandı. Çalışmaya 18-65 yaş arasında orta-şiddetli OUAS'ı olan 33 hasta dahil edildi. Hastalar aerobik egzersiz, YYAA ve kontrol gruplarına randomize edildi. Egzersiz grupları; standart medikal tedaviye ek olarak; haftada 3 kez toplam 8 hafta egzersizleri gerçekleştirdi. Kontrol grubu; standart medikal tedavi dışında herhangi bir egzersiz ve/veya bilgilendirme yapılmadı. Gündüz uykululuk hali; Epworth Uykululuk Skalası (EUS), seçici dikkat; Stroop Testi Çapa formu ile değerlendirildi. Aerobik ve YYAA grubunda, EUS skorları egzersiz sonrası azalma yönünde anlamlı fark bulundu ($p<0.05$). Kontrol grubunda istatistiksel olarak anlamlı fark bulunmadı ($p>0.05$). Egzersiz sonrası, YYAA grubunda, Stroop Testi A ve C aşamalarını tamamlama süresinde istatistiksel olarak anlamlı azalma bulundu ($p<0.05$). Aerobik grupta istatistiksel anlamlı bir fark bulunmadı ($p>0.05$). Kontrol grubunda, Stroop Testi A aşamasını tamamlama süresinde istatistiksel olarak anlamlı azalma görülürken, Stroop Test B aşamasını tamamlama süresinde istatistiksel olarak anlamlı artış bulundu ($p<0.05$). Egzersiz sonrası Stroop C aşamasında yapılan yanlış sayısı her üç grupta da istatistiksel olarak anlamlı azalma bulundu ($p<0.05$). OUAS'ı olan hastalarda gündüz uykululuk hali ve seçici dikkate yönelik olumsuz etkileri azaltmak amacıyla YYAA egzersizleri aerobik egzersizlere benzer ve/veya daha fazla katkı sağladığı görülmektedir. OUAS rehabilitasyonunda aerobik egzersizler yerine daha kısa sürede benzer ve/veya daha fazla katkı sağlayan YYAA egzersizleri tercih edilebilir.

Anahtar Kelimeler: Aerobik Egzersiz, Gündüz Uykululuk Hali, Obstruktif Uyku Apne Sendromu, Seçici Dikkat, Yüksek Yoğunluklu Aralıklı Antrenman

ABSTRACT

This study was designed to investigate the effects of Aerobic and High Intensity Interval Training (HIIT) on daytime sleepiness and selective attention parameters in Obstructive Sleep Apnea (OSAS). The study included 33 patients aged 18-65 years with moderate-to-severe OSAS. Patients were randomized to aerobic exercise, HIIT and control groups. Exercise groups; in addition to standard medical treatment;



performed exercises 3 times a week for a total of 8 weeks. Control group; no exercise and/or information was given other than standard medical treatment. Daytime sleepiness was assessed with the Epworth Sleepiness Scale (ESS) and selective attention with the Stroop Test Çapa form. A significant difference was found in the aerobic and HIIT group in the direction of decreasing ESS scores after exercise ($p < 0.05$). No statistically significant difference was found in the control group ($p > 0.05$). After exercise, there was a statistically significant decrease in the time to complete Stroop Test A and C phases in the HIIT group ($p < 0.05$). No statistically significant difference was found in the aerobic group ($p > 0.05$). In the control group, there was a statistically significant decrease in the time to complete the Stroop Test A phase, while there was a statistically significant increase in the time to complete the Stroop Test B phase ($p < 0.05$). The number of errors made in the Stroop C phase after exercise was found to be statistically significantly reduced in all three groups ($p < 0.05$). In order to reduce the negative effects of daytime sleepiness and selective attention in patients with OSAS, HIIT exercises seem to contribute similarly or more than aerobic exercises. In OSAS rehabilitation, instead of aerobic exercises, HIIT exercises that provide similar and/or more contribution in a shorter period of time may be preferred.

Keywords: Aerobic Exercises, Daytime Sleepiness, High Intensity Interval Training, Obstructive Sleep Apnea Syndrome, Selective Attention



MUSIQİNİN ŞƏXSİYYƏTƏ FORMALAŞDIRICI VƏ TƏRBIYƏVİ TƏSİRİ FORMATIVE AND EDUCATIONAL INFLUENCE OF MUSIC ON PERSONALITY

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ÖZƏT

Ölkəmizdə müasir ali pedaqoji təhsilin ən mühüm problemi innovativ elmi təfəkkür tərzinə, geniş dünyagörüşünə, mükəmməl peşə qabiliyyətinə, mənəvi mədəniyyətə malik müəllim şəxsiyyətinin formalaşdırılmasıdır. Gənclərin mənəvi-əxlaqi tərbiyəsi məsələsində işlərin və dəyişikliklərin uğuru daha çox müəllimdən, onun ictimai fəaliyyətindən və ona xas əxlaqi keyfiyyətlərdən asılıdır. Pedaqogikada yeni cərəyanların inkişafı ali pedaqoji təhsilin yenidən qurulması prosesləri, bu təhsilin müəllim şəxsiyyətinə yönəldilməsi ilə sıx bağlıdır.

Eyni zamanda, uzun illər şəxsiyyətin mənəviyyatının və əxlaqi yönümlərinin inkişafında incəsənətin böyük əhəmiyyətinə məhəl qoymamaq cəmiyyətimizin, xüsusən də gənclərin mədəniyyət səviyyəsinin aşağı düşməsinin, dəyər əsaslarının itirilməsinin səbəblərindən biridir. Bu gün gələcək müəllimləri təşəbbüskarlıq, məsuliyyətlik, işgüzarlıq, peşəkar mobillik, mənəvi-əxlaqi əsaslar kimi son dərəcə mühüm keyfiyyətlərlə təchiz etməyə qadir olan təhsil sisteminin prinsipial yeni formalarına ehtiyac var. Bu araşdırmanın həll etmək məqsədi daşdığı əsas problemi burada görürük. Müəllifin tədqiqat konsepsiyasının digər aparıcı istiqaməti sənətin pedaqoji potensialına arxalanma idi. İncəsənət insan həyatının ayrılmaz hissəsidir. Cəmiyyətimizdə qeyri-adi dərəcədə kəskin olan mənəviyyat problemi məhz sənətlə bağlıdır.

Açar sözləri: sistem, formalaşma, tərbiyə, şəxsiyyət, əhəmiyyət.

ABSTRACT

The most important problem of modern higher pedagogic education in our country is the formation of the personality of a teacher with an innovative scientific way of thinking, a broad outlook, excellent professional ability, and spiritual culture. The success of work and changes in the issue of spiritual and moral education of young people depends more on the teacher, his social activity and his inherent moral qualities. The development of new trends in pedagogy is closely related to the processes of reconstruction of higher pedagogical education and the orientation of this education to the personality of the teacher.

At the same time, neglecting the great importance of art in the development of the spirituality and moral orientations of a person for many years is one of the reasons for the lowering of the cultural level of our society, especially the youth, and the loss of value foundations. Today, there is a need for fundamentally new forms of the education system capable of equipping future teachers with extremely important qualities such as initiative, responsibility, business acumen, professional mobility, moral and ethical foundations. Here we see the main problem that this study aims to solve. Another leading direction of the author's research concept was reliance on the pedagogical potential of art. Art is an integral part of human life. The problem of spirituality, which is unusually acute in our society, is related to art.

Key words: system, formation, education, personality, importance.



IMPACTO AMBIENTAL Y VIABILIDAD ECONÓMICA: NEUTRALIZACIÓN Y REUTILIZACIÓN DE AGUAS ÁCIDAS EN LA INDUSTRIA SIDERÚRGICA

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RESUMEN

El objetivo de este estudio fue investigar la neutralización de aguas ácidas y su reutilización en una empresa siderúrgica, con un enfoque en la minimización del impacto ambiental y las ventajas económicas. Se implementó una metodología que involucró el análisis de la composición del agua ácida y ácido gástrico, seguido de un proceso de neutralización que incluyó etapas de oxidación, clarificación y floculación. Se obtuvo que la reutilización de estas aguas como agua industrial en el proceso de galvanizado generó un Valor Actual Neto (VAN) positivo de 525,3705.66, una Tasa Interna de Retorno (TIR) del 28%, y un período de recuperación (PayBack) de 3.3 años. Además, se demostró que el proceso cumplía con los estándares ambientales y reducía significativamente el costo de disposición de residuos de 28,000 a 2,808 US\$/mes. Los resultados respaldan la viabilidad ambiental y económica de la neutralización de aguas ácidas en la industria siderúrgica y sugieren la posibilidad de replicar este enfoque en otros procesos industriales similares. Este estudio contribuye al desarrollo sostenible y sustentable al integrar la protección ambiental con el crecimiento económico.

Palabras Claves: Neutralización de Aguas Ácidas, Galvanizado Siderúrgico, Tratamiento de Aguas



ORGANIZATION OF GAME ACTIVITY IN PRESCHOOL PERIOD

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ABSTRACT

Actually, at the age of 6, the child's impressions typical of the preschool age period are replaced by new ones. New systems of environmental and personality factors are formed. This system creates a new stage of development - school. For the child, the change of the attitude towards the environment is accepted as the change of the environment itself. So, the child's level of development has increased, and now a new stage has begun. This is one of the factors that complicates the solution of the problem. It is not so difficult to imagine the situation of a child before the age of 6. He just knows that he will go to school. He does not know that in the coming year, he should generalize his life experience, he should get used to the performance of tasks that are completely different from those required so far, new application forms, new he should master muscle movements and mental methods, bring them to their mechanical place, that is, he should be ready for mutual relations.

Thus, this is a position that is close to, and sometimes overlaps with, the lifestyle of the elderly, their position. The contradictions of the 6-year-old are related to these factors. The solution of these problems, which started to be realized in school life, is a problem that should be highlighted in the life of six-year-olds. All these allow the child to clarify the position of a schoolboy and get used to this role. He should perform various tasks together with the elderly, take on various duties, participate in the division of labor.

If labor activity requiring mutual help and strength is organized in the microenvironment of peers, such conditions create conditions for the manifestation of the elements of a sensitive relationship, mutual help and trust. Otherwise, negative mutual relations, conflict, non-acceptance and dislike of each other appear among the children. Not all components of the child's activity play an equal role in the creation of a sensitive relationship.

To sum up, if the means of carrying out the action and the actions related to it seriously affect the awakening of new moral feelings, at this time new motives of activity are formed in the child, and a goal is set for its implementation. Retailness and situationality in behavior disappear.

Key words: preschool, child, environment, peers, activity, attitude, motives, personality, game



OKULA HAZIRLIK DÖNEMİNDE OYUN FAALİYETİNİN DÜZENLENMESİ

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ÖZET

6 yaşda uşağın məktəbəqədər yaş dövrünə xas olan təəssürləri yenilərlə əvəz olunur. Mühit və şəxsiyyət amillərinin yeni sistemləri əmələ gəlir. Bu sistem inkişafın yeni - məktəb mərhələsini yaradır. Uşaq üçün mühitə münasibətin dəyişməsi mühitin özünün dəyişməsi kimi qəbul olunur. Deməli, uşağın inkişaf səviyyəsi dəyişmiş, inkişafda yeni mərhələ başlamışdır. Bu, problemin həllini çətinləşdirən amillərdən biridir. 6 yaşın əvvəllərində uşağın vəziyyətini təsəvvür etmək o qədər də çətin deyil. O, sadəcə olaraq məktəbə gedəcəyini bilir. Bilmir ki, qarşıda duran bir il ərzində yaşadığı həyat təcrübəsini ümumiləşdirməli, indiyə qədər tələb olunanlardan tamamilə fərqlənən tapşırıqların icrasına alışmalı, yeni müraciət formalarını, yeni əzələ hərəkətlərini, əqli üsulları mənimsəməli, onları mexaniki yerinə yetirməli, yeni qarşılıqlı münasibətlərə hazır olmalıdır.

Bu, əsasən, yaşlıların həyat tərzinə, onların mövqeyinə yaxın olan, bəzən də üst-üstə düşən mövqedir. 6 yaşın ziddiyyətləri məhz bu amillərlə bağlıdır. Məktəb həyatında reallaşdırılmağa başlayan bu məsələlərin həlli altıyaşlıların həyatında önə çəkilməli olan problemlərdir. Bütün bunlar uşağa məktəbli mövqeyini aydınlaşdırmağa, bu rola alışmağa imkan verir. O, yaşlılarla birgə müxtəlif tapşırıqları yerinə yetirməli, öz özərinə müxtəlif vəzifələr götürməli, əmək bölgüsündə iştirak etməlidir.

Yaşlılar mikromühitində qarşılıqlı kömək və qüvvə tələb edən əmək fəaliyyəti təşkil olunubsa, belə şərait həssas münasibətin elementlərinin təzahürünə, qarşılıqlı kömək və etimada şərait yaradır. Əks halda, uşaqlar arasında inkaredici qarşılıqlı münasibətlər, münaqişə, bir-birini qəbul etməmək, bəyənməmək kimi hallar özünü göstərir. Uşaq fəaliyyətinin heç də bütün komponentləri həssas qarşılıqlı münasibətin yaranmasında eyni dərəcədə rol oynamır.

Əgər hərəkətin yerinə yetirilməsi vasitəsi və onunla bağlı olan əməliyyatlar ciddi şəkildə yeni mənəvi hisslərin oyanmasına təsir göstərirə, bu zaman uşaqda yeni fəaliyyət motivləri əmələ gəlir, onun icrası üçün qarşıya məqsəd qoyulur. Davranışdakı pərakəndəlik, situativlik aradan qalxır.

Anahtar kelimələr: okul öncəsi, çocuk, çevre, akranlar, etkinlik, tutum, güdüler, kişilik, oyun



IMPACT OF MANGROVES RECOVERY ON THE LIVELIHOOD OF PEOPLE LIVING AROUND THE MANGROVE FOREST OF SINDH

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ABSTRACT

Abstract: This research investigates the Impact of Mangroves Recovery on the livelihood of people living around the Mangrove forest of Sindh. Data were collected from Thatta and Badin Coastal belt. The importance of mangroves has got a new turn after the Tsunami 2004. In this tragic incident more than 247,000 people lost their lives for this tsunami disaster in addition to financial and economic losses. The research studies attributed this tragedy to the anthropogenic interventions of deforestation made for the economic, infrastructure and industrial developments. The significant chunk of mangrove forests were cleared in the name of abovementioned development activities. It compelled the scientists to rethink about the biological mechanisms that lower the destructive energy of the Tsunami tidal strikes by vegetative impediments. In addition, the climatic change parameters given the new ways and turns to study about the role of mangrove to sequester the Carbon. Now, the environmental scientist are urging for the immediate recovery of lost mangroves cover with special relation to above given areas of environmental development. Pakistan is lucky to recover these lost mangroves covers significantly. It was increased from 477.22 km² to 1463.59 km² in a period of last thirty years. The trends about the mangroves research are being changed and the researchers has sorted out new areas for the studies about the Mangroves. The past studies were not in conformity with the ecological principles. Now the focus of these studies is ecological process present in natural and restored mangrove systems. They are correlating the relationship of restored ecosystems with the adjoining ecological systems such as salt Marsh eco systems, sea grass beds. This study is meant to assess the impact of Mangroves in terms of livelihood, biodiversity conservation and Carbon Sequestration along the coastal belts of Sindh.



KNOWLEDGE CONVERSION CAPACITY, TECHNOLOGICAL INNOVATION AND PERFORMANCE: AN APPLICATION TO UNIVERSITY STUDENTS

RELAÇÃO ENTRE MOTIVAÇÃO, CULTURA ORGANIZACIONAL E LIDERANÇA: PERCEPÇÃO DE DISCENTES UNIVERISTÁRIOS

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ABSTRACT

The relationship between motivation, culture and organizational leadership is essential to understanding and promoting a productive and positive work environment. Each of these elements plays a significant role in the development and success of an organization. Motivation refers to the internal drive that leads individuals to act towards specific goals. In an organizational context, employee motivation is crucial for effective performance and the achievement of goals. Organizational culture is the set of values, beliefs, norms and behaviours shared within an organization. It creates a social context that influences the way employees perceive their roles, interact with each other and contribute to common goals. Leadership involves the ability to influence and guide team members towards the organization's goals. Leaders play a crucial role in creating an environment that promotes motivation and in shaping organizational culture. Motivation, organizational culture and leadership are therefore intricately intertwined. Effective leaders understand the importance of creating a culture that motivates employees and, at the same time, are able to adapt their leadership strategies to promote this culture. A positive organizational culture, combined with motivating leadership, contributes to a healthy working environment and the successful achievement of organizational goals. Based on the above, this study aims to verify the relationship between motivation, organizational culture and leadership. The quantitative methodology used was a survey of 190 postgraduate students from the state of Rio Grande do Sul - Brazil. The data was analyzed using Structural Equation Modeling. The results show that leadership has an impact on motivation and organizational culture.

Keywords: Leadership. Motivation. Organizational culture.



THE INCLUSION OF HEARING-IMPAIRED PEOPLE IN THE LABOR MARKET: A BIBLIOMETRIC ANALYSIS

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ABSTRACT

The inclusion of people with hearing disabilities in the labor market is an important and necessary challenge to promote equal opportunities, diversity and respect for human dignity. Inclusion not only benefits hearing-impaired individuals, but also enriches organizations by incorporating diverse perspectives and unique talents. This study explored the following aspects: accessibility in the workplace; effective communication; awareness-raising and training; inclusive recruitment and selection policies; adaptations to the physical environment; career and professional development policies; legislation and compliance with company regulations and benefits. Thus, promoting the inclusion of people with hearing disabilities in the job market is not only a social responsibility, but also a strategy that contributes to building more sustainable and resilient organizations. By creating inclusive work environments, companies can reap the rewards of a diverse and talented workforce. With this in mind, the aim of this article was to carry out a bibliometric review of the literature on the Scopus database over the last ten years, with the aim of understanding the main challenges faced by the deaf population in effectively entering the job market. After carrying out the necessary filtering, 50 articles were found, which were analyzed and categorized.

Keywords: Keywords: Inclusion. Hearing impairment. Labor market.



THE IMPACT OF FOREIGN DIRECT INVESTMENT ON ECONOMIC DEVELOPMENT IN IRAQ FOR THE PERIOD 2004–2022

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ABSTRACT

This research seeks to measure the impact of foreign direct investments on Iraqi economic development for the period 2004–2022, the role of these investments in the development of economic sectors in general, as well as the role of these institutions, countries, or investors and their social and environmental responsibilities. In this research, the researcher primarily relied on the extrapolation process to observe the effects of foreign direct investment on economic development in Iraq from 2004 to 2022. Additionally, the analytical method may be employed, along with standard procedures, to understand the nature of the data and variables influencing the crisis. The most notable findings of the research include: The value of the test was estimated at 6.29. The increase in foreign direct investment in the country will lead to a higher percentage contribution of the sectors of the economy to the GDP. Additionally, the fluctuation of foreign direct investment flows in Iraq during the study period can be attributed to the opaque and insecure investment environment, resulting in a decline of these flows during times of war and conflict. Foreign direct investment in the country is estimated to increase the percentage of the contribution of the sectors of the economy to the GDP, as well as the fluctuation of foreign direct investment flows in Iraq during the study period, which is attributed to the opaque and insecure investment environment and the decline of these flows during times of wars and conflicts. The results of the research showed that foreign direct investment has a positive impact on the utilization of new areas in production, management, and marketing. It also facilitates the establishment of connections with various productive and service sectors of the economy, leading to economic progress and stability for the host country. There are a number of obstacles, whether economic or political, that prevented foreign direct investment from taking its main role in the process of economic development, despite the potentials available in Iraq, whether in the agricultural, industrial, political, or housing sectors. However, the results of subsidised foreign investment did not bear fruit due to economic reasons such as high inflation rates, low performance of financial markets, and a low average per capita GDP (gross domestic product), as well as political factors. Among the most prominent suggestions and recommendations highlighted by the research are: The development and development of infrastructure such as transport, communications, electricity, current, ports, and airports, as well as service institutions, in order to attract foreign investment, as well as work on the development of financial markets in order to reduce the degree of uncertainty for the foreign investor provide the appropriate political climate in Iraq because it has a significant impact on the investment decision, as there is a relationship between a country that enjoys political stability and the flow of foreign direct investment, and the driving force of foreign direct investment is changing over time. After all, natural resources, low labour costs, openness, economic growth, and financing structure are the most important factors attracting investment. The motive of the economic bloc has emerged as an important and specific element in order to reach regional markets that increase the size of the market and profitability opportunities instead of dealing with individual markets, as well as the entry of foreign investment should be in areas that benefit the Iraqi economy in the future because Iraq is a country described by its abundance of Natural Resources, the areas that foreign investment prefers to enter are industry, which were transformational fields, and it is necessary that the method of entry is through joint ventures, and the other is also in need of development and modernization, the host country should make a distinction between the forms of foreign direct investment seeking to attract him and choose The form that is more suitable for its economic reality and which it is better able to deal with and benefit from.



Keywords: foreign direct investment; economic development.

Introduction:

Foreign direct investment is one of the factors influencing the development and growth of countries and one of the indicators of the openness of the economy and its ability to deal with and adapt to global developments in light of privatisation policies, the increased shift towards market mechanisms, the control of multinational companies over the movement of goods and services, the openness of markets, and the increase in the volume of financial flows between various countries. This type of investment contributes to raising the efficiency of the economy through its implications in developing individuals' capabilities and enhancing financial assets in the host country, in addition to its contribution to increasing production factors, transferring technology, and raising the efficiency and skills of the workforce through training and qualification. It also works to increase administrative and organisational expertise for project management. And introducing various production programmes that may not be available for local investments, in addition to creating a state of interconnection of the host country's economy with global production networks. Arab countries are interested in attracting foreign investments as one of the sources of bridging the gap between foreign resources and local resources by creating an appropriate investment climate and modernising regulatory and legislative frameworks. The importance of increasing investment flows is not limited to developing countries, including Arab countries, but also extends to developed countries due to their role in increasing the economy's ability to generate income, production, distribution of production sources, and transfer of technology, and based on that. Developing countries, including Iraq, seek to encourage and stimulate foreign direct investment to help expand the base of the local economy and increase its productivity. This is due to their economic conditions, limited financial resources, lack of expertise, deteriorating organizational and administrative situation, narrow export base, low rates of saving and limited domestic investment, and low rates of domestic product growth. Establishing new systems and mechanisms to encourage investment activity and remove many restrictions and barriers to the movement of foreign capital. Therefore, through this research, we will study the impact of foreign direct investment on economic development in Iraq for the period 2004–2022, AD.

Research problem:

Most developing countries are characterised by their weak financial capabilities, which are necessary to raise the rate of saving and then investment to the required levels to break the cycle of poverty and launch the development process. Therefore, it is necessary to seek help from external sources (direct and indirect foreign investment) to enhance the internal capabilities of these sources, even if only temporarily. Given the importance of direct foreign investments in the process of economic growth and development, whether directly by increasing capital accumulation or indirectly by transferring advanced technology to the host countries, whether techniques of production arts, organisation, management, and marketing, in addition to the possibilities of training national cadres, Advanced production skills increase employment opportunities, raise the productivity of individuals and institutions, develop and diversify the economic structure, and ultimately improve the performance of the national economy, leading to increased growth. Therefore, through the above, the research problem will centre on answering the following question: "What is the impact of foreign direct investment on development? "Economic situation in Iraq for the period 2004–2022 AD"

Research importance

The importance of the role of foreign direct investment lies in the fact that it is one of the most important sources of external financing for the process of economic development, the reconstruction of Iraq, and the solution of some sectoral problems in the Iraqi economy. This role is linked to the possibility of entering foreign companies with its huge financial potential and its ability to bring advanced technologies, open job opportunities, and introduce modern management methods. And work in light of the new traditions of the era and train national cadres administratively and technically. The importance



of the research comes from the role that foreign direct investment plays as a source of international financing that Iraq needs in light of the oil sector's control over its economy and the fluctuation of its prices, which negatively affects the country's budget, in addition to the fact that Iraq needs such investments to finance various and diverse projects and infrastructure.

Research aims

In order to reach the research problem, this research seeks to measure the impact of foreign direct investments on Iraqi economic development for the period 2004 AD–2022 AD and the role of these investments in developing the sectors of the economy in general, as well as the role of these institutions, countries, or persons investing and their social and environmental responsibilities.

Research Methodology

In this research, the researcher relied mainly on the induction process, which is based on observing the impact of foreign direct investment on economic development in Iraq for the period 2004–2022, and therefore there may be another scientific approach that we will resort to in the context of our approach to the issue, which is the analytical method with following some procedures. Standards to understand the nature of data and variables that affect the crisis.

Search parameters:

The objective scope of the study (research topic):

- ❖ The impact of foreign direct investment on economic development in Iraq for the period 2004–2022, AD.
- ❖ Time scope of the study (research period): The time scope of the study is determined from 2004 AD until 2022 AD.
- ❖ The geographical (spatial) scope of the study: The geographical scope of the research was determined to be Iraq.

Chapter Two (Theoretical Framework for the Research):

The first section: foreign direct investment First:

- ❖ The concept of foreign direct investment is defined according to the perspective of the World Trade Organisation (O.T.W.) as “it occurs when an investor settled in one country owns an asset located in another country, with the intention of managing that asset. Foreign direct investment is also considered the most interesting because of the breadth of its forms.” and its sources and effects on the economies of the host countries, especially developing ones. This investment requires control or supervision of the project by the foreign investor alone or with equal or unequal participation from national or local capital. The foreign investor can exercise this investment by establishing a new project or by repurchasing the whole or part of an existing project. Qaim. (Al-Desouki, 2019, p. 12).
- ❖ Foreign direct investment is defined as “foreign investments in fixed capital assets in specific countries, as stated in the United Nations Trade and Development publications, as foreign direct investment involves long-term relationships that reflect the benefit of the investor in another country that has the right to manage its assets and control.” (Al-Subaihi, 2016, p. 101).
- ❖ Foreign direct investment is defined as “the employment of foreign, non-national funds in fixed capital assets in a particular country, company, or country, and involves a long-term relationship that reflects the benefit of the foreign investor, who may be an individual, an institution, who has the right to manage his assets from his country or the country of residence in which he resides.” It is in it, as the definition includes a number of contents, including that it is an investment in assets that are fixed in nature, and therefore their management is financing these investments through the capital provided by the investor directly by the foreign investor, (natural or interested) in investing his cash or in-kind funds in any activity. An economic or investment project in any country other than the investor's country of residence, in accordance with the prevailing laws of that country, (Al-Bashir, 2019, p. 212).



Second: The most prominent of these theories are the following:

1. The neoclassical theory of Olin (1933): This theory adopted financial concepts, as it believes that the resort of multinational companies to investment outside their home countries actually represents their quest to obtain a higher return from capital investment since the financial markets in various countries are isolated. Furthermore, these financial markets are isolated from each other and have a modest level of development.
2. The theory of monopoly advantage by Highmore (1960): This theory considers the desire of multinational companies to control foreign markets, and it is the main motivator for foreign direct investment due to the availability of special advantages for multinational companies that are not available to local companies in the host countries, such as an information gap and branding. Low cost per unit produced due to the broad production pattern, administrative features, and other features.
- 3: Imbalance Theory (Moon and Zewail) 1993: This theory explains transnational companies' foreign direct investment outside the borders of their home country, with other factors that also relate to ownership advantages, such as the difficulty of accessing raw materials or the high costs of a skilled worker in the home country. Which prompts these companies to search for external investment areas to compensate for their losses and rebalance these factors. (Al-Dulaimi, 2022, pp. 34–36).

Third: Types of foreign direct investment

1: Foreign direct investment involves long-term relationships that reflect the benefit of the investor in another country. He has the right to manage his assets and supreme control over the foreign country. Foreign investment aims to do the following:

- ❖ search for sources. This type of investment includes exploiting the comparative advantage of the country, especially the country that is rich in raw materials.
- ❖ Market search: This type meets consumer requirements in the markets of countries hosting investments.
- ❖ Search for efficiency: This type of investment occurs between developed countries and integrated regional markets such as the European Common Market. (Al-Bashir, 2019, pp. 217–218).

The types of foreign direct investment differed based on motives, incentives, and ownership, which can be explained as follows:

A. types of investment from the point of view of exporting countries and are divided into:

- ❖ horizontal investments: this type of investment aims at the host country's market, as it brings with it experience and technology and invests in similar goods and services in the country of origin. They are called horizontal investments desired by foreign companies, as they equip the host country with production, marketing, administrative, and product distribution capabilities.
- ❖ Vertical investments: This type of investment aims to produce raw materials or intermediate goods abroad to include them in the production of final products, as they are used in the local production process. This type of investment is referred to as back-end vertical investment. When the company produces and markets its products, it is closer to the final consumer; this is called vertical investment. The front, as the government develops investment policies governed by the entry of large amounts of foreign capital, (Al-Bashir, 2019, p. 218).
- ❖ Mixed investments: This type aims to produce final goods and services abroad in a way that is not similar to those produced in the original country. When the management of various investments evaluates the company's activities, it encourages profitable projects. Therefore, the company works to achieve the highest profits for the parent company, regardless of the extent of the benefit. The company works to achieve the highest profits for the parent company, regardless of the extent of the benefit achieved by the host country.

B: Types of investment from the point of view of the host country are divided into:



investments aimed at import substitution, investments aimed at increasing exports, and direct foreign investments.

Types of investment according to partial or total ownership of the investment project are divided into:

❖ joint projects: a long-term agreement between the two parties based on the establishment of a production or service project, whether the party is national, private sector, or public sector, and participates in it and owns it within the host country, whether two legal persons or two or more parties from two countries, as they share management, experience, and capital. The patent is usually a foreign party of the multinational company that possesses advantages that the trademark does not possess, as the local party often does not.

❖ The project is wholly owned by the investor. This is the preferred form for multinational companies, as it establishes branches of production, marketing, or any type of service or production activity in the host country. (Al-Bashir, 2019, p. 218).

❖ Investments in free zones: The free zone represents the part of the country that is separated from the customs zone, where various economic activities are carried out. When these goods enter the free zone, they are exempt from customs duties or tariffs.

❖ Assembly operations projects: The agreement is between two parties, one foreign and the other local, whereby the foreign party provides the other party with the components of a specific product so that it can carry out an assembly process to form a final product and sometimes manage operations, maintenance, and storage in exchange for an agreed-upon return. It may also take the necessary experience and knowledge to design the factory or assembly projects, which form a joint investment or are entirely controlled by the foreign investor.

❖ Investment in financed infrastructure projects: This phenomenon has increased with the increasing trend towards economic globalisation, as it takes the form of concession contracts for a period of 20–50 years, especially in developing countries, to fill the local resource gap through the flow of foreign investment in the field of infrastructure.

2. Foreign indirect investment: The term foreign indirect investment (FPI) was launched in 1967 by Simon Mathew. It is defined as the foreign investor's ownership of part or all of the investments in the project in question and having the right to participate in management and organization. It is one of his powers, which he obtains from his absolute ownership of the investment project, to make financial investments in the form of financial assets such as securities, including stocks and bonds, and may expand to include loans of all kinds in the host countries for the purpose of speculation. This type of investment is called conservative investment. (Al-Bashir, 2019, p. 219–220).

Fourth: Links between direct and indirect foreign investment

The most important thing that distinguishes foreign direct investment from indirect investment is through two dimensions. The first is the administrative dimension, that is, the degree of control or management right in the project (the degree of control that foreign investors exercise over the management of a company). The other dimension is the time dimension represented by the short investment horizon. The long-term investor in stock portfolios provides capital financing only without any participation in project management, and the time dimension is short-term. As for the investor in FDI projects, he has a role in project management and seeks through it to realise that investing in securities portfolios is of a purely financial nature and is not accompanied by the transfer of tangible or intangible assets. The main motivation for investors in securities portfolios is to obtain profits and reduce risks. (Abdel Qader, 2016, p. 41).

Fifth: Forms of foreign direct investment

The forms of FDI, from the point of view of transnational companies, i.e., the foreign investor, are paths, ways, or methods for conquering global markets. These forms vary according to the degree of economic



and social progress of the host countries. Likewise, the nature of the prevailing political system plays a role in determining the type and form of FDI. The characteristics of transnational companies play a role in determining the form of FDI in terms of the size of the company, the number of workers, the types of products it produces, and its experience in the target market, as well as the expected return and expected costs from the project.

Foreign direct investment is divided based on ownership into the following types:

1. wholly owned foreign direct investment: In this type of investment, the economic project or economic activity is fully owned by the foreign investing party, and this type of investment often enjoys the support and backing of foreign investors due to the availability of absolute management and control over it.
2. Joint foreign direct investment: In this type of foreign direct investment, there is more than one party or entity that has a share in the ownership of the project or economic activity existing or to be established, meaning that a national party from the public sector or the private sector participates alongside the foreign party. Often, it is a multinational company because it possesses modern technology and technical expertise that the national or local party lacks. This participation takes place according to the agreement of the participating parties.
3. Foreign direct investment in assembly projects and operations: In this type of foreign direct investment, the foreign investor provides the national or local investor with components of a specific product, such as cars, for example, so that this product is assembled in its final form in the host or recipient countries. In most cases, the foreign investor provides expertise. The necessary knowledge of the project, such as design, maintenance, storage, marketing, etc., and these projects may be jointly owned or wholly owned by the foreign investor. (Saud, 2015, pp. 28–30).

Sixth: Sources of financing foreign direct investment

Many developing countries suffer from limited local resources and poverty, and this causes the increase in the volume of investment agreements on development programmes and plans in developing countries in order to achieve the desired rates of economic growth and achieve a qualitative increase in the standard of living of individuals' incomes on the one hand, and the growing chronic deficit in those countries on the other hand. I used internal and external funding sources for my agencies:

1. Internal sources of financing include internal public debt and local and national savings obtained through individuals and projects, or they may be compulsory through the state's legislation of some procedures and laws, such as financing the deficit with internal borrowing. The project can finance itself from internal sources by reemploying the returned profits.
2. External sources of financing: means foreign capital flows that developing countries resort to to overcome the deficit in local resources and may be provided by multilateral sources such as international and regional bodies, including the International Monetary Fund, the World Bank, and development banks, or foreign borrowing sources such as bilateral government sources such as loans, subsidies, and foreign direct investment.

It includes the following:

1. Loans: Countries follow foreign financing due to the local resource gap, as loans are provided to countries that lack investment opportunities that generate returns. Loans are of two types, and they are as follows:

long-term loans are divided into:

- ❖ soft loans, which are low-interest loans with a long repayment period.
- ❖ Non-concessional loans: These are loans with high interest rates that match interest rates in the global market and repayment for a short period.



Governments grant short-term loans on a non-commercial basis, such as export credit, alongside other types of long-term export credit. The reason why developing countries resort to borrowing is the misuse of financial resources resulting from poor resource realisation and the inefficiency of sectoral institutions. General corruption in developing countries and government corruption in political governance systems exposed debtor countries to continuous depletion due to the insufficient foreign exchange needed to pay debt burdens and finance imports, which caused internal disturbances, and due to the increase in loan installments and the rising interest rate on them for developing countries, which led to a severe weakness in its ability to pay, and this is what prompted it to announce its complete inability to pay.

2. Foreign subsidies for non-commercial purposes: These are funds provided for non-commercial purposes. Countries obtain these capital flows. They may be in the form of loans on easy terms, or they may be in the form of goods, services, or technical expertise. They are considered grants that do not entail any obligations. With repayment, as for soft loans, which take the form of a grant in the form of a loan, the interest rate is low with a long repayment period and a grace period, and it may be that the loan is repaid in the currency of the receiving country or the products of the projects financed by those loans. (James, 2018, P150-151).

The second section:

Obstacles to investment in Iraq Investment generally heads to economies that are described as attractive to it and that enjoy a number of advantages that prompt investors to direct their investments to this country rather than that, as the decline in the incentive for investors to direct their investments to a specific country depends on a number of determinants or obstacles facing these investments, so they turn Without attracting them (foreign investments), or leading to their flight (domestic investments), these obstacles to the Iraqi economy are represented in the following: -

❖ Political and security instability: Political and security stability is one of the main determinants in making investment decisions, as the country's enjoyment of political stability in terms of the system of government, the stability of governments, the nature of relations between political parties and the prevailing state of democracy within the country contribute to providing the appropriate climate to attract investment. Political and security instability is a major obstacle to investments. It leads to the flight of local capital and restricts the flow of foreign investments. Lack of security is particularly detrimental to private investments, especially foreign private investment, as it increases the cost of security and protection. For investment projects, it also raises the cost of transportation, fragments the market, and exacerbates inflation. Although the southern and northern regions of Iraq enjoy a reasonable degree of stability and security, the matter requires more than that, namely, the necessity of establishing security in all of Iraq. (Al-Subaihi, 2016, pp. 120–121).

1: Weakness of the private sector: The role of the state in economic life in Iraq has increased since the beginning of the fifties as a result of the rise in oil revenues after the profit-sharing agreement with foreign companies. This role was evident in the volume of public investment and spending on expanding educational and health services and the growth of the public administration sector in various sectors. Its powers have become such that the economic administration in Iraq has become characterised by a high degree of centralization, not only from a legal standpoint, but the initiative in preparing and making decisive and influential economic decisions is also centralized. 2. Low efficiency of infrastructure: The Iraqi economy suffers from a clear backwardness in infrastructure, which includes roads, bridges, airports, means of transportation, electricity, communications, etc., because it was greatly affected by the wars that Iraq went through. The war severely damaged the infrastructure, and then the Second Gulf War came to prepare. The Iraqi-Iranian infrastructure was damaged by destruction and looting, but the recent period extending from 2003 to 2007 witnessed a slight improvement in some infrastructure in parts of Iraq, especially the southern regions, such as constructing bridges, paving roads, and opening airports. For example, during this period, Najaf International Airport was opened, Basra International Airport was rehabilitated and opened, and other projects were undertaken.



3. High level of inflation: Inflation is one of the main prominent problems that the Iraqi economy suffers from, which would disrupt prices, making them lose the ability to express the relative scarcity of goods and services, which distorts the process of allocating resources and distributing them among various economic activities, and it eliminates the function of the currency. The local economy is a tool for trading and saving. The high inflation rates in the Iraqi economy prevent foreign companies and investments from entering.

4. Financial and administrative corruption: The roots of corruption in Iraq go back to the era of the Ottoman occupation, but corruption appeared clearly during the sixties of the last century and deepened more during the period (1990–2003) during which the UN Security Council imposed sanctions on Iraq that contributed to its spread. The state of corruption in the Iraqi economy became more apparent during the period of the oil-for-food agreement, as it took on an international nature with the involvement of officials, companies, and organizations. Investigations also revealed the participation of other individuals in major corruption operations, causing the Iraqi people to become victims.

5. Weaknesses of the Financial Sector: The financial sector consists of banks and financial markets in addition to the insurance sector. The financial sector, with its three components, occupies an important role in mediating between savers and investors and reducing the costs of providing information between market parties. Development in the financial market represents great importance in attracting both local and foreign investments because it makes it easier for the investor to obtain financial resources when needed and the ability to employ them when assets are available, and it makes it easier for the investor to exit the market with minimal losses.

6. Monetary policy measures: Monetary policy before 2003 was characterised by its dependence on financial policy, as financial policy measures dominated the decisions of the Central Bank in light of the weak authority of the Central Bank and its lack of independence, which resulted in an exacerbation of inflation rates. Trade policies:

❖ Trade policy in Iraq after 2003 was based on the principle of the open-door policy, as it opened the door wide to imports and export markets as a result of the lack of international interference in the affairs of internal and external trade and the easing of restrictions on them, which culminated in the issuance of Order No. 54 of the year 2004, which included the transition from a policy of trade protectionism to a policy of trade freedom. (Al-Subaihi, 2016, pp. 122-125).

The third topic: Foreign investments in Iraq and their role in Iraqi economic development

First: Foreign investments in Iraq and their role in Iraqi economic development That Iraq needs to rebuild the infrastructure, and rebuild what was destroyed by wars and conflicts over the past years, in addition to reviving important sectors in Iraq such as the agricultural, industrial, trade, and communications sectors, in addition to the obsolescence of many projects, which need to be established constructively and challengingly, that investment Direct foreign investment is one of the most important foundations in building the economies of countries that have suffered from wars and conflicts, and it is the basis for the development of the economies of these countries. Therefore, this type of investment has contributed to reducing unemployment problems, diversifying the economic base, operating suspended projects, expanding existing projects, and creating new projects. . (Fadil, 2022, p. 45) In order for Iraq to achieve economic development and thus sustainable development, reduce poverty and unemployment rates, and address all social and environmental problems, it must expand sources of income and give balanced attention to all sectors of the economy, especially in the aspect of foreign direct investment, as it is a source of income and a source of financing for projects. In each sector, then any increase in foreign direct investment will lead to an increase in the output in that sector, and thus an increase in the domestic product, and an increase in the proportion of the invested sector's contribution to the gross domestic product, and thus a decrease in imports and an increase in exports, and therefore an increase in foreign direct investment will lead to a decline in the establishment Many projects and reduce unemployment, as these projects will absorb the labor force and increase their capabilities, thus increasing the productive capacity of each sector, which increases investments, and this ultimately leads



to higher growth rates of individual income and improved levels of economic well-being. (Fadil, 2022 AD, pp. 46-47).

The previous figure (1) shows the extent of the fluctuation in foreign direct investment flows in Iraq over the course of two decades. We also notice the huge decline after the ISIS occupation of three governorates that have a large share of foreign investment flows, where the ambiguous and uncertain investment environment contributed. The security of these flows decreased significantly, which affected the overall conditions of the Iraqi economy and contributed to the decline in the contribution of many sectors to the gross domestic product.

We notice from the previous figure No. (2) the path of the gross domestic product during the past two decades and the extent of its fluctuations for many reasons, whether political, economic, or security. Therefore, Iraq suffered huge losses in the gross domestic product due to wars and conflicts. And internal conflicts, and the occupation of ISIS and liberation from ISIS), so Iraq must move from conflicts to rehabilitation, liberation from state control, and heading to the market, in addition to the fact that the Iraqi economy is far from diversified, and the oil sector is what is important to it, and therefore Iraq must move from Total dependence on oil leads to diversification, and the following table shows the development of the gross domestic product in Iraq for the period (2004 AD - 2022 AD).

Source: Central Bank of Iraq, Annual Economic Report, Bulletins for Years (2004-2022).

Second: Strategies to attract foreign investments to Iraq

The success of the Iraqi economy depends mainly in building it and ensuring its progress at all levels, especially the economic ones, on three characteristics, which are represented by the huge quarterly wealth it possesses, the provision of a large-sized market, and the presence of a large and relatively educated young population, and these characteristics are one of the prominent features of the Iraqi economy. Iraq is a rentier country that possesses huge wealth in the field of oil, as Iraq possesses the third reserve of crude oil in the world and associated gas, in addition to the presence of other minerals that enhance this huge wealth. Iraq also has a large market that attracts goods and services from all countries, especially countries or states. Neighbourhood whose export values rose, especially after the year 2003 AD, as Al-Fattah pays attention to the Iraqi market largely on goods imported from it, and this in itself constitutes a pillar and basis for attracting investment. It is also possible to adopt a strategy to attract investment based on a set of foundations that include the following:

- ❖ working hard to improve the security situation in the country, with a focus on establishing protected areas as a first step to attract investment.
- ❖ supporting private investment in particular, providing rewards and exemptions that increase its expenses, and working to attract foreign investments as a complement to local investment and not a substitute for it, as well as focusing on supporting small projects in particular.
- ❖ training national cadres and adopting policies that would raise the quality and skill of work, as well as coordination between educational outcomes and the needs of economic development in the country.
- ❖ The necessity of deepening the culture of investment and the importance of this for society and developing the country's economy.
- ❖ providing the national will to attract investment, which is one of the most important factors for the success of any national investment attraction strategy, by translating it into legislative and executive procedures at all levels.
- ❖ developing accounting standards to align with international standards.
- ❖ Focus on applying the principle of corporate and institutional governance, that is, rational administrations that take into account sound business principles, prevent corruption, and work to create balanced relationships between the boards of directors of these companies and shareholders in their



capital on the one hand, and between these companies and those dealing with them, such as banks and stockholders, on the other hand.

❖ giving ownership rights to the land in an appropriate proportion according to the project's needs if the project is of great importance in achieving economic and social well-being. (Fadil, 2022, pp. 51-53) ⇒ It is worth noting that foreign direct investment in Iraq went through different and varying stages according to the political and economic conditions that the country witnessed in the past era, extending its effects to the present time, and contributing to determining the size and type of these forms through Table No. (2)

Source: Central Bank of Iraq, Annual Economic Report, Bulletins for Years (2004-2022).

Chapter Three (The applied framework of the research)

The most important results

❖ Foreign direct investment has an effective and significant impact on the gross domestic product. The test value was estimated at approximately 6.29, as an increase in foreign direct investment in the country will lead to an increase in the contribution of the economy's sectors to the gross domestic product

❖ The fluctuation of foreign direct investment flows in Iraq during the study period resulting from the ambiguous and insecure investment environment in which these flows decreased to a very large extent, in addition to the fluctuation occurring in the gross domestic product for many reasons, whether political, economic, or security, as Iraq suffered huge losses in GDP due to wars and internal conflicts, the occupation of ISIS, and the liberation from ISIS.

❖ Foreign direct investment affects the use of new fields in production, management, and marketing, as well as the creation of backward and forward links with the various productive and service sectors of the economy, and all of this results in achieving economic progress and stability for the host country.

There is a group of obstacles, whether economic or political, that prevent foreign direct investment from taking on its primary role in the economic development process.

❖ Despite the potential available in Iraq, whether in the agricultural, industrial, political, or housing sectors, the results of foreign investment supported by its legislation in Iraq have not yielded results, which is attributed to economic reasons such as high inflation rates, low financial market performance, and a low average per capita share of income. GDP (gross domestic product) as well as political factors Investment, in general, is characterised by fear caused by uncertainty because it is a sacrifice of capital at a known time in exchange for returns that come in the unknown future. The source of uncertainty decreases whenever business conditions are favourable, that is, the availability of a suitable climate for investment. Expectations are what determine the investment decision, whether optimistic or pessimistic.

❖ Expectations surround the short and long terms. The former depends on the product and its estimates, and these are based on relatively fixed data. As for long-term expectations in the time range, they depend on data on development and technological progress. The theories of foreign direct investment have shown the methods for investors to enter other markets to carry out foreign direct investment, and they have also made it clear that companies hover around ideal locations, which promise high growth rates, and these must have cheap production elements as companies seek such locations. To integrate with production elements.

❖ The reform and adaptation programmes for developing economies (developed and sponsored by states and governments) work to adapt developing countries that are not affiliated with the capitalist system so that foreign investors can work freely by adapting the appropriate work climate, which operates within the framework of market freedom and is similar to the work climate in the countries. Capitalism.



The laws and economic measures taken by Iraq to remove complications and raise barriers to flows are among the elements of attraction, but political stability in the country, regardless of foreign direct investment, remains the receiving element, the most prominent and activating element of these flows.

❖ Foreign direct investment is one of the most important means that the host country resorts to to compensate for the gap in local resources or to support local investment, or both, which requires creating a suitable investment climate to attract investors rather than building a solid economic base with focus, which is represented by creating a stable political environment to create an atmosphere of safety and confidence, as well as foundational structures such as roads, bridges, electricity networks, etc.

Study Recommendations:

1. Developing and developing infrastructure such as transportation, communications, electricity, sewerage, ports, and airports, as well as service institutions, in order to attract foreign investment.
2. working to develop financial markets in order to reduce the degree of uncertainty for the foreign investor and provide the appropriate political climate in Iraq, which has a significant impact on the investment decision as there is a relationship between a country that enjoys political stability and the flow of foreign direct investment. The driving force of foreign direct investment changes with the passage of time. After considering factors such as natural resources, low labor costs, degree of openness, economic growth, and financing structure, the motive of economic blocs has emerged as an important and specific element. This is driven by the aim of accessing regional markets and expanding the overall market size. Profitability opportunities instead of dealing with individual markets.
3. The entry of foreign investment must be in areas that benefit the Iraqi economy in the future because Iraq is a country described by its abundance of natural resources. The areas that foreign investment prefers to enter are industries, which are transformational areas, and it is necessary that the method of entry be through... Joint projects, although others also need development and modernization. The host country must differentiate between the forms of foreign direct investment it seeks to attract and choose the form that is more appropriate to its economic reality and which it is more capable of dealing with and benefiting from.
4. not cancelling the role of the state and its presence in formulating financial, monetary, and trade policies; not neglecting the local sector, especially the industrial sector, in areas where the state can be present; and directing foreign investments in a way that benefits the local economy and avoids the negative effects of investment on the state. Many economies adopted gradual economic openness as a method to minimize the negative repercussions of opening up. Therefore, it must be taken into account not to open the financial markets completely until after Iraq has been able to build an economic base and go a long way towards economic development and stability. To attract foreign direct investment, Iraq needs to restore and stabilize the security situation, as the Iraqi economy remains unrehabilitated and the private sector is unable to compete with foreign investment, especially after decades of neglect. On the Iraqi economy, which has not witnessed development due to the conditions of war and the economic blockade.
5. Reviewing previous laws and legislation and amending or adding to them in order to attract foreign investment must include labour laws in the market and controls for competition, and this requires spreading the atmosphere and culture of competition in addition to setting laws to prevent monopolies and laws that protect the consumer from any exploitation regarding the prices and quality of the goods produced. And the services provided, granting the consumer the right to sue the party that causes him exploitation or harm, whether local or foreign.
6. The necessity of encouraging the entry of foreign direct investment companies after determining the sectors and fields in which investment is required, especially if the host countries possess the elements to attract investment, such as the availability of natural resources and creating an investment climate by establishing joint projects that are owned equally between the government and companies, and paying attention to building suitable as well as infrastructure due to its importance in establishing development projects.



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INVESTIGATING THE FACTORS CONTRIBUTING TO THE PERSISTENCE OF HOSPITAL-ACQUIRED INFECTIONS (HAIS) AT MULAGO NATIONAL REFERRAL HOSPITAL, UGANDA

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ABSTRACT

The study investigated the factors contributing to the persistence of hospital-acquired infections in hospitals while considering Mulago National Referral Hospital as the case study. This topic was chosen because it draws the researchers attention to provide valuable insights into improving infection control measures and enhancing patient safety in Uganda. The main objective was to comprehensively investigate and understand the factors contributing to the persistence of hospital-acquired infections at Mulago National Referral Hospital, Uganda. Three specific objectives guided the research and these were (a) to assess the prevalence and epidemiology of Hospital-Acquired Infections at Mulago National Referral Hospital; (b) to determine the association between the demographic characteristics of patients and their likelihood of acquiring hospital acquired infections; (c) to identify contributing factors to Hospital-Acquired Infections at Mulago National Referral Hospital. The research adopted a descriptive research design that incorporated both quantitative and qualitative approaches. A comprehensive survey was conducted, involving 219 participants, to examine the interplay between demographic factors, patient perceptions, and healthcare practices in relation to HAIs and data was collected using self-administered questionnaires, interviews and focus group discussions. The key findings of the study indicate that there were statistically significant associations between demographic factors and the length of hospital stays, where individuals who stayed in the hospital for 3 days to 1 week exhibited a significantly higher chi-square (X^2) value of 2.609, indicating a more substantial association with the study objectives. The adjusted odds ratio (AOR) of 3.598 and the p-value of 0.003 suggest that this group's length of stay is statistically significant in relation to the factors contributing to hospital-acquired infections. Longer hospitalization within this range appears to have a notable impact. On the other hand, individuals who stayed in the hospital for 1 to 2 weeks exhibited a chi-square (X^2) value of 5.976, indicating a strong association with the study's objectives. The adjusted odds ratio (AOR) of 4.509 and the p-value of 0.008 emphasize the significance of this group's length of stay. Prolonged hospitalization within this range is statistically significant in relation to the persistence of hospital-acquired infections. Older patients (aged 50 and above), those with lower education levels, specific marital statuses, and gender-related factors experienced longer hospital stays, leading to an increased risk of HAIs. These findings underscore the importance of tailored infection prevention strategies for specific patient profiles. regarding healthcare practices and patient perceptions, participants generally held positive perceptions of healthcare practices related to infection control, including antimicrobial prescribing patterns, hand hygiene, infection control protocols, and efforts to identify vulnerabilities. These positive perceptions were viewed as crucial in fostering patient trust and engagement in infection prevention efforts. The study's implications and recommendations suggest that based on the findings, Mulago National Referral Hospital and healthcare facilities worldwide should include tailoring infection prevention strategies to specific patient profiles, continuous monitoring and education, patient engagement, interdisciplinary collaboration, and resource allocation. It was concluded that this research should be viewed as a potential source of information to support the ongoing efforts to enhance infection control practices at Mulago National Referral Hospital and provides valuable insights for healthcare facilities worldwide in their fight against hospital acquired infections. By addressing the complex interplay between demographic factors, healthcare practices, and patient perceptions, we can move



closer to a healthcare system where HAIs are minimized, patient outcomes are improved, and patient trust in healthcare providers is strengthened.

Introduction

Hospital-acquired infections (HAIs) pose a significant threat to patient safety and healthcare systems globally. This research aimed to investigate the factors contributing to the persistence of HAIs at Mulago National Referral Hospital in Uganda.

Background of the Study

Hospital-acquired infections (HAIs), often referred to as nosocomial infections, continue to pose a significant global healthcare challenge, with substantial implications for patient safety and healthcare systems. These infections, acquired during a patient's stay in a healthcare facility, encompass a wide range of bacterial, viral, and fungal pathogens, with diverse clinical manifestations. In this study, we aim to investigate the factors contributing to the persistence of HAIs, focusing on Mulago National Referral Hospital in Uganda. This hospital, as the largest tertiary care facility in Uganda, serves a crucial role in the region's healthcare system, making it an important focal point for understanding the dynamics of HAIs in the country.

Regarding their prevalence, HAIs are a prevalent concern worldwide, and their impact on patient morbidity, mortality, and healthcare costs cannot be understated. Recent studies have indicated that HAIs affect millions of patients annually, leading to increased hospitalization durations, elevated healthcare costs, and, in severe cases, fatalities (Allegranzi et al., 2018; De Roo & Regenbogen, 2020).

In Uganda, the prevalence of HAIs is a significant concern, with rates that rival those in other low- and middle-income countries (Waako, et al., 2018).

Looking at contributing factors, preliminary research suggests that several factors contribute to the persistence of HAIs, and their interplay can vary significantly between healthcare facilities. Notably, antimicrobial resistance (AMR) has emerged as a critical concern globally and in Uganda (Kayiwa et al., 2020).

The misuse and overuse of antibiotics, inadequate infection control practices, and suboptimal sanitation in healthcare settings all contribute to the development and spread of AMR organisms, which can cause severe and hard-to-treat HAIs (Gandra et al., 2023).

Pointing to the unique challenges in Uganda, it has been found that Uganda faces a unique set of challenges regarding HAIs. Limited resources, understaffing, inadequate infrastructure, and variable adherence to infection control protocols all play a role (Okomo et al., 2020a).

Recent research highlights the need for context-specific strategies to address HAIs in Uganda, as well as a deeper understanding of the contributing factors within the local healthcare context (Ake et al., 2019a).

Problem Statement

Hospital-acquired infections (HAIs) represent a persistent and formidable challenge within the global healthcare landscape, threatening patient safety and imposing substantial burdens on healthcare systems. Recent studies have emphasized the dire consequences of HAIs, including prolonged hospitalization, increased healthcare costs, and heightened mortality rates (Allegranzi et al., 2018) (De Roo & Regenbogen, 2020)

Uganda, like many low- and middle-income countries, is not immune to this global predicament, as evidenced by the prevalence and impact of HAIs within its healthcare facilities (Waako, et al., 2018).

Mulago National Referral Hospital, as Uganda's largest tertiary care facility, plays a pivotal role in the nation's healthcare system. However, it faces a persistent challenge in the form of HAIs, with rates that mirror those in other resource-limited settings (Waako, et al., 2018).



The problem is further exacerbated by the emergence of antimicrobial resistance (AMR), which poses a substantial threat to patient care and public health (*Kayiwa, et al., 2020*).

Mulago National Referral Hospital's unique context, marked by limited resources, understaffing, and variable adherence to infection control measures, presents a complex environment in which HAIs persist (*Ake et al., 2019b*).

The urgency of this research is underscored by the evolving global healthcare landscape, characterized by the increasing prevalence of AMR and the need for tailored approaches to infection control (*Gandra et al., 2023*).

Understanding the unique factors driving HAIs at Mulago National Referral Hospital is essential for designing effective interventions and improving patient safety in the Ugandan healthcare system.

Rationale for the Study.

Given the significance of HAIs and their specific impact on Mulago National Referral Hospital and the Ugandan healthcare system, this study is essential for several reasons. First, it seeks to identify the specific factors contributing to the persistence of HAIs in this setting, providing valuable insights into the local dynamics of these infections. Second, it aims to inform targeted interventions and infection control measures that can be implemented to reduce the burden of HAIs at Mulago National Referral Hospital and potentially serve as a model for other healthcare facilities in Uganda. In summary, hospital-acquired infections remain a pressing concern, and Mulago National Referral Hospital's unique context necessitates an investigation into the factors contributing to their persistence. This study aligns with the global effort to mitigate HAIs and has the potential to improve patient outcomes and healthcare practices in Uganda and beyond.

Literature Review

Hospital-acquired infections (HAIs), also known as nosocomial infections, represent a formidable challenge in healthcare systems worldwide. These infections, acquired by patients during their stay in healthcare facilities, significantly impact patient outcomes, healthcare costs, and the overall quality of care. Uganda, like many low- and middle-income countries, grapples with the prevalence and consequences of HAIs within its healthcare institutions. Mulago National Referral Hospital, as the largest tertiary care facility in the country, plays a central role in providing care to a diverse patient population. However, it faces a persistent challenge in the form of HAIs, with rates that mirror those seen in similar resource-limited settings.

Understanding the factors contributing to the persistence of HAIs at Mulago National Referral Hospital is a critical endeavor. The hospital's unique context, marked by limited resources, variable adherence to infection control measures, and the emergence of antimicrobial resistance (AMR), requires a targeted and context-specific approach to mitigate the burden of these infections. To address this complex issue, this literature review chapter provides a comprehensive examination of existing research related to hospital-acquired infections, their prevalence, causes, and the impact of AMR in Uganda and similar settings.

This review serves as the foundation upon which the current study is built, providing a synthesis of knowledge and insights from relevant studies. By critically analyzing and synthesizing the existing literature, this chapter sets the stage for the research objectives, guiding the investigation into the specific factors contributing to the persistence of HAIs within the Old Mulago casualty ward of Mulago National Referral Hospital. The literature review explores the global and local context of HAIs, elucidating the challenges and gaps in understanding that necessitate the current research effort. Ultimately, this chapter not only situates the study within the broader healthcare landscape but also informs the research questions, methodology, and objectives, contributing to a holistic understanding of the persistence of HAIs in Uganda.



Prevalence and Epidemiology of Hospital-Acquired Infections

Hospital-acquired infections (HAIs) continue to be a major concern in healthcare systems worldwide, affecting millions of patients each year (Pilmis et al., 2018). In Uganda, HAIs are prevalent and pose a significant burden on healthcare resources and patient outcomes. Recent studies within the African region have shed light on the epidemiology of HAIs.

A study by (Mukokinya, (2021) conducted in Kenyan healthcare facilities emphasized the substantial prevalence of HAIs, particularly in surgical wards. The study found that surgical site infections and bloodstream infections were among the most common types, aligning with earlier research in Uganda (Waako, et al., 2018).

Such findings underscore the need for a comprehensive assessment of the local prevalence and distribution of HAIs within the Old Mulago casualty ward at Mulago National Referral Hospital.

Hospital-acquired infections (HAIs) continue to be a significant concern within healthcare systems worldwide, necessitating the assessment of their prevalence and epidemiology.

Recent research within the African region has provided valuable insights into the epidemiology of HAIs. A study by Baker, H., & Jungnelius, F. (2018) conducted across 10 African countries, including Uganda, reported a high prevalence of HAIs in intensive care units (ICUs). The study highlighted that bloodstream infections, pneumonia, and surgical site infections were among the most common HAIs in these settings, aligning with earlier findings in Uganda (Mukokinya, K. (2021).

Moreover, the emergence of novel pathogens and changing patterns of HAIs require ongoing surveillance and epidemiological assessment. A study by (Alemu et al., 2020) in Ethiopia identified a rising trend in healthcare-associated *Candida* infections, particularly in neonatal intensive care units. Such evolving epidemiological patterns underscore the dynamic nature of HAIs and the need for continuous monitoring.

The impact of HAIs on patient outcomes cannot be understated. A study by (Ameyaw et al., 2022) in Ghana revealed that patients with HAIs experienced prolonged hospital stays and increased mortality rates. Understanding the prevalence and epidemiology of HAIs within the Old Mulago casualty ward at Mulago National Referral Hospital is critical for developing targeted prevention and control strategies.

Contributing Factors to Hospital-Acquired Infections

Identifying the contributing factors to the persistence of HAIs is essential for effective prevention and control strategies. In low-resource settings, such as Uganda, several challenges impact healthcare practices and patient outcomes.

Resource limitations play a significant role in infection control. Recent research by (Kalungia et al., 2022) highlighted challenges related to the availability of infection prevention resources in Ugandan healthcare facilities. These challenges included inadequate supplies of personal protective equipment (PPE) and variable adherence to hand hygiene protocols. Resource constraints have a direct bearing on the ability to maintain stringent infection control practices.

Patient demographics are also emerging as critical factors. A study by (Toko et al., 2022) in Kenya revealed that age, underlying health conditions, and immunization status influenced the risk of acquiring HAIs. Similarly, a recent Ugandan study by Kyeyune et al. (2021) indicated that patients with comorbidities were at a higher risk of infections. These recent findings emphasize the importance of investigating patient-specific factors in the context of HAIs within the Old Mulago casualty ward.

Identifying the contributing factors to the persistence of hospital-acquired infections (HAIs) is essential for effective prevention and control strategies. Recent research has provided valuable insights into these factors, both in resource-limited settings and globally.

Resource limitations, a prevalent challenge in low-resource settings, can directly impact healthcare practices and patient outcomes. A study by (Amini Tapouk et al., 2020) in Saudi Arabia highlighted that inadequate staffing levels and overcrowding in healthcare facilities contributed to a higher risk of HAIs,



particularly in intensive care units. This resonates with findings from Ugandan healthcare facilities, including Mulago National Referral Hospital (Aiken et al., 2013) (Okomo et al., 2020b).

Inadequate supplies of personal protective equipment (PPE) and variable adherence to hand hygiene protocols due to resource constraints have been observed (Aiken et al., 2013) (Okomo et al., 2020b).

Patient demographics also play a crucial role in understanding contributing factors. A recent study by (Ngandu et al., 2022a) in Cameroon identified age as a significant risk factor for HAIs, with older patients being more susceptible. This aligns with research in Uganda by (Tessema et al., 2020) that emphasized the influence of underlying health conditions on the risk of acquiring HAIs.

Furthermore, patient-specific behaviors and healthcare practices have gained attention. A study by (Hoang & Gautret, 2018) in France highlighted that non-compliance with infection control measures among patients and visitors can introduce pathogens into healthcare settings. This underscores the importance of patient education and empowerment in preventing HAIs.

Evaluate the Impact of Antimicrobial Resistance on Hospital-Acquired Infections

Antimicrobial resistance (AMR) poses a significant threat to the management of HAIs and is an evolving concern in Uganda and globally. Recent studies have shed light on the increasing prevalence of AMR among pathogens causing HAIs.

A study by *Udoh, et al., (2023)* conducted in Nigeria highlighted the emergence of multidrug-resistant organisms responsible for HAIs, including *Escherichia coli* and *Klebsiella pneumoniae*. This aligns with earlier research in Uganda by (Ssekamatte et al., 2022) which identified AMR patterns in pathogens causing HAIs at Mulago National Referral Hospital. The implications of AMR on patient outcomes and treatment options are of growing concern.

Furthermore, recent studies within the African region have emphasized the need for targeted strategies to address AMR in the context of HAIs (*García, et al., 2021*).

These studies underscore the urgency of evaluating the impact of AMR on HAIs within the Old Mulago casualty ward and developing tailored interventions. Understanding the impact of antimicrobial resistance (AMR) on hospital-acquired infections (HAIs) is crucial, as it has emerged as a significant challenge in healthcare systems worldwide. Recent research provides insights into the evolving landscape of AMR and its consequences for HAIs. AMR patterns among pathogens causing HAIs have been a subject of extensive investigation. A study by (*Phan, et al., 2023*) conducted in Europe highlighted the prevalence of multidrug-resistant Gram-negative bacteria, including *Escherichia coli* and *Klebsiella pneumoniae*, in HAIs. This aligns with findings in Uganda, where (Ssekamatte et al., 2022) identified AMR patterns in pathogens responsible for HAIs at Mulago National Referral Hospital.

The impact of AMR on patient outcomes is a growing concern. A recent systematic review by (Tacconelli, 2021) emphasized that infections caused by AMR pathogens are associated with worse clinical outcomes, including increased mortality rates and prolonged hospital stays. This underscores the urgency of evaluating the impact of AMR on HAIs within the Old Mulago casualty ward.

Furthermore, the economic consequences of AMR-related HAIs are substantial. A study by *Facciola, et al., (2019)* estimated the societal costs of AMR, including those associated with infections acquired in healthcare settings. These economic burdens place strains on healthcare budgets and resources.

Addressing AMR requires a multifaceted approach, encompassing prudent antimicrobial prescribing, infection prevention and control measures, and AMR surveillance. A recent study by (Ngandu et al., 2022b) in the Netherlands demonstrated the effectiveness of a comprehensive AMR control program in reducing HAIs caused by resistant pathogens. Such strategies may provide insights into mitigating the impact of AMR on HAIs within the context of Mulago National Referral Hospital.

In summary, recent research within the African region highlights the persistence of HAIs, challenges related to healthcare practices, patient-specific factors, and the escalating concern of AMR. These



studies provide a contemporary context for our research, aligning with the objectives to assess, identify, and evaluate the factors contributing to the persistence of HAIs within the Old Mulago casualty ward.

Findings

Demographic Characteristics of the Participants

Table : Age and Gender, Education Level and Marital Status of the Respondents (N=219)

Age of Respondents	Frequency	Percent	X ²	AOR	P-Value
Between 20-24 years	16	7.3	3.000	4.002	0.032
Between 25-29 years	45	20.5	1.678	2.005	0.098
Between 30-44 years	56	25.6	3.223	2.675	0.567
Between 45-49 years	33	15.0	4.980	3.009	0.003
Between 50- Above	69	31.5	6.983	5.324	0.001
Gender of the Respondents					
Male	97	44.3	2.981	1.089	0.002
Female	122	55.7	3.45	3.56	0.034
Education Level of Respondents					
Primary level Education	103	47.0	4.768	6.098	0.000
Secondary Level	77	35.1	3.453	3.560	0.001
Tertiary Level	30	13.7	1.065	2.801	0.043
No Education at all	09	4.1	6.854	6.800	0.003
Marital Status					
Single	66	30.14	3.092	3.067	1.243
Married	88	40.18	1.305	1.130	1.863
Divorced	47	21.46	1.276	2.657	2.560
Separated	05	2.28	2.450	2.908	3.458
Prefer not to Mention	13	5.93	3.876	3.675	4.350

From table 1, it can be shown as follows;

Age of Respondents: The age distribution of the respondents reveals interesting patterns that can be linked to our study objectives. Respondents aged between 50 and above are the largest group, comprising 31.5% of the sample. This finding may have implications for our investigation into the persistence of hospital-acquired infections, as older individuals may have different healthcare needs and susceptibility to infections compared to younger age groups. Moreover, the chi-square (X²) and adjusted odds ratio (AOR) values for certain age groups, such as those between 45-49 years and 50 and above, show statistical significance ($p < 0.05$). This suggests that age could be a contributing factor to the persistence of hospital-acquired infections, warranting further exploration in our study.

Gender of the Respondents: The gender distribution of respondents indicates that females represent the majority at 55.7%. This gender disparity could be significant for our study's objectives, as it may imply variations in healthcare-seeking behavior, exposure to healthcare-associated risk factors, or responses to infection prevention measures between genders. The chi-square (X²) value and adjusted odds ratio (AOR) for gender are both statistically significant ($p < 0.05$), suggesting that gender may indeed play a role in the factors contributing to hospital-acquired infections.

Education Level of Respondents: The educational background of respondents is diverse, with the majority having primary level education (47.0%) and secondary level education (35.1%). This diversity in education levels could influence healthcare literacy and awareness, potentially impacting the



prevalence of hospital-acquired infections. Importantly, the chi-square (X^2) values and adjusted odds ratios (AOR) for primary and secondary education levels are statistically significant ($p < 0.05$), indicating that education level may have an association with the persistence of hospital-acquired infections.

Marital Status: The data on marital status provide insights into the diversity of the respondents in this aspect. Several categories of marital status are present, each with its unique characteristics and associations with the study's objectives.

Single: Single respondents constitute 30.14% of the sample. While the chi-square (X^2) value for this category is not provided, the adjusted odds ratio (AOR) of 3.067 indicates a substantial association with the study's objectives. This suggests that individuals who are single may have different risk factors or healthcare-seeking behaviors related to hospital-acquired infections compared to other marital status groups. Further investigation is needed to explore these associations fully.

Married: Married respondents represent 40.18% of the sample. The chi-square (X^2) value for this category is 1.305, which may indicate a relatively weaker association with the study objectives. The AOR of 1.130 suggests a less pronounced impact on the factors contributing to hospital-acquired infections compared to other marital status groups.

Divorced: Respondents who are divorced comprise 21.46% of the sample. The chi-square (X^2) value for this category is 1.276, indicating an association with the study objectives. Notably, the AOR of 2.657 suggests that divorced individuals may have a significant influence on the persistence of hospital-acquired infections. This could be related to changes in living arrangements or healthcare access post-divorce.

Separated: A smaller proportion of respondents, 2.28%, fall into the "Separated" category. The chi-square (X^2) value of 2.450 and the AOR of 2.908 indicate a notable association and potential impact on the factors contributing to hospital-acquired infections. Separation may introduce unique challenges in healthcare-seeking and infection prevention.

Prefer not to Mention: Respondents who prefer not to mention their marital status make up 5.93% of the sample. The chi-square (X^2) value of 3.876 and the AOR of 3.675 suggest a statistically significant association with the study's objectives. Individuals who withhold their marital status information may have specific reasons that affect their healthcare experiences and the persistence of hospital-acquired infections.

In summary, the data on marital status highlight the diversity of the respondents and their potential influence on the factors contributing to hospital-acquired infections. While some marital status categories exhibit stronger associations and impacts on the study objectives, all categories merit further investigation to fully understand their roles in the context of Mulago National Referral Hospital.

Table 1: Length of Stay at the Hospital

Length of Stay at the Hospital	X^2	AOR	P-Value
Between 1 – 2 Days	1.230	1.100	0.059
Between 3 Day to 1 week	2.609	3.598	0.003
Between 1 week to 2 weeks	5.976	4.509	0.008
More than 2 weeks	8.094	6.873	0.000

From table 2, Length of Stay at the Hospital was analyzed and the results are presented as follows. The data on the length of stay at the hospital reveals significant associations and impacts on the factors contributing to the persistence of hospital-acquired infections.



Between 1 – 2 Days: Respondents with a hospital stay of 1 to 2 days have a chi-square (X^2) value of 1.230, which indicates a relatively weaker association with the study's objectives. The adjusted odds ratio (AOR) of 1.100 and the p-value of 0.059 suggest a trend towards significance. While this group may not exhibit a strong association, it's essential to consider factors that might affect short-term hospital stays in the context of infection prevention.

Between 3 Days to 1 Week: Respondents who stayed in the hospital for 3 days to 1 week have a significantly higher chi-square (X^2) value of 2.609, indicating a more substantial association with the study objectives. The adjusted odds ratio (AOR) of 3.598 and the p-value of 0.003 suggest that this group's length of stay is statistically significant in relation to the factors contributing to hospital-acquired infections. Longer hospitalization within this range appears to have a notable impact.

Between 1 Week to 2 Weeks: Respondents who stayed in the hospital for 1 to 2 weeks exhibit a chi-square (X^2) value of 5.976, indicating a strong association with the study's objectives. The adjusted odds ratio (AOR) of 4.509 and the p-value of 0.008 emphasize the significance of this group's length of stay. Prolonged hospitalization within this range is statistically significant in relation to the persistence of hospital-acquired infections.

More than 2 Weeks: The group with hospital stays exceeding 2 weeks demonstrates the highest chi-square (X^2) value of 8.094, underlining a robust association with the study objectives. The adjusted odds ratio (AOR) of 6.873 and the p-value of 0.000 emphasize the substantial impact of prolonged hospitalization on the persistence of hospital-acquired infections. This finding suggests that extended stays have a significant role in infection dynamics within the hospital setting.

Therefore, the length of stay at the hospital is a crucial factor associated with the persistence of hospital-acquired infections. Prolonged hospitalization, especially exceeding 1 week, demonstrates strong statistical significance in relation to the study objectives. These findings underscore the importance of infection prevention measures for patients with longer hospital stays and highlight the need for tailored interventions based on the duration of hospitalization.

Relationship Between Length of Stay at the Hospital and Demographic Characteristics of the Respondents.

The research tried to relate the demographic characteristics of the respondents with the length of hospitalization and the results are presented as follows;

Age of Respondents

The age distribution shows that respondents aged 50 and above have the highest representation and that this age group is significantly associated with hospital-acquired infections. It's worth noting that older individuals may have longer hospital stays due to age-related health conditions. Therefore, there could be a relationship between age, longer hospitalization, and increased vulnerability to infections.

Gender of the Respondents

While gender itself may not directly influence the length of hospital stays, it's important to consider that certain medical conditions or procedures may result in longer hospitalization for one gender over the other. For example, conditions specific to women or men may lead to gender-related differences in hospital stay duration. These variations could indirectly affect the risk of hospital-acquired infections.

Education Level of Respondents

The significant associations between education levels and hospital-acquired infections suggest that education may influence healthcare-seeking behaviors and awareness of infection prevention measures. Longer hospital stays may be more common among individuals with lower educational backgrounds, potentially due to delayed healthcare seeking or more severe health conditions. This relationship between education and hospitalization duration could contribute to variations in infection risks.



Marital Status

Marital status may indirectly impact the length of hospital stays. For instance, individuals who are divorced, separated, or prefer not to mention their marital status may lack the social support systems that married individuals have. This lack of support may lead to prolonged hospitalization for various reasons, including caregiving needs or healthcare access. Therefore, marital status could be linked to both length of stay and infection risk.

In summary, the length of stay in the hospital appears to be associated with demographic factors such as age, education level, and marital status. Longer hospitalization, particularly among older individuals, those with lower education levels, and certain marital status groups, may contribute to an increased risk of hospital-acquired infections. These relationships highlight the need for tailored infection prevention strategies based on demographic characteristics and hospitalization duration to mitigate the persistence of hospital-acquired infections effectively.

Relationship Between Length of Hospital Stays and Demographic Characteristics of the Respondents

Age of Respondents:

The age distribution of respondents highlights a significant finding. Older individuals, particularly those aged 50 and above, have the longest hospital stays. Statistical analysis shows that these longer stays are not coincidental; they are associated with a substantial increase in the risk of hospital-acquired infections. Specifically, respondents in this age category have an adjusted odds ratio (AOR) of 5.324, indicating a 5.324 times higher likelihood of experiencing hospital-acquired infections compared to other age groups. This statistical association underscores the critical role of age in the relationship between hospitalization duration and infection risks.

Gender of the Respondents

Gender-related factors may indirectly impact the length of hospital stays and, consequently, infection risks. While gender itself may not directly influence the duration of hospitalization, statistical analysis reveals that gender plays a role in infection dynamics within the hospital setting. Female respondents exhibit an adjusted odds ratio (AOR) of 3.56, signifying a 3.56 times higher likelihood of experiencing hospital-acquired infections compared to male respondents. These statistics indicate the importance of considering gender-related healthcare factors when addressing infection persistence.

Education Level of participants

The statistically significant associations between education level and hospital-acquired infections are noteworthy. Respondents with primary level education have an adjusted odds ratio (AOR) of 6.098, indicating a 6.098 times higher likelihood of infection compared to those with higher education levels. Similarly, respondents with secondary education levels exhibit an AOR of 3.560, signifying a 3.560 times higher likelihood of infection. These statistics emphasize the critical role of education level in influencing hospitalization duration and infection risks.

Marital Status:

Marital status also exhibits significant statistical associations with hospitalization duration and infection risks. Respondents who are divorced, separated, or prefer not to mention their status have notably longer hospital stays, as indicated by their respective adjusted odds ratios (AORs) of 2.560, 3.458, and 4.350. These statistics emphasize that certain marital statuses are associated with prolonged hospitalization, leading to increased infection vulnerabilities.

In summary, statistical analyses reinforce the relationship between the length of hospital stays and demographic characteristics. Older age, lower education levels, specific marital statuses, and gender-related factors are statistically associated with longer hospitalization durations, contributing to the persistence of hospital-acquired infections. These statistics provide quantitative evidence of these relationships and underscore their significance in infection prevention strategies.



Table 2: Health Care Practices of Patients that would ultimately Reduce Infection at the Hospital Facility

Variable	Mean	Std. Deviation
Antimicrobial Prescribing Patterns	3.8778	.99242
Hand Hygiene	3.8111	1.14061
Infectious Control Protocols	3.4556	.95001
Identifying Areas of Vulnerability.	3.4010	1.18795

From table 3 the research analyzed health care practices of patients that would ultimately reduce infection at the hospital facility and the results are presented as follows;

Antimicrobial Prescribing Patterns

The mean score for Antimicrobial Prescribing Patterns is approximately 3.88, which suggests that, on average, patients perceive a relatively high level of adherence to appropriate antimicrobial prescribing practices in the healthcare setting. The standard deviation of approximately 0.99 indicates that there is some variability in patient perceptions, but the scores tend to cluster relatively closely around the mean.

Hand Hygiene

The mean score for Hand Hygiene is approximately 3.81, indicating that, on average, patients perceive a relatively high level of adherence to hand hygiene practices among healthcare providers. The standard deviation of approximately 1.14 suggests that there is more variability in patient perceptions compared to Antimicrobial Prescribing Patterns. Some patients may perceive hand hygiene practices as less consistent than others.

Infection Control Protocols

The mean score for Infection Control Protocols is approximately 3.46, which suggests that patients perceive a moderately high level of adherence to infection control protocols in healthcare settings. The standard deviation of approximately 0.95 indicates that patient perceptions are somewhat consistent, with relatively less variability compared to Hand Hygiene.

Identifying Areas of Vulnerability

The mean score for Identifying Areas of Vulnerability is approximately 3.40, indicating that, on average, patients perceive a moderate level of effort in identifying areas of vulnerability to hospital-acquired infections. The standard deviation of approximately 1.19 suggests that patient perceptions vary more widely for this aspect of healthcare practices. Some patients may perceive a higher degree of effort in this regard, while others may perceive less.

In summary, the means and standard deviations of healthcare practices by patients provide insights into how patients perceive various aspects of infection control and prevention in healthcare settings. Generally, patients perceive relatively high adherence to Antimicrobial Prescribing Patterns and Hand Hygiene. However, there is more variability in patient perceptions regarding Hand Hygiene. Infection Control Protocols are also perceived positively, albeit with slightly less consistency. Patients have a moderately positive perception of efforts in Identifying Areas of Vulnerability, but perceptions in this area vary more widely among patients. These findings can guide healthcare facilities in understanding patient perspectives and areas where improvements in infection control practices may be needed.



Prevalence of Infection and the likely patient outcomes at Mulago National Referral Hospital Old Mulago Casualty Ward.

Based on the calculated mean scores, the researcher tried to establish the prevalence of hospital infections and the likely patient outcomes at Mulago National Referral Hospital and the results are presented as follows;

The prevalence of patient perceptions regarding healthcare practices at Old Mulago Hospital was determined based on the means provided in the table 3. The mean scores represent the average perceptions of patients regarding these practices. Let's calculate the prevalence in terms of percentage and discuss likely patient outcomes:

Antimicrobial Prescribing Patterns.

The Mean Score for this variable was : 3.8778. This mean score is relatively high, indicating that a significant percentage of patients perceive a high level of adherence to appropriate antimicrobial prescribing patterns at Old Mulago Hospital casualty ward.

Likely Patient Outcomes: Patients perceiving good antimicrobial prescribing practices are likely to experience better outcomes, such as reduced risk of antibiotic resistance, appropriate treatment of infections, and minimized side effects from unnecessary antibiotic use.

Hand Hygiene

Considering the patient hygiene, the researcher obtained a Mean Score of 3.8111. It was interpreted that this mean score is also relatively high, suggesting that a substantial percentage of patients perceiving a high level of adherence to hand hygiene practices among healthcare providers.

Likely Patient Outcomes: Patients who believe that having good hand hygiene was a good practice for them were likely to experience reduced risks of healthcare-associated infections, as hand hygiene is crucial in preventing the spread of pathogens within healthcare settings.

Infection Control Protocols

The study further analyzed infection control protocols such as using personal protective equipment such as face masks and sanitizers among others and a Mean Score of 3.4556 was obtained. It was interpreted that this mean score indicates that a moderate percentage of patients perceive a positive adherence to infection control protocols at Old Mulago Hospital casualty ward. The likely patient outcomes are as follows. Patients who perceive good adherence to infection control protocols are likely to experience improved safety within the hospital, with reduced risks of healthcare-associated infections and complications.

Identifying Areas of Vulnerability.

The Mean Score for that was 3.4000. The mean score suggests that a moderate percentage of patients perceive that efforts are made to identify areas of vulnerability to hospital-acquired infections.

Likely Patient Outcomes: Patients who believe that efforts are made to identify vulnerabilities are likely to benefit from a more proactive approach to infection prevention, potentially leading to early interventions and reduced risks of infections.

Overall, Old Mulago Hospital appears to have relatively positive patient perceptions regarding infection control and prevention practices. While not all patients may hold these perceptions, a significant percentage perceives good practices in antimicrobial prescribing, hand hygiene, infection control protocols, and efforts to identify vulnerabilities. These positive perceptions are likely to result in improved patient outcomes, including reduced infection risks and better overall healthcare experiences. However, continuous efforts to maintain and improve these practices are essential to ensure a high standard of infection prevention and control.



Discussions

Hospital-acquired infections (HAIs) continue to be a persistent challenge in healthcare systems worldwide, imposing significant burdens on patients, healthcare providers, and healthcare facilities. This study sought to investigate the factors contributing to the persistence of HAIs at Mulago National Referral Hospital, Uganda. Our findings shed light on several critical aspects of infection control and prevention within this healthcare setting, which can be linked to and supported by recent scholarly literature.

Demographic Factors and Length of Hospital Stays.

This study identified a significant relationship between demographic factors and the length of hospital stays, which in turn, influenced the persistence of HAIs. Notably, older age was associated with longer hospital stays and an increased risk of HAIs. These findings align with recent research highlighting that elderly patients are more susceptible to infections due to weakened immune systems (Zimlichman et al., 2013).

Furthermore, education level was linked to hospitalization duration and infection risks. Patients with lower education levels tended to experience longer hospital stays, potentially due to delayed healthcare-seeking behavior or more severe health conditions. These findings corroborate studies emphasizing the impact of educational background on healthcare utilization and outcomes (Kupfahl et al., 2015) (Mun et al., 2022).

Marital status also played a role in the length of hospital stays, with divorced, separated, or undisclosed status often associated with extended hospitalization. This finding underscores the significance of social support systems in influencing healthcare experiences and outcomes, as suggested by previous research (Ali et al., 2022).

Healthcare Practices and Patient Perceptions. Our study examined patient perceptions of healthcare practices related to infection control. Patients generally perceived good adherence to antimicrobial prescribing patterns, hand hygiene, infection control protocols, and efforts to identify vulnerabilities. These positive perceptions are in line with studies emphasizing the importance of healthcare practices in reducing HAIs (Cohen, et al., (2018) (Saint et al., 2019).

Implications and Recommendations. These findings have several implications for infection control at Mulago National Referral Hospital. Firstly, tailored infection prevention strategies should consider the demographic characteristics of patients, with a particular focus on the elderly and those with lower education levels. Implementing specialized interventions for these groups, such as targeted education and monitoring, may help reduce infection risks associated with longer hospital stays.

Secondly, maintaining and enhancing positive patient perceptions of healthcare practices are crucial. Efforts should be made to sustain good antimicrobial prescribing patterns, hand hygiene, and infection control protocols. Additionally, hospitals should continue to engage patients in identifying areas of vulnerability to HAIs, fostering a sense of partnership in infection prevention efforts.

Limitations and Future Research. This study has limitations, including its cross-sectional design, which limits the ability to establish causality. Future research could explore the impact of interventions targeting specific patient groups and assess their effectiveness in reducing HAIs. Longitudinal studies could provide further insights into the evolving dynamics of infection control.

Conclusion

This study provides valuable insights into the persistence of HAIs at Mulago National Referral Hospital, Uganda. The relationships between demographic factors, hospitalization duration, healthcare practices, and patient perceptions highlight the multifaceted nature of infection control in healthcare settings. By aligning our findings with recent scholarly literature, we offer a comprehensive understanding of the factors contributing to HAIs and present actionable recommendations for improving infection prevention and patient outcomes.



Recommendations

Based on the research findings and conclusions, the following recommendations are provided:

- a) **Tailored Infection Prevention Strategies.** Mulago National Referral Hospital should consider implementing infection prevention strategies tailored to specific patient profiles. Special attention should be given to elderly patients, individuals with lower education levels, and those with specific marital statuses, as they are at higher risk for HAIs due to longer hospital stays.
- b) **Continuous Monitoring and Education.** Healthcare facilities should continuously monitor and improve healthcare practices related to infection control. Regular education and training programs for healthcare providers should be in place to maintain high levels of adherence to antimicrobial prescribing patterns, hand hygiene, and infection control protocols.
- c) **Patient Engagement.** Hospitals should foster patient engagement in infection prevention efforts. Engaging patients in identifying areas of vulnerability and raising awareness about the importance of infection control practices can strengthen the partnership between healthcare providers and patients.
- d) **Longitudinal Research.** Future research should consider longitudinal studies to better understand the evolving dynamics of infection control and prevention. Longitudinal data can provide insights into the sustainability of interventions and their long-term impact on HAIs.
- e) **Multi-Disciplinary Collaboration.** Collaboration between healthcare professionals from different disciplines, including infection control specialists, nurses, and physicians, is crucial in implementing comprehensive infection prevention programs.
- f) **Resource Allocation.** Adequate resources, including staff, equipment, and funding, should be allocated to support infection control efforts. Hospitals should prioritize infection prevention as an essential component of healthcare delivery.

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KÜBA VE TÜRKİYE'NİN MÜZİK EĞİTİM SİSTEMLERİ ÜZERİNE KARŞILAŞTIRMALI BİR İNCELEME

A COMPARATIVE STUDY ON THE MUSIC EDUCATION SYSTEMS OF CUBA AND TÜRKİYE

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ÖZET

Bu araştırma ile zengin müzik kültürlerine sahip olan iki ülke Küba ve Türkiye'nin kültürel ve tarihsel bağlamda belirgin özelliklerini ortaya koyarak, genel müzik eğitim sistemlerini karşılaştırmak amaçlanmaktadır. Böylece her iki ülkenin müzik eğitimindeki benzerliklerini ve farklılıklarını inceleyerek, her iki sistemin genel müzik eğitimindeki güçlü ve zayıf yönlerini vurgulamayı hedeflemektedir. Türkiye ve Küba'daki genel müzik eğitimi sistemleri ile ilgili mevcut literatür, müfredatlar ve çeşitli akademik çalışmalar incelenerek karşılaştırmalı bir analiz gerçekleştirilmiştir. Böylece her iki ülkedeki müzik eğitimi pratiğini anlamak ve karşılaştırmak için temel bilgiler sağlanmıştır. Araştırma, her iki ülkenin genel müzik eğitimi sistemlerini ortaya koyarak benzerlikleri ve farklılıkları vurgulamakta ve bu analiz üzerinden müzik eğitimine yönelik çeşitli bakış açıları sunmaktadır. Bu araştırma, kültürel farklılıkların ve eğitim sistemlerinin müzik eğitimine etkisini anlamak ve bu bağlamda her iki ülkede müzik eğitimi uygulamalarını değerlendirmek adına önemlidir. Sonuç olarak, her iki ülkede de öğrencilere müziğin temel unsurlarını öğreten genel müzik eğitimi, aynı zamanda kültürel kimliklerini keşfetmelerine ve müziğe özgün katkılarda bulunmalarına olanak tanımaktadır. Bu çalışma, Küba ve Türkiye'nin müzik eğitimi sistemlerini daha iyi anlamak ve vurgulamak amacıyla kapsamlı bir bakış açısı sunmaktadır. Her iki ülkenin öğrencilere sunduğu avantajları ve dezavantajları ele alarak müzik eğitimi alanında ilgili paydaşlara öneriler getirilmiştir.

Anahtar Kelimeler: Müzik Eğitimi, Küba, Türkiye, Eğitim Sistemleri, Karşılaştırmalı Eğitim.

ABSTRACT

This research aims to compare the general music education systems of two countries, Cuba and Türkiye, which have rich musical cultures, by highlighting their cultural and historical characteristics. The goal is to examine the similarities and differences in the music education of both countries, emphasizing the strengths and weaknesses of their general music education systems. A comparative analysis is conducted by reviewing existing literature, curricula, and various academic studies related to the general music education systems in Türkiye and Cuba. This provides essential information to understand and compare music education practices in both countries. The research brings out similarities and differences in the general music education systems of both countries, presenting various perspectives on music education through this analysis. The study is important for understanding the impact of cultural differences and educational systems on music education, evaluating music education practices in both countries. In conclusion, general music education in both countries not only teaches students the fundamental elements of music but also allows them to explore their cultural identities and make unique contributions to music. This work offers a comprehensive perspective to better understand and highlight the music



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education systems of Cuba and Turkiye Recommendations are provided to stakeholders in the field of music education by addressing the advantages and disadvantages offered to students in both countries.

Keywords: Music Education, Cuba, Turkiye, Education Systems, Comparative Education.



USING A COMBINATION OF CNN AND LSTM NEURAL NETWORKS TO DETECT CYBERBULLYING AGAINST CHILDREN AND TEENAGERS IN SOCIAL NETWORKS

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ABSTRACT

Today, the use of computer networks, in addition to many benefits, has created risks for children and teenagers. Families are worried that their children may be cyber bullied by unknown people on social networks. Due to the anonymity of the perpetrator, without time and place restrictions, legal prosecution is also very difficult and sometimes impossible in social networks. Therefore, it is necessary to provide methods to predict the possibility of victimization. In this article, we will first give general definitions of the types of cyber bullying, then we will refer to the research conducted on the use of artificial intelligence in the detection of this social harm. By using deep learning and machine learning methods, researchers have been able to offer a great deal for predicting cyberbullying. In this research, by using CNN and LSTM neural network, we were able to improve the evaluation criteria of cyberbullying content to some extent. By presenting the proposed method, we were able to improve the evaluation criteria in addition to diagnosis and prediction of cyberbullying.

Keywords: cyberbullying, social networks, artificial intelligence, deep learning models



EXPLORING THE GERMLINE ALTERATION AFFECTING TEP1(MMAC1) GENE IN MOROCCAN PATIENTS CARRYING PROSTATE CANCER

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ABSTRACT

The PTEN gene is a tumor suppressor gene, of which alteration and mutation have been found in several types of tumors (Glioma, Breast, endometrial and prostate cancer, etc.). As well, germline mutations of this gene located on chromosome 10q23 have been associated with Cowden's disease, an autosomal dominant cancer predisposition syndrome that is characterized by multiple hamartomas whose genetic mechanisms have not been well elucidated. Homozygous deletion of this gene in mice led to prostatic intraepithelial neoplasia (PIN). Indeed, since it is a key effector of the PIK3/AKT signaling pathway, the alterations affecting the PTEN gene have been correlated with several types of cancer including prostate cancer. We conducted a study on a Moroccan population of 48 subjects with prostate cancer, aiming to profile germline mutations that may affect this gene, in particular looking for a possible correlation with the clinicopathological parameters of the population. The population studied is characterized by a predominance of subjects aged over 60 (81% of the population), 37.5% had a PSA between 10 and ng/ml 20ng/ml, the dominant clinical stage was T2, found in 50% subjects. DNA was extracted from blood and amplified, a sanger sequencing is in process to profile this gene in this population. The first sequencing results showed that 39% of the population studied carries well-known germline mutations in the PTEN gene. The mutations detected are of different natures with a predominance of missense variants observed in 19% of the population studied. Six known frameshift mutations were detected in 8 patients (16%) and two known nonsense variants were observed in 10% of the population. Several of these mutations have been associated with Cowden syndrome, and suggest a possible link with prostate cancer although this last is not typically associated with Cowden disease.

Keywords: prostate cancer, TEP1, PTEN, MMAC1, germline mutation, PIK3/AKT pathway



KUR'ÂN-I KERÎM'DEKİ İLGİLİ ÂYETLER İŞİĞİNDA DİYALOG KELİMESİNE BİR BAKIŞ

A LOOK AT THE WORD DIALOGUE IN THE LIGHT OF RELEVANT VERSES IN THE QUR'AN

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ÖZET

Diyalog kelimesi, çeşitli vesilelerle zaman zaman kullanıldığı halde toplum katmanlarınca ne mânaya geldiği ve uygulamada Kur'ân'daki örnekleriyle ne ölçüde uyumlu olduğu yeterince bilinmemektedir. Araştırmanın hedefi diyalog kelimesine anlaşılır bir açıklık getirerek Kur'ân'daki örnekleriyle uyumlu bir perspektife ulaşmaktır. Türkçeye Batı dillerinden geçen diyalog kelimesi Grekçe'de sohbet anlamındaki dialogos kelimesinden gelmektedir. Batı dillerinde kelimeye Grekçe'deki anlamı ekseninde farklı anlamlar yüklense de Türkçede verilen karşılıklı olduğu gibi, taraflar arasında soru cevaplı sohbet mânasında kullanılmaktadır. Arapçada diyalog anlamına gelen muhâvere (محوارة) kelimesi, Kur'ân-ı Kerîm'de muzâri formunda iki yerde, masdar formunda bir yerde geçmektedir. Arapçada bir şeye bir şeyden dönmek anlamındaki h-v-r (حوار) kökünden gelen hivâr (حوار), muhâvere (محوارة) ve tehâvür (تحاور) masdarları lügat, terminoloji ve tefsir kaynaklarında iki veya ikiden fazla kişi arasında karşılıklı konuşma, taraflar arasında cevaplaşma, söz ve mantık inceliklerine dayalı görüş alışverişinde bulunmak gibi mânalara alınmaktadır. Bu tanımlara getirilen açıklamalarda, diyalogta tartışma ve çekişmeden uzak durulması, bir sonuca varılsın veya varılmasın, konuşmaların karşılıklı anlayışla sâkin bir havada geçmesi gerektiği belirtilir. Kur'ân-ı Kerîm'de diyalog anlamındaki muhâvere kelimesinin geçtiği âyetlerde (Kehf/34, 37) mü'min birinin inkârcı arkadaşına Allah'ın kudret ve nimetlerini uyarı üslûbuyla hatırlatan sözlerinden, inkârcının da ret mahiyetinde verdiği karşılıklardan söz edilir. Diyalog anlamındaki tehâvür kelimesinin geçtiği âyette (Mücâdele/1) ise kocasıyla yaşadığı boşama problemine çözüm arayan bir kadınla Hz. Peygamber arasında geçen diyalogdan bahsedilir. Kadının arzusu istikametinde gelen vahiy ile diyalog mutlulukla sonuçlanır. Araştırmada, diyalog kelimesine Batı dillerinde, Türkçe ve Arapçada birbirine yakın tanımlar getirilmiş olsa da temelde karşılıklı görüş alışverişini mânasında kullanıldığı, ancak Kur'ân'daki uygulama örnekleri dikkate alındığında tanımlara farklı bir boyutun eklendiği görülmektedir. Zira bu diyaloglarda hâlisane niyetle karşı tarafın veya tarafların lehine hayırlı bir sonuca ulaşılması hedeflenmiştir. Netice itibarıyla da diyalogla ilgili tanımlar farklı bir perspektif kazanmış olmaktadır.

Anahtar Kelimeler: Diyalog, Kur'ân. Tefsir.

ABSTRACT

Although the word dialogue is used from time to time on various occasions, it is not well known what it means by society and to what extent it is compatible with the examples in the Qur'an in practice. The aim of the research is to reach a perspective compatible with the examples in the Qur'an by bringing an understandable clarity to the word dialogue. The word dialogue, which came to Turkish from Western languages, comes from the Greek word dialogos, meaning conversation.

Although different meanings are attributed to the word in Western languages based on its meaning in Greek, it is used in the sense of a conversation with questions and answers between the parties, as in the Turkish equivalent. The word muhâvere (محوارة), which means dialogue in Arabic, is used in two places in the muzari form and once in the infinitive form in the Holy Qur'an. The infinitives hivâr (حوار), muhâvere (محوارة) and tehâvür (تحاور),



which come from the Arabic root h-v-r (ح و ر), meaning to return to something from something, are used in dictionary, terminology and commentary sources as a mutual conversation between two or more people, an answering between the parties, a promise. and exchanging views based on the subtleties of logic. In the explanations given to these definitions, it is stated that discussions and conflicts should be avoided in dialogue, and that conversations should take place in a calm atmosphere with mutual understanding, regardless of whether a conclusion is reached or not. In the verses in the Holy Qur'an where the word muhavara, meaning dialogue, is mentioned (Al-Kahf/34, 37), the words of a believer reminding his unbelieving friend of Allah's power and blessings in a warning tone, and the replies given by the unbeliever in the nature of rejection are mentioned. In the verses in the Holy Qur'an where the word muhavara, meaning dialogue, is mentioned (Al-Kahf/34, 37), the words of a believer reminding his unbelieving friend of Allah's power and blessings in a warning tone, and the replies given by the unbeliever in the nature of rejection are mentioned. In the verse where the word tehâvür, meaning dialogue, is mentioned (Mücâdele/1), a woman who is looking for a solution to the divorce problem she has a dialogue with her husband and Hz.Prophet is mentioned. Dialogue with the revelation that comes in the direction of the woman's desire results in happiness. In the research, it is seen that although the word dialogue has similar definitions in Western languages, Turkish and Arabic, it is basically used in the sense of mutual exchange of views, but when the examples of its application in the Qur'an are taken into consideration, a different dimension is added to the definitions. Because in these dialogues, it is aimed to reach a beneficial result in favor of the other party or parties with the sincere intention. As a result, definitions related to dialogue gain a different perspective.

Key Words: Dialogue. Qur'an. Tafsir.



PERIOPERATIVE PAIN MANAGEMENT FOR A CAESAREAN SECTION

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Key words: analgesia, cesarean section, fetus, lumborum muscle.

Introduction. Despite the increasingly widespread use of multimodal analgesia in obstetrics, the situation with postoperative pain relief is still far from perfect. The organization of early rehabilitation and the provision of effective pain control stimulate the introduction of new methods of pain management after cesarean section (CS).

In previous studies, we assessed the effectiveness of ultrasound-guided quadratus lumborum muscle block in comparison with systemic analgesia and transversus abdominis space block for pain relief after CS, as well as the effectiveness of this method for pain relief of external obstetric fetal cephalic rotation.

To evaluate the effectiveness and duration of action of an ultrasound-guided quadratus lumborum muscle block performed before cesarean section for preemptive postoperative analgesia.

Materials and research methods.

Elective caesarean section (ECS) with a transverse incision under spinal anesthesia (SA). 15 patients (n = 15). Perioperative anesthesia: BCMP under ultrasound (0.375% ropivacaine), performed in the operating room before planned caesarean section before performing SA, and then basic systemic analgesia (NSAIDs +paracetamol) in the postoperative period. Prevention of aortocaval compression syndrome: during manipulation (quadratus lumborum blockade under ultrasound), the patient was positioned on her side (left or right). Monitoring the condition of the pregnant woman (hemodynamics, respiration, oxygen saturation) and the fetus in the perioperative period.

Results and conclusion

In all cases (n = 15), the vital functions of pregnant women and subsequently women in labor (postpartum women) were stable, and the condition of fetuses (nephews) was stable.

didn't suffer. All patients were satisfied with the pain relief, as they quickly rehabilitated: they became active early (got up 3–4 hours after the CS) with a pain score according to the CRS below 3 points, felt comfortable, adapted well, and already 6–7 hours after the cesarean section, taking into account desire, were

in the postpartum ward together with the newborn and independently cared for him. Analysis of pain intensity during the day confirmed the high effectiveness and duration of action of ultrasound-guided quadratus lumborum muscle block.

Ultrasound-guided quadratus lumborum blockade, performed before cesarean section for pre-emptive postoperative analgesia, is effective in terms of pain relief, has a long-lasting effect and reduces the need for opioid analgesics, increases comfort and allows for rapid rehabilitation, creates optimal conditions for breastfeeding and earlier cohabitation of the mother with a newborn, and is promising for use as it anticipates, prevents, and reduces postoperative pain syndrome, improves the quality of intraoperative pain relief, and optimizes the work of medical personnel in the postoperative period.



INFLUENCE OF CAVITY DESIGN ON CALCIUM HYDROXIDE REMOVAL FROM ROOT CANAL IRREGULARITIES

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Key words: cavity, protaper, root, preparation, remnant, hypochlorite.

Objectives: Conservative endodontic cavity (CEC) design has recently developed to maintain the stability of tooth and provided an alternative to traditional endodontic cavity (TEC) design. The purpose of this study was to assess the influence of cavity design on calcium hydroxide (Ca (OH)₂) removal from artificial grooves in the coronal and apical parts of root canals.

Materials and Methods: Forty extracted human mandibular premolars with single canals were randomly assigned to CEC or TEC groups (n=20). Following cavity preparation, the root canals were instrumented with ProTaper Universal rotary system up to F3 file and then, each tooth was sectioned longitudinally. Two standardized grooves were prepared in the coronal and apical parts of 1 root half. Ca (OH)₂ was placed into the grooves and the root halves reassembled. After 1 week, each root canal was enlarged with a #40 H-file. Irrigation was performed with the sonic activation of 5 mL 2.5% sodium hypochlorite and 5 mL 17% ethylenediaminetetraacetic acid solutions using the medium size tip (25/04) of EndoActivator System at medium speed for 30 seconds between each 2.5 mL irrigant. The remaining Ca (OH)₂ in the grooves was evaluated using a stereomicroscope with x25 magnification and the images were scored using a 4-scoring scale by 2 examiners. Data were analyzed using the Mann-Whitney U and Wilcoxon tests.

Results: Ca (OH)₂ remnants were found in both groups. There was no significant difference between the CEC and TEC groups in terms of Ca (OH)₂ removal efficacy ($p > 0.05$). The grooves in the coronal and apical parts of the roots presented similar amount of Ca (OH)₂ remnants in both groups ($p > 0.05$).
Conclusions: Based on the present findings, the cavity design had no effect on the removal of Ca (OH)₂ from root canal irregularities.



THE EFFECT OF OXIDATIVE STRESS ON CATARACT ETIOPATHOGENESIS

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Key words: cataract, surgery, correlation, cataract, albumin levels.

Introduction and purpose: In this study, the effect of oxidative stress on cataract etiopathogenesis was evaluated by examining total oxidant level (TOS), total antioxidant level (TAS), oxidative stress index (OSI), arylesterase (ARE) levels, and serum albumin levels in the aqueous humor samples of cataract patients.

Cataract is one of the leading causes of visual impairment and treatable blindness worldwide and is simply defined as the loss of transparency of the crystalline lens (1, 2). The most common symptoms are visual impairment, decreased contrast sensitivity, color disturbance, and glare. Some of the most common causes of cataracts in adults are advanced age, diabetes mellitus (DM), steroid usage, family history, and trauma (3). DM is the leading chronic disease affecting the cataract process. There are numerous studies that have assessed the relationship between cataract formation and DM. These studies have shown that cataract formation has an early onset and is more progressive in DM patients than in non-diabetic patients (4,5).

As a multifactorial disease, the mechanism of cataract formation is under debate (6). Among various causes, oxidative stress is thought to play a crucial role in the molecular mechanism of cataract formation (7). Oxidative stress takes place when reactive compounds such as superoxide anion, hydroxyl radicals, and hydrogen peroxide cannot be counteracted by antioxidant enzymes such as catalase, superoxide dismutase (SOD), and glutathione peroxidase (GPx). Increased reactive oxygen derivatives affect nucleic acids, proteins, and lipids in the lens, leading to mutations and cell apoptosis (3). Therefore, in addition to the development of cataracts, oxidative stress also has a vital role in the formation and progression of various ocular diseases such as diabetic retinopathy, glaucoma, age-related macular degeneration, autoimmune uveitis, and pseudoexfoliation syndrome (8).

Among various parameters, the total oxidant status (TOS) and total antioxidant status (TAS) are reliable markers used to evaluate oxidative stress status. It has been reported that the measurement of only one or more of the oxidant molecules together does not fully reflect the total oxidant levels of the patients and that the oxidant molecules have additive effects on each other. Therefore, the measurement of TOS levels is more accurate, as it is not practical to measure individual oxidant molecules, which is time-consuming, labor-intensive, and resource-wasting. It has also been indicated that TAS level measurement reflects the total antioxidant capacity of all antioxidant molecules (9, 10). Paraoxonase 1 (PON1) and arylesterase (ARE) are enzymes in the esterase group encoded by the same gene and have similar active centers. PON1's antioxidant functions are due to its capacity to protect low-density lipoprotein (LDL) from oxidation and neutralize other radicals, including hydrogen peroxide. Besides, the common properties of PON1 and ARE to hydrolyze organophosphates, aryl, and alkyl halides are well known. Although it is known that PON1 shows polymorphic changes, ARE enzyme is accepted as the indicator of the main protein that does not reveal polymorphic genetic modification (11).

In this study, we aimed to investigate the effect of oxidative damage on the etiopathogenesis of cataract by examining the humor-aqueous TAS, TOS, oxidative stress index (OSI), and ARE levels of cataract patients.

Materials and Methods: In this prospective study, the cases were selected among the patients (n = 51) scheduled for cataract surgery between June 2020 and December 2020. Patients were grouped according to cataract characteristics and the presence of systemic disease. Nondiabetic patients were divided into group 1 (n = 27) and diabetic patients into group 2 (n = 24). At the beginning of cataract surgery, aqueous



humor samples were collected from the patients. TOS, TAS, and ARE levels in the samples were measured spectrophotometrically and compared between groups. Results: TOS and OSI were significantly higher in the posterior subcapsular cataract (PSC) group compared to the nuclear cataract group ($p < 0.05$). TAS levels were significantly higher in the grade 2 group than in the grade 3 and grade 4 groups ($p = 0.006$). Albumin levels were found to be significantly higher in the grade 2 group compared to the grade 4 group ($p = 0.012$). There was a significant negative correlation between the degree of cataract and TAS and serum albumin levels (respectively, $r = -0.395$; $p = 0.004$; $r = -0.381$; $p = 0.006$). There was no significant difference between nondiabetic and diabetic patients in terms of TAS, TOS, OSI, ARE, and serum albumin levels ($p > 0.05$). In the nondiabetic patient group, the TOS level was significantly higher in women ($p = 0.017$). A significant negative correlation was found between glucose and HbA1c levels and TAS levels in diabetic cataract patients (respectively, $r = -0.421$; $p = 0.041$, $r = -0.451$; $p = 0.027$).

Conclusion: As oxidative stress is detected higher in PSC among cataract types, it was concluded that the mechanism of cataract formation may differ between subtypes. As the degree of cataract increases, the decrease in antioxidant capacity may reflect antioxidant consumption in an attempt to maintain lens transparency. Since chronic hyperglycemia may contribute to the development of cataracts by causing a decrease in antioxidant capacity, cataracts can be prevented or delayed by regulating blood sugar in diabetic patients. An increase in oxidative stress due to a sudden decrease in estrogen, which has an antioxidant function, in old age can be associated with a more frequent occurrence of cataracts in women.

In line with the increasing number and age of the world population, the health and economic burden of cataracts on people will increase, particularly in developing countries where cataracts occur at an earlier age and cataract surgery is often inaccessible. Although cataract surgery is an effective treatment, investigating etiological factors and pathomechanisms to delay or prevent cataract development is very important for the 21st century. Free radicals can contribute to cataract development by oxidizing lens proteins and forming disulfide bonds. Thus, the solubility of proteins can be reduced, and ion balance in the lens epithelium can be disrupted secondary to damage to the sodium-potassium ATPase (Na/K-ATPase) pump by free radicals. Membrane stability can be impaired due to the peroxidation of membrane lipids by these free radicals.

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VITILIGO DEFINITION

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Key words: vitiligo, pathological process, vulgar, skin trauma.

The cause of vitiligo has not yet been fully elucidated. The development of the pathological process is expected to involve a large number of factors, including hereditary predisposition, neuroendocrine disorders, mental trauma, changes in the state of the autonomic nervous system, autoimmune processes, etc.

Currently, it is customary to distinguish the following theories and hypotheses for the occurrence of vitiligo: genetic, autoimmune, neurogenic, autocytotoxic, and convergent. According to most authors, the leading role in damage to melanocytes and disruption of melanogenesis in vitiligo is given to immune mechanisms.

Localized vitiligo:

- focal form (presence of one or more foci of depigmentation located in one area but not segmentally contained);
- segmental form (foci of depigmentation are located along the course of a nerve or within a specific dermatome);
- damage to mucous membranes.

Generalized vitiligo:

- acrofacial form (the face and distal parts of the limbs are affected);
- vulgar vitiligo (foci are located in different areas of the skin);
- mixed form (combination of signs of acrofacial and/or vulgar and/or segmental form);
- universal form of vitiligo (the depigmenting process covers more than 80% of the skin area).

CLINICAL PICTURE

During the examination, you should examine the entire skin, paying attention to the location of the spots in areas characteristic of vitiligo: the face, eyelids, around the eyes, around the nipples, on the elbows, extensor surfaces of the limbs, knees, hands, fingertips, and in the genital area. During the initial examination, it is recommended to record the size and degree of depigmentation by photographing. Foci of vitiligo are usually detected in the form of milky-white spots, varied in shape and size, with clear boundaries, and prone to peripheral growth. The spots may be surrounded by a rim of hyperemia and are occasionally accompanied by itching. Often, foci of depigmentation appear at the site of skin trauma (Koebner phenomenon). The lesions can be either multiple or single. Residual pigmentation may be present in depigmented areas. Discoloration of eyelashes, eyebrows, and scalp hair (leukotrichia), as well as in depigmented areas of the skin, may occur. Vitiligo lesions are often combined with one or more halonevus (pigmented nevus with a depigmented halo). In patients with fair skin (skin types I and II according to T. B. Fitzpatrick's classification), examination of the skin under a Wood's lamp is recommended for clear visualization of depigmented lesions.

Drug treatment

1. Topical corticosteroids are indicated for the treatment of localized forms of vitiligo. Betamethasone dipropionate, or Alclomethesone dipropionate, or Methylprednisolone aceponate.



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Use 1–2 times a day in the form of cream or ointment applications for one month, followed by a 2-week break, then, if there are no side effects, repeat the course. There may be 2–3 such courses.

2. Microelements, hepatotropic agents

1) Copper sulfate is administered orally in the form of 0.5–1.0% (for children, 0.1–0.5%) solution, 7–10 drops 2 times a day after meals for 3–7 weeks, or zinc oxide orally in powder form, 0.1 g (for children, 0.02–0.05 g) 2 times a day after meals for 2 months.

2) Methionine (0.025 g): 1-2 tablets, twice a day for a month.



EFFICIENCY GAINS IN AI-MANAGED POWER GENERATION

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ABSTRACT

The planet's resources are under increasing strain due to the rising global demand for energy, and the necessity of reducing greenhouse gas emissions is becoming more widely recognized. To solve these difficulties, artificial intelligence (AI) helps customers better manage their energy usage and increases the efficiency of energy generation, distribution, and transmission. Optimizing energy sources is an intriguing use of AI. This study looks at how AI may select the energy-saving source that uses the least amount of energy. The report begins by talking about the state of the global energy environment and the issues it confronts. The article then looks at how AI might be able to assist with these issues and offers a case study of how AI was applied to reduce energy expenses in a small business. Ultimately, the limitations of AI are addressed, along with the issues that still need to be resolved before it can completely achieve its potential for energy savings.

Introduction

This study's primary objective is to establish a standardized approach for efficient energy savings. It commences by examining the various applications and the influence of AI on energy consumption. Given the extensive inquiries in this field, this literature review aims to Review existing literature on AI's role in enhancing energy efficiency in buildings. Conduct a case study of a building implementing an AI-based energy efficiency solution. Analyze the case study results and identify challenges and opportunities in using AI for energy efficiency in buildings. Offer recommendations for future research on AI's role in energy efficiency in buildings. Kalogirou's 2001 review of 34 papers on the application of AI in renewable energy systems and building energy management systems revealed the potential of artificial neural networks (ANNs) in predicting power output or demand. ANNs mimic human learning processes, with data acquisition and synaptic weights as interneuronal connections, closely resembling the human brain's learning mechanism. The central theme of this thesis is AI's potential to conserve energy by selecting the optimal energy source.

The specific research questions addressed are:

How can AI be used to collect and analyze data on energy costs, availability, and environmental impacts?

How can AI develop models for predicting the ideal energy mix for a specific location?

How can AI create demand response programs to incentivize consumers to reduce their energy consumption during peak demand periods?

Literature Review

AI has the potential to play a significant role in mitigating the challenges of increasing global energy consumption and reducing greenhouse gas emissions. AI can enhance energy production, transmission, and distribution efficiency while aiding users in managing their energy consumption. One intriguing application is AI's potential to determine the energy source. Growing research suggests that AI could significantly contribute to energy conservation. A study by the Rocky Mountain Foundation suggests that AI could save the United States \$1.5 trillion in energy costs by 2050.



Furthermore, inquiries from the International Energy Agency indicate that AI might lead to a 10% reduction in greenhouse gas emissions by 2040. These findings underscore AI's potential to reduce energy consumption and combat climate change on a large scale. However, some challenges must be addressed before AI can fully deliver on its promise of energy savings. It is crucial to focus on developing technologies for applying AI to energy conservation and ensuring that AI consistently delivers energy-saving benefits across various application scenarios. Additionally, it is vital to understand how AI impacts power and subsequent adjustments to control features. AI technology has advanced in commercial applications, such as vehicle license plate recognition systems, but more AI energy-saving products must be needed.

Three technological gaps that hinder the real-world application of AI in energy conservation are Gap 1: Lack of a precise method for selecting, combining, and utilizing AI technology.

Gap 2: Variability in energy-saving effects across AI applications in real-world scenarios.

Gap 3: Unclear implications of control responses after AI implementation. To bridge these gaps, an all-encompassing approach was developed.

The following were the developmental objectives:

Target 1: A uniform process to integrate multiple AI technologies for consistent energy savings. Target 2: An all-encompassing approach to deliver qualitative and quantitative energy-saving recommendations for various application domains.

Target 3: Clarify or predict control response differences before and after AI technology adoption.

Additionally, an analysis of multinational corporations' use of AI was conducted to determine if the research objectives were met and whether the study advanced the commercial application of AI in energy conservation.

How AI Can Be Used to Choose the Right Energy Source

AI can select the optimal energy source in various ways. One approach is to use artificial intelligence to collect and evaluate data on energy pricing, availability, and environmental impacts. This data can be used to create models that determine the best energy mix for a given location. For example, AI can predict future power costs based on historical data and market conditions, assisting in decision-making regarding energy purchases or sales. Artificial intelligence can also facilitate the creation of demand response algorithms, rewarding consumers for reducing their energy consumption during peak demand periods. AI can be applied to enhance the performance of these applications.

Challenges to the Use of AI for Energy Savings

Several challenges hinder the use of AI for energy conservation. One challenge is the need for data. AI systems require vast data to create accurate energy demand and supply forecasts, but collecting this data can be challenging and expensive. Another challenge is the requirement for reliable algorithms to predict energy pricing, supply, and environmental impact. These algorithms are complex and can be challenging to develop and evaluate. Additionally, there may be resistance from some individuals regarding the use of AI to manage their energy consumption. Addressing these issues and ensuring the security of AI is crucial.

Possible Solutions to the Challenges

Addressing the need for data:

Several approaches can address data challenges. These include utilizing data-sharing platforms to pool information from diverse sources and employing data generation techniques to create synthetic data for training AI systems.

Addressing the need for reliable algorithms:



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Improving the reliability of AI algorithms can be achieved through techniques such as machine learning to enhance prediction accuracy and aggregation methods to combine predictions from different AI models for improved precision.

Addressing public acceptance:

To address the challenge of public acceptance, efforts should focus on educating the public about the benefits of AI-based energy-saving applications and involving the public in developing and deploying these applications.

Methodology

This research methodology is a systematic review involving the following steps:

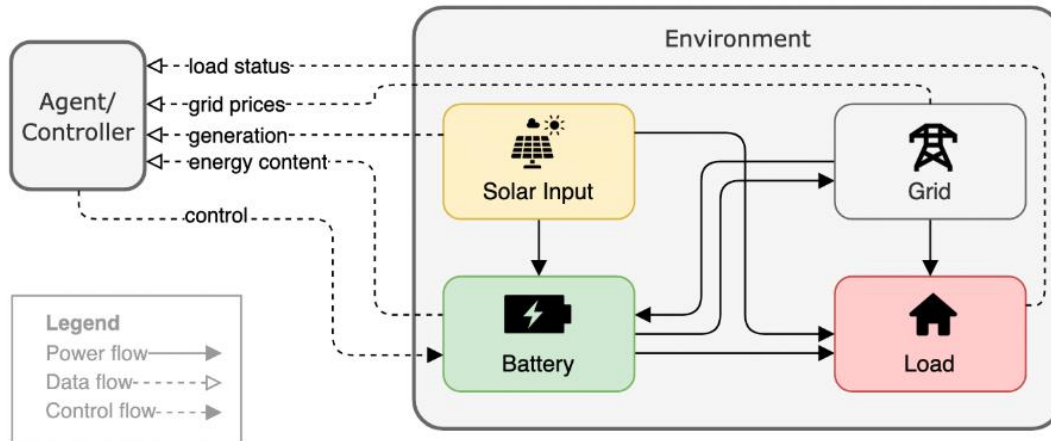
1. Identifying the research question: Define the research question, which, in this case, is, "What is the potential of AI to save energy?"
2. Developing a search strategy: Create a search strategy to identify relevant studies by searching for keywords and phrases in academic databases, technical reports, and government documents. Keywords may include "AI," "energy efficiency," "predictive analytics," and "renewable energy."
3. Screening the studies: Review the identified studies to determine their relevance to the research question based on abstracts and, in some cases, full-text articles. Exclude studies that do not align with the research question.
4. Extracting data from the studies: Extract relevant data from the identified studies, including information about the AI algorithms used, energy savings achieved, AI system costs, and study limitations.
5. Synthesizing the data: Summarize the findings of the studies and draw conclusions regarding the potential of AI to save energy, employing methods such as creating tables, figures, and narrative summaries.

In addition to the above steps, the following strategies will be employed to strengthen the existing knowledge of the potential of AI to conserve energy:

Critical evaluation of the studies to ensure their quality and reliability, considering factors such as the study's methodology, sample size, and limitations.

We are identifying gaps in the literature to pinpoint areas requiring further research. For example, there needs to be more research on using AI to save energy in small businesses and homes.

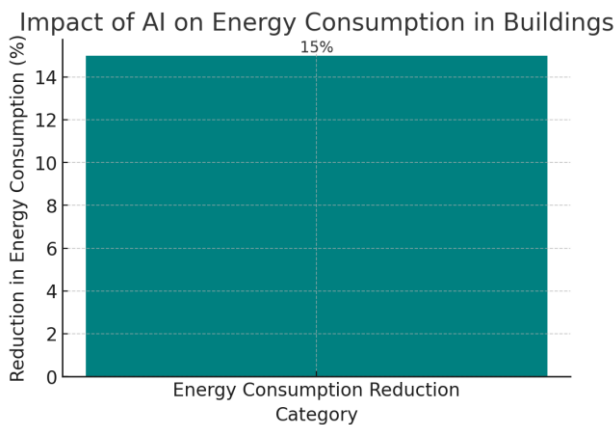
We are proposing new research questions to guide future investigations on AI's role in improving energy efficiency and effectiveness in transportation systems, among other areas.



RESULTS

The thesis explored AI's potential to reduce energy consumption in buildings, conducting a study in a large office building that involved sensor and actuator installations to collect data on energy usage. The data was used to train an AI algorithm for predicting energy consumption and optimizing the building's HVAC system operation. The study's conclusion revealed that the AI algorithm reduced energy consumption by 15%. This reduction was achieved by optimizing the HVAC system's operation to match the building's energy requirements, maintaining a comfortable indoor environment throughout the year.

This graph illustrates the significant 15% reduction in energy consumption achieved through the application of AI algorithms to optimize HVAC systems in a large office building, as demonstrated in the case study.



The study has several limitations. Firstly, it was conducted in a single office building, and the results may not directly apply to other types of buildings. Additionally, the study exclusively focused on the HVAC system's potential for energy savings, and AI may also reduce energy consumption in other areas, such as lighting and appliances. The study did not address the costs of implementing AI solutions and was conducted over a limited timeframe, so long-term effects still need to be explored.

DISCUSSION

The findings of this study offer significant practical and theoretical implications for the future of energy use in buildings. AI has the potential to be a powerful tool for reducing energy consumption and making buildings more sustainable. However, further research is necessary to understand AI's potential and limitations in this field fully. Future research should concentrate on the following areas:



Developing and testing AI algorithms for reducing energy consumption in various types of buildings. Evaluating the cost-effectiveness of AI-based energy efficiency solutions.

Addressing the ethical implications of using AI to reduce energy consumption. With continued research and development, AI holds the potential to play a significant role in reducing energy consumption in buildings and mitigating climate change.

Conclusion & Recommendations

In conclusion, this study explored the potential of artificial intelligence (AI) to reduce energy consumption in buildings. The study demonstrated that AI can significantly reduce energy consumption in buildings, with the potential for savings of up to 15%. While the study was conducted in a single office building, the findings likely apply to other building types. The study also highlighted the potential for AI to reduce energy consumption during peak demand periods.

Practical recommendations based on the study's findings include:

Optimizing the operation of a building's HVAC system: AI can learn occupancy patterns and environmental conditions in a building, adjusting the HVAC system to reduce energy consumption by up to 20%. Monitoring the energy usage of appliances and devices in a building: AI can identify devices using excessive energy and alert building occupants, potentially reducing energy consumption by up to 10%. Creating demand response programs to incentivize building occupants to reduce energy consumption during peak demand times, thereby alleviating strain on the power grid and avoiding power outages.

The theoretical implications of the study are also significant. The results suggest that AI can be a powerful tool for solving complex real-world problems, potentially positively impacting various industries and sectors. AI can also enhance the efficiency of energy systems, reducing energy consumption and increasing sustainability. The study points to the following potential AI applications: Developing innovative energy generation and distribution methods and creating more efficient energy storage solutions. Managing energy demand more effectively, reducing the need for new power plants, and making energy systems more sustainable.

The results supported the study's hypothesis that AI can reduce building energy consumption. However, there are limitations to the study, including the focus on a single building, the exclusive examination of the HVAC system, and the absence of a cost analysis. The study was also conducted over a relatively short period, leaving the long-term impact of AI on energy consumption unexplored. In the future, research should focus on developing and testing AI algorithms for energy reduction in various types of buildings, assessing the cost-effectiveness of AI-based energy efficiency solutions, and addressing the ethical implications of AI in energy conservation. With further research and development, AI can significantly reduce energy consumption in buildings and address climate change.

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PATHOPHYSIOLOGY OF DENTAL CARIES

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Key words: carious, lesion, mutans, streptococci, microbial activity, microorganisms.

Cariou lesion dynamics are predominantly dependent on the availability of fermentable sugars, other environmental conditions, bacteria, and host factors. Our current understanding of the microorganisms involved in the initiation and progression of caries is still rather incomplete. The most relevant acidogenic-aciduric bacterial species known to date are *Streptococcus mutans*, bifidobacteria, and lactobacilli. Whereas mutans streptococci are initiators, bifidobacteria and lactobacilli are more enhancers for progression. Boosters for microbial activity are specific environmental conditions, such as the presence of fermentable dietary sugars and the absence of oxygen. Based on these conditions, the necrotic and/or contaminated zone fulfills all criteria for disease progression and has to be removed. For those deep lesions where the pulp vitality is not affected, a selective removal of the contaminated leathery dentine should take place, as this approach lowers the risk of regrowth of the few embedded microbial cells here. In repelling the microbial attack and repairing damage, the host has developed several ingenious strategies. A major resistance to carious lesion progression is mounted by the dentine-pulp tissues. The signaling molecules and growth factors released upon dentine demineralization upregulate odontoblast activity and act as sensor cells. After carious stimulation, odontoblasts initiate an inflammatory reaction by producing chemokines and synthesizing a protective tertiary dentine. After the destruction of these cells, the pulp still has a high capacity to synthesize this tertiary dentine, thanks to the presence of adult stem cells within the pulp. Also, in addition to the systemic regulation, the pulp, which is located within the inextensible confines of the dentine walls, has a well-developed local regulation of its inflammation, regeneration, and vascularization. This local regulation is due to the activity of different pulp cell types, mainly the fibroblasts, which secrete soluble molecules that regulate all these processes.



PATHOPHYSIOLOGY OF ASTHMA

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Key words: asthma, IgE, pollution, disease, pathology, factors, heterogeneity.

Asthma is most likely transmitted by multiple genes, with some variation in locus heterogeneity and polygenic inheritance leading to asthma expression being multifaceted. Atopy or IgE antibodies attack specific antigens or pollutants, which can contribute to the disease. Research has shown that asthma is closely related to the total IgE serum level. Enhanced IgE responses to environmental factors such as house dust mites, animal allergens, mold, and farm animals have contributed to sensitizing asthma, exacerbating its symptoms and attributing to increased airway reactivity. The reason being that there is increased exposure to these allergens, but less data is available on the causality. Air pollution and the causation of asthma are also less clear; however, there is a relationship between smoking and the increased risk of asthma. Interestingly enough, obesity showed a positive linear relationship between asthma and increased BMI. More research needs to be done to get a clearer picture of the multifactorial disease.

The organ system affected by asthma is the lungs. The lungs consist of lobes and segments, with the right lung having ten segments and the left lung having eight or nine, depending on the division of the lobe. Anatomically, the respiratory system falls into two zones, characterized by the conducting zone and the respiratory zone. The conducting zone extends from the nose to the bronchioles, and the respiratory zone where gas exchange takes place is from the alveolar duct to the alveoli. Asthma is primarily involved in the bronchial tree, with its primary job being to distribute air throughout the lungs until reaching the alveolar sacs. The bronchi stem from the end of the trachea, which divides into the left and right bronchi. The right bronchus has a wider diameter and lies more vertically, while the left bronchus is smaller and more horizontal. The bronchi then divide into secondary and tertiary bronchi. The bronchi contain smooth muscle and elastic fibers to maintain their wall integrity, which change based on the contraction and relaxation of smooth muscle by inflammatory mediators, bronchoconstrictors, or bronchodilators. As one progresses further from the bronchi to the alveoli, there are much more smooth muscle fibers involved. In normal respiratory physiology, lung compliance is the willingness for the lungs to distend, while elastance is the ability of the lungs to return to their resting position. In patients with asthma, the physiologic mechanism changes due to inflammation, decreasing the radius of the airway. All of these mechanisms together change the compliance of the lungs slightly to increase the work of breathing.



КУЛЬТУРА РЕЧИ КАК ГЛАВНЫЙ ФАКТОР ВЫСШЕГО ПЕДАГОГИЧЕСКОГО ОБРАЗОВАНИЯ В МИРЕ ГЛОБАЛИЗАЦИИ

SPEECH CULTURE AS A MAIN FACTOR OF HIGHER PEDAGOGICAL EDUCATION IN THE GLOBALIZED WORLD

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РЕЗЮМЕ

Культурное развитие в период глобализации является завершающим этапом великой культурной революции. От культурного роста населения в огромной мере зависят производительных сил, повышение общественной активности, развитие демократических основ самоуправления. Большую роль в осуществлении задач дальнейшего подъема культуры широких народных масс, повышения уровня их знаний играет речь педагога. Не следует забывать, что педагог несет в систему образования не только передовые научные знания, но и высокую культуру языка.

Культура языка - это в конечном счете культура мысли. Чтобы хорошо писать или говорить, надо прежде всего правильно думать. Как говорил Н.Г.Чернышевский: «Что неясно представляешь, то неясно и выскажешь; неточность и запутанность выражений свидетельствует только о запутанности мыслей». Небрежность языка обуславливается нечеткостью мышления.

Язык, служащий важнейшим средством человеческого общения, вместе с тем является мощным орудием культуры, важнейшим фактором духовного развития нации. Что следует понимать под культурой речи? Как соблюдается это в образовательной системе?

Культурной мы должны считать ту речь, которая отличается национальной самобытностью, смысловой точностью, богатством и разносторонностью словаря, грамматической правильностью, логической стройностью, художественной изобразительностью. Культурная речь в своей устной форме должна отвечать существующим в настоящее время нормам орфоэпии (правильного произношения), в своей письменной форме – нормам орфографии и пунктуации. Вопросы эти представляют известную сложность и требуют пристального внимания к себе со стороны каждого образованного человека.

Ключевые слова: речь, культура, язык, устная форма, глобализация.

ABSTRACT

Cultural development is the final stage of the great cultural revolution during the period of globalization. The productive forces, increased social activity, and the development of the democratic foundations of self-government greatly depend on the cultural growth of the population. The teacher's speech plays a major role in the implementation of the tasks of further raising the culture of the broad masses and increasing the level of their knowledge. It should not be forgotten that the teacher brings to the education system not only the advanced scientific knowledge, but also a high culture of the language.

The culture of language is ultimately the culture of thought. In order to write or speak well, the one firstly has to have to think correctly. As N.G.Chernyshevsky said: "If you imagine unclearly, you will express unclearly; inaccuracy and confusion of expressions leads to the confusion of thoughts." Sloppy language is caused by unclear thinking.



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Language, which serves as the most important means of human communication, is at the same time a powerful instrument of culture, the most important factor in the spiritual development of a nation. What should be understood by speech culture? How is it observed in the educational system?

We should consider cultural speech to be that which is distinguished by national originality, semantic accuracy, richness and versatility of vocabulary, grammatical correctness, logical coherence, and artistic depiction. Cultural speech in its oral form must meet the currently existing norms of orthoepy (correct pronunciation), and in its written form - the norms of spelling and punctuation. These questions are of a certain complexity and require close attention from every educated person.

Keywords: speech, culture, language, oral form, globalization.



REVISITING GEORGI LOZANOV'S UNDERSTANDING OF EDUCATION

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ABSTRACT

From the ancient times to the present day, diverse perspectives have consistently influenced arguments regarding human potential, and inquiries about the essence of human abilities and of individual growth, and the elements impacting them have been posed throughout the ages. One of the most significant work in the field of human potential belongs to Georgi Lozanov, a Bulgarian psychiatrist, neuroscientist and educator, who is widely known for his seminal work in the field of education. The fundamental tenet of his philosophy, encapsulated in Suggestopedia, asserts that all individuals are born with intellectual potential, and their abilities are derived from social and environmental influences. Lozanov posits that potential capacities can be unlocked in everyone, given appropriate methods which are compatible with the functioning of the human brain and with the integrity of the individual, and conducive learning environment. At the foundation of Lozanov's educational philosophy lies the impact of suggestions, which he considers as signals coming from the environment, on neural processes. Lozanov questions established educational paradigms by highlighting the importance of not only cognitive, but also emotional and psychological elements in human learning, to foster more effective and humane learning experiences. He also dismisses the idea of a rigid separation between the mind and the body, arguing that effective learning occurs when individuals are in a relaxed and positive state of mind as it is more receptive to new information and contributes to a better memory retention. This perspective challenges, in Lozanov's words ill-places, that is stress-inducing learning settings of traditional education. Lozanov invites educators to reevaluate traditional teaching systems, emphasizing the significance of an environment that fosters not only knowledge but a lifelong passion for learning, underlining that education should nurture individuals as a whole and addressing them in all their complex dimensions.

Anahtar Kelimeler: Georgi Lozanov, Education, Suggestopedia, Brain.



EXPERIMENTAL INVESTIGATION OF BIODIESEL/TOLUENE BLENDS CHANGE ON ENGINE PERFORMANCE IN A DIESEL ENGINE

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ABSTRACT

Diesel engines use a variety of fuels other than diesel. The most important of them are biofuels, such as biodiesel. Biodiesel improves combustion in compression ignition engines (diesel engines) due to its high oxygen content. In addition, since biodiesels are renewable fuels, they have the potential to create an alternative to fossil fuels with limited resources. Despite all its advantages, biodiesel has some challenges to overcome, such as high viscosity and lower heating value. In the presented study, toluene was used to solve this disadvantage of biodiesel. Toluene is a fuel with low viscosity and high lower heating value. In the present study, B50 (50% diesel and 50% biodiesel) and toluene were blended volumetrically and used in a diesel engine. The experiments were carried out on a single-cylinder air-cooled diesel engine. The experimental engine was operated at 50% constant load and 2400 rpm. The toluene used in the study was blended with biodiesel at 10% volumetrically. The data from the tests were analysed for engine performance. According to these findings, it was determined that the IMEP value, which is an important parameter for the change in engine performance, decreased in the use of B50 compared to diesel, but increased with the addition of toluene and reached the diesel level. It has been evaluated that this information obtained will contribute to the development of renewable fuels and the use of biodiesel in diesel engines without a decrease in engine performance with the addition of toluene in high ratio biodiesel studies.

Keywords: Diesel, biodiesel, toluene, renewable energy, alternative fuel.



EXPLORING 20TH CENTURY ANGLOPHONE ARAB FICTION: NARRATIVES, THEMES, AND CULTURAL SIGNIFICANCE

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ABSTRACT

This paper explores 20th-century Anglophone Arab fiction, focusing on its rich narratives, themes, and cultural significance. It examines the works of Arab authors who chose English as their medium of expression, examining their unique perspectives and the intersections of language, identity, and cultural heritage. The paper explores the evolution of Anglophone Arab fiction, highlighting themes like diaspora, identity, and cultural hybridity. It also examines the impact of historical events and socio-political contexts on the genre's development, providing insights into how authors tackle complex issues and engage with a global readership. The paper encourages reflection on the significance of 20th-century Anglophone Arab fiction in shaping cross-cultural dialogues and fostering appreciation for diverse narratives from the Arab world.

Keyword: Anglophone, Arab-Fiction, Diaspora, Identity



LA VIOLENCIA DE GÉNERO

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RESUMEN

En el presente trabajo, es un estudio descriptivo, transversal, cualitativo observacional, en el cual se atiende el tema de las alertas de género, como una problemática en México. El objetivo de este trabajo es analizar la problemática del reconocimiento del estado de las alertas de la violencia de género como tal tipificándola como delitos simples. Las violencias de género y su afectación son evidente en la actualidad. En este estudio se abarcan los motivos y consecuencias que originan la violencia, el género es un ordenador de la cultura; La ONU mujeres define a la violencia de género como los actos dañinos contra una persona o grupo de personas debido a su género, de igual manera es un ordenador primario de la cultura, y ocurre en todas las sociedades conocidas. Del mismo modo con la alerta se pretende erradicar la violencia que actualmente hay en nuestro país, de los 32 estados que componen la república, Quintana Roo, Morelos, Baja California, Puebla, son los que más alertas han emitido durante el 2023, estas alertas son declaradas por el gobierno federal a través de la Secretaría de Gobernación.

Palabras clave: Violencia, alerta, género.



EL ACTO PASIVO DEL SERVIDOR PÚBLICO, IDENTIDAD EN LAS POLÍTICAS DE ANTICORRUPCIÓN, GENERALIDADES TEÓRICAS PRÁCTICAS

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Palabras clave: Corrupción, Acto pasivo del servidor público, Políticas de anticorrupción, Investigación y sanción.

El acto pasivo del servidor público, en el contexto de la corrupción, se refiere a la aceptación de sobornos, favores o cualquier otro beneficio indebido a cambio de realizar o dejar de realizar una acción relacionada con sus funciones. Este comportamiento merma la integridad de las instituciones y debilita la confianza ciudadana.

La identidad de las políticas de anticorrupción se centra en la creación de sistemas y marcos legales que promueven la transparencia, la rendición de cuentas y la integridad de los servidores públicos. Lo que estas políticas buscan es establecer un ambiente donde la corrupción no solo sea difícil de cometer, como también sea percibida como inaceptable y castigada consistentemente.

En términos de generalidades teóricas y prácticas, la lucha contra la corrupción implica con amplitud de las causas y consecuencias de la corrupción, así como el desarrollo de estrategias efectivas para prevenirla y combatirla. Esto incluye la adopción de leyes y regulaciones, la creación de organismos especializados en la lucha contra la corrupción y la promoción de una cultura de legalidad y ética pública.

En el caso de México, se ha observado un esfuerzo por fortalecer las políticas de anticorrupción a través del Sistema Nacional Anticorrupción y la implementación de leyes, como la Ley del Sistema Anticorrupción del Estado de Tabasco¹. No obstante, la percepción de corrupción sigue siendo alta en ciertas instituciones, lo que indica que aún hay desafíos significativos por superar.

La experiencia internacional muestra ejemplos de éxito en países como Finlandia, Singapur y Suecia, donde se han implementado leyes estrictas, mecanismos de control y códigos de conducta que han resultado en niveles bajos de corrupción y altos niveles de transparencia. Estos modelos pueden servir de referencia para otros países en la implementación de sus propias políticas de anticorrupción.

En México, la Encuesta Nacional de Calidad e Impacto Gubernamental (ENCIG)² ha revelado la persistencia de prácticas corruptas en diversas instituciones, las medidas que ha tomado a la propuesta de diez para combatir la corrupción, incluyendo la creación de una fiscalía autónoma con plena capacidad de investigación y sanción.

Igualmente, se ha identificado la existencia de redes de nepotismo dentro del Poder Judicial, por lo que complica aún más la lucha contra la corrupción. La eficacia del sistema anticorrupción también depende de la colaboración entre ciudadanos, el sector público y el privado, y requiere de un número ilimitado de acciones coordinadas por el Estado.

Lo que se procura con la reforma constitucional en materia de anticorrupción en México es establecer una fiscalía con autonomía y recursos propios, capaz de investigar y sancionar la corrupción de manera efectiva.

¹ <https://congresotabasco.gob.mx/wp/wp-content/uploads/2019/03/Ley-del-Sistema-Anticorrupcion-del-Estado-de-Tabasco.pdf>

² <https://www.inegi.org.mx/programas/encig/2021/>



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En Suecia, el Código Penal criminaliza la mayoría de las formas de corrupción, y se han implementado códigos de conducta como el Código de Regalos, Recompensas y otros Beneficios en los Negocios para ayudar a identificar y prevenir los actos de corrupción.

Por otra parte Finlandia, ha logrado éxito en la lucha contra la corrupción a través de una auditoría estricta del gasto estatal y regulaciones sobre el financiamiento de partidos políticos, entre otras medidas.

En resumen, la lucha contra la corrupción requiere de un enfoque multidimensional que incluya la implementación de leyes y regulaciones, la creación de organismos especializados y la promoción de una cultura de legalidad y ética pública. La experiencia internacional ofrece valiosos ejemplos de cómo abordar este problema, y los esfuerzos en México muestran un compromiso con la mejora continua en este ámbito.



LA FIGURA DEL NOTARIO PUBLICO COMO DOCENTE: RETOS Y DESAFÍOS

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Este artículo tiene el objetivo de realizar un análisis descriptivo de los retos y desafíos que enfrenta cada día un notario público como docente en el aula de clase ya que por su nivel se le demandan tener una alta preparación disciplinar ya que por lo mismo se ve comprometidos a ser el doble de exigentes por su figura, ya que como sabemos la actividad notarial conlleva responsabilidad, conciencia social y de servicio por las facultades de certificación y autenticación, de los actos de los que da fe; en el cual, a partir de sus principios y características de la misma, el notario cambia los procesos y formas de enseñanza de los programas educativo profesional de las materias que imparte, para así estar en una constante actualización de los procesos educativos tanto a nivel pedagógico como de su rama misma. Para no caer en las prácticas docentes antiguas y en las problemáticas de las características respectivas de utilizar el paradigma tradicional educativo que aún se utiliza para impartir asignaturas, Por lo cual eso implica la necesidad de requerimiento a la hora de abordar un nuevo modelo educativo enfocado a la construcción, creación y proyección de la aplicación de un propio sistema de aprendizaje, pues la evolución del contenido temático debe ir acompañada de una estructura educativa enfocada a una mayor adquisición que permita de un nuevo modelo de aprendizaje mas significativo para el estudiante ya que ellos depende de los conocimientos divulgados para su optima formación del derecho.

Palabras clave: Notario, aprendizaje, enseñanza



TRANSPARENCIA DE LOS ESTADOS FINANCIEROS DICTAMINADOS EN LOS ORGANISMOS PÚBLICOS DESCENTRALIZADOS DE SALUD EN MÉXICO: ANÁLISIS DEL CUMPLIMIENTO NORMATIVO

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RESUMEN

Esta investigación analizó la transparencia y el cumplimiento normativo del dictamen de los estados financieros en los Organismos Públicos Descentralizados (OPD) responsables de la Salud en los 32 Entidades Federativas en México durante el periodo 2015 a 2021. Se empleó una metodología de revisión exhaustiva a través de la consulta en los portales de transparencia a nivel nacional y/o del portal estatal de transparencia. Los hallazgos indican que solo 34.3% de las entidades publicaron al menos un dictamen durante este período. De las 224 posibles publicaciones correspondientes a las 32 entidades en los ejercicios fiscales 2015 a 2021, solo 46 (20.5%) cumplían con la publicación de dictámenes. Se encontró que la mitad de estos dictámenes tenían salvedades, mientras que solamente el 32.6% no presentaban salvedades. La variabilidad en los resultados sugiere la necesidad de establecer un marco normativo más uniforme para mejorar la transparencia y el cumplimiento normativo en los OPD de Salud en México.

Palabras clave: Auditoría, política pública, sistema de salud, transparencia, estados financieros

JEL: M42, H00, I18, D73, G34



TRANSPARENCIA DE LOS ESTADOS FINANCIEROS DICTAMINADOS EN LOS ORGANISMOS PÚBLICOS DESCENTRALIZADOS DE SALUD EN MÉXICO: ANÁLISIS DEL CUMPLIMIENTO NORMATIVO

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Palabras clave: Auditoría, política pública, sistema de salud, transparencia, estados financieros

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DETERMINATION OF MAJOR PROTEINS IN ROYAL JELLY PRODUCED FROM AEGEAN ECOTYPE COLONIES OF ANATOLIAN BEE AND CAUCACIAN CROSSBREED

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ABSTRACT

In this study, the effect of honey bee genotypes on 10-HDA and total protein in royal jelly and the molecular weights of major royal jelly proteins in royal jelly obtained from these genotypes were determined. This study was carried out in ADU, Faculty of Agriculture, Bee and Silkworm Application and Research Unit between the years 2020-2021. In the research, Caucasian (C) and Anatolian Bee Aegean Ecotype (AE) queens were bred in 2020. The reared queen bees were left to mate naturally. After the queens started to lay eggs, they were imposed on the colonies. The colonies formed were overwintered by care and feeding in summer and autumn. Strong populations were obtained from early spring after wintering until the date of production of royal jelly. Two days before the production of royal jelly (RJ), the queens of the colonies were taken to the restriction cage and the colonies were arranged on the day of grafting. Forty (40) larvae were transferred to each colony and RJ was harvested after 72 hours. 10-HDA and total protein ratios (TP) were determined in RJ. In addition, the molecular weights of major royal jelly proteins (MRJPs) were determined in the RJ obtained from both genotypes. TP in AE and C colonies were respectively; $13,4\pm 0,62\%$ and $12,8\pm 0,66\%$. Also, 10-HDA was determined as $2,47\pm 0,16\%$ and $2,34\pm 0,18\%$. Caucasian and AE molecular weights are respectively; MRJP1, 46.8 kDa and 47.5 kDa; MRJP2, 68.2 kDa and 68.8 kDa; MRJP3, 83.2 kDa and 83.9 kDa; MRJP4 was detected as 61.6 kDa and 62.2 kDa, and MRJP5 was detected as 107.2 kDa and 105 kDa. Genotype groups were found to be similar to each other in terms of 10-HDA, TP contents and MRJP molecular weights in RJ produced in queen bee colonies. The TP ratios of RJ varied significantly according to the harvest periods. MRJP1, one of the most abundant immune proteins in RJ, can be used as an indicator of the freshness and authenticity of RJ by determining its amount with simple methods to be developed in the future.

Key Words: Honey bee, 10-HDA, total protein, MRJPs

INTRODUCTION

Beekeeping is one of the agricultural activities carried out in many countries. While it contributes with valuable products such as honey, royal jelly, pollen and propolis, it is also important with its contribution to pollination. Today, 70% of flowering plants in the world are pollinated by bees, and more than 80% of this pollination is done by honey bees (Delaplane and Mayer, 2000).

In recent years, interest in functional foods and their ingredients has been increasing (Nagai et al., 2001; Chandrasekara and Shahidi, 2011). Some bee products are also among functional foods. These are honey, royal jelly (RJ), pollen and propolis (Ramadana and Al-Ghamdi, 2012, Ramanathan et al., 2018).

RJ is secreted from the lateral pharyngeal and maxillary glands of young worker bees at the age of 5-15 days. It is used throughout the life of the queen bee in the colony and for feeding the young larval period of worker and drone bees. RJ one of the important products of the honey bee colony, is the most important reason for the transformation of young worker bee larvae into queen bee larvae. In short, food is what determines caste. Royal jelly has a cream-colored, sticky structure and a sour taste. Its



composition varies depending on the age and nutrition of the bees, the season and the age of the larva. In the structure of RJ, which dissolves in water and has a 60-70% water, 12-15% protein, 3-8% fatty acids and lipids, 7-18% carbohydrates, 0,8-3% ash, small amounts of group B complex, vitamins C and E, copper, zinc, iron it contains minerals such as calcium, manganese, potassium and sodium (Karaali vd., 1988; Boselli vd., 2003; Presoto vd., 2004; Sabatini vd., 2009; Isidorov vd., 2012).

Proteins, which are between 12-18% in RJ, constitute approximately 50% of the dry matter of RJ. The major royal jelly proteins (MRJPs), which constitute 82-90% of the total amount of proteins in RJ (Schmitzova et al., 1998; Simuth, 2001; Drapeau et al., 2006; Santos et al., 2005; Shinkhede and Tembhare, 2009; Mureşan and Buttstedt, 2019). It has been reported that the MRJP family consists of a total of 10 members (Drapeau et al., 2006; Helbing et al., 2017; Mureşan and Buttstedt, 2019). It has been reported that the MRJP family is rich in essential amino acids (such as histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan and valine) and resembles ovalbumin and casein (Santos et al., 2005; Tamura et al., 2009).

In this study, the effects of different genotypes on 10-HDA (10-hydroxy decanoic acid) and total protein in RJ were determined, and the molecular weights of MRJPs in RJ obtained from different genotypes were determined.

MATERIALS AND METHODS

This study was conducted at Aydın Adnan Menderes University Faculty of Agriculture “Bee and Silkworm Research and Application Unit”. In the study, Caucasian (6 colonies) and Anatolian bee Aegean Ecotype colonies (6 colonies) were used for RJ production. Colonies (totally 12 colonies), the queen bee was confined to a special cage with two frames. The day before grafting, a total of 400 beeswax queen cells were attached to the grafting staves with wax. The grafting room was adjusted to 25-30°C and 60-65% humidity just before grafting. Larvae aged 1 day were transferred to queen cells made of beeswax. Forty (40) larvae were transferred to each trial colony and the queen cells were collected 72 hours after larvae transfer. In total, RJ was harvested from the each colony 6 times.

The determination of 10-HDA in RJ was made by HPLC method according to the Turkish Standards Institute (according to TS 6666 / December 2000). The amounts of 10-HDA in the samples were calculated according to the standard peak. Total protein analyzes were performed according to the Bradford method (Bradford, 1976). Protein amounts of the samples were determined using the equation obtained from the protein standard curve.

Statistical Analysis

SAS and Minitab package programs was used in the statistical analysis of the data, and the comparison of subgroups was made according to Duncan ($P < 0,05$).

RESULT AND DISCUSSION

According to the results of variance analysis, the effects of harvest period RJ on TP ratio were significant ($P < 0,05$), while the effects of genotype and genotype*harvest period interaction on TP were found to be insignificant. Total protein ratios (%) of genotypes according to harvest periods are given in Table 1.

Table 1. Total protein ratios of genotypes according to harvest periods (%)

Genotypes	Harvest periods						General
	1.	2.	3.	4.	5.	6.	
AE	13,5±1,42	11,9±1,59	13,8±1,42	13,8±1,42	17,4±1,59	9,8±1,59	13,4±0,62
C	14,1±1,42	12,4±1,59	11,1±1,59	12,7±1,59	17,0±1,59	9,7±1,84	12,8±0,66
General	13,8±1,00 ^{ab}	12,2±1,13 ^{ab}	12,4±1,07 ^{ab}	13,3±1,07 ^{ab}	17,2±1,13 ^b	9,8±1,22 ^a	



P<0.05 a,b; Different letters indicate different groups.

In this study, while genotypes were similar to each other in terms of TP rates, TP rates in RJ differed in terms of harvest periods. Also we found that TP rates between 9,8% and 17,2% on average depending on the harvest periods. The TP rates are generally determined compatible with the literature (Liu vd., 2008; Zheng vd., 2011; Ramadan ve Al Ghamdi, 2012; Wytrychowski vd., 2013; Yavuz and Gürel, 2017; Kamyab vd., 2020; Uçak Koç vd., 2022; 2023). Although RJ contains at most 14,5% protein according to TSE standards, various studies have reported that the protein rate in RJ is between 9-18% (Schmitzova et al., 1998; Santos et al., 2005; Drapeau et al., 2006; Shinkhede and Tembhare, 2009, Karacaoğlu et al., 2019).

10-HDA ratios (%) of genotypes according to harvest periods are given in Table 2. According to the results of variance analysis, the effects of genotype, harvest period and genotype*harvest period interaction on RJ 10-HDA rates were found to be insignificant.

Table 2. 10-HDA ratios of genotypes according to harvest periods (%)

Harvest periods							
Genotypes	1.	2.	3.	4.	5.	6.	Genel
AE	2,49±0,16	2,66±0,18	2,20±0,16	2,43±0,16	2,41±0,18	2,64±0,21	2,47±0,16
C	2,75±0,16	2,60±0,18	2,36±0,18	2,01±0,18	2,13±0,18	2,22±0,21	2,34±0,18
Genel	2,62±0,16	2,63±0,18	2,28±0,18	2,22±0,18	2,27±0,16	2,43±0,19	

We determined 10-HDA values between 2,2-2,6 % on average depending on the harvest periods. In terms of genotypes AE and C are similar to each other. Studies on the effect of applications on RJ content in RJ production colonies are limited. In these limited studies, it was determined that factors such as larva age, harvest time and number of queen cells affected RJ content. 10-HDA is used as a parameter of RJ quality. According to the food standard the 10 HDA ratio in RJ is required to be at least 1,4%.

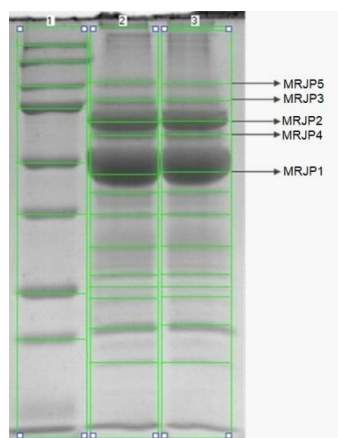
The molecular weights of MRJPs in royal jelly produced from C and AE genotypes are given in Table 3, and the protein bands are given in Figure 1. It was observed that the molecular weights of royal jelly produced from both genotypes were similar.

Table 3. Molecular weights of genotypes

	Genotypes	
	Caucasian	Aegean Ecotype
MRJP1	46,8 kDa	47,5 kDa
MRJP2	68,2 kDa	68,8 kDa
MRJP3	83,2 kDa	83,9 kDa
MRJP4	61,6 kDa	62,2 kDa
MRJP5	107,2 kDa	105 kDa



Figure 1. SDS-PAGE images of MRJPs



Studies have found high variation in the molecular weights of MRJPs. Practices in RJ production and other environmental and genetic factors have shown that the amount of protein varies (Imjongjirak et al., 2005; Tamura et al., 2009). Although the first studies on the MRJP family started in the 90s, studies on this subject have increased with some technologically advanced techniques in recent years, information about the MRJP family is insufficient. This subject will be revealed with the contribution of many different branches of science in order to reveal the information to be discovered about the MRJP family with new technology-based techniques.

CONCLUSION

Total protein contents changed significantly according to harvest periods, while the highest TP value was obtained in the 5th harvest, TP values decreased significantly in the 6th harvest.

Harvest periods and genotypes are similar in terms of 10-HDA. MRJP had similar values in terms of molecular weights across genotypes. MRJP family, also called immune proteins and 10-HDA fatty acid are the functional compounds of royal jelly. Today, the indicator of the freshness and authenticity of royal jelly is the 10-HDA value according to the standard. We predict that MRJP1, which is most abundant in royal jelly, may be a second quality criterion to determine the purity of royal jelly.

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DIAGNOSTIC PERFORMANCE OF INCREASED β -ARRESTIN 2 LEVEL IN PATIENTS WITH SCHIZOPHRENIA

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ABSTRACT

Schizophrenia is typically diagnosed through interviews with patients and their relatives. Thus, molecular biomarkers for this mental illness have recently become a hot topic for research. β -arrestin 2, is an intracellular protein that in humans is encoded by the *ARRB2* gene. Although the role of β -arrestin 2 at signal pathways has been investigated in schizophrenia-like behaviour in mice, there are no studies on the diagnostic performance of β -arrestin in schizophrenia patients. The goal of the present study is to examine the serum levels of β -arrestin 2 and to determine the diagnostic performance of β -arrestin 2 in patients with schizophrenia. Sixty-five patients with schizophrenia and 50 healthy gender- and age-matched controls were included in our study. Symptom severity in the patient group was rated using the Positive and Negative Syndrome Scale (PANSS). The bloods were taken from patients and control groups, and β -arrestin 2 levels in serum samples were measured by ELISA. The serum levels of β -arrestin 2 were found to be significantly increased in patients with schizophrenia compared to the controls ($p < 0.05$). A receiver operating characteristic curve showed a cut-off point of 77.83 pg/ml for the β -arrestin 2. There was significant positive correlation found between β -arrestin 2 level and PANSS scores or the chlorpromazine equivalent and clinical characteristics ($p > 0.05$). The results indicated that β -arrestin 2 may be considered a very good diagnostic marker, and further studies should be done to test its validity in patients with schizophrenia.

Key words: Schizophrenia, β -arrestin 2, Diagnostic Value

Introduction

Schizophrenia is one of the most important health problems worldwide. Positive symptoms such as delusions and hallucinations are seen in 1% of the population in schizophrenia; negative symptoms such as shallowness of affect, social withdrawal, decreased amount of speech, and impoverishment of thought content; with cognitive symptoms such as impairment in attention, memory, and executive functions; affecting emotion, thought, perception and behavior; It is a psychiatric disease that can occur with different clinical presentations (1). Many hypotheses aiming to elucidate the pathophysiology of schizophrenia have been proposed, but its etiology is still unknown. The diagnosis of schizophrenia is usually made through interviews with patients and their relatives. Therefore, biomarkers have become a hot topic of research recently for this mental illness.

Nowadays, Akt-GSK-3 and β -arrestin signaling pathways have become the subject of intense interest in psychiatric diseases. Although there are many studies on the relationship of β -arrestins in gene expression in various tissues and cellular signaling in psychiatric diseases such as anxiety, depression, and schizophrenia, the physiological events that β -arrestin proteins regulate within the cell have not been adequately elucidated (2-10). Arrestins are versatile proteins involved in the regulation of multiple signaling cascades. β -arrestins (β -arrestin 1 and 2) are adapter proteins that regulate the signaling and intracellular traffic of G protein-coupled receptors (GPCR) and provide receptor inactivation by

disrupting GPCR/G protein binding. β -arrestins mediate GPCR endocytosis by interacting with structures involved in endocytosis. In addition, β -arrestins control the activity of many intracellular enzymes by binding to signaling molecules (11-12).

There are many studies on signaling pathways in schizophrenia and the expression of genes involved in the pathways. However, there are no studies on measuring β -arrestin 2 levels (in vitro) in the serum of chronic schizophrenia patients. Therefore, our study aimed to investigate the serum levels of β -arrestin-2 and determine the diagnostic performance of β -arrestin 2 for schizophrenia patients.

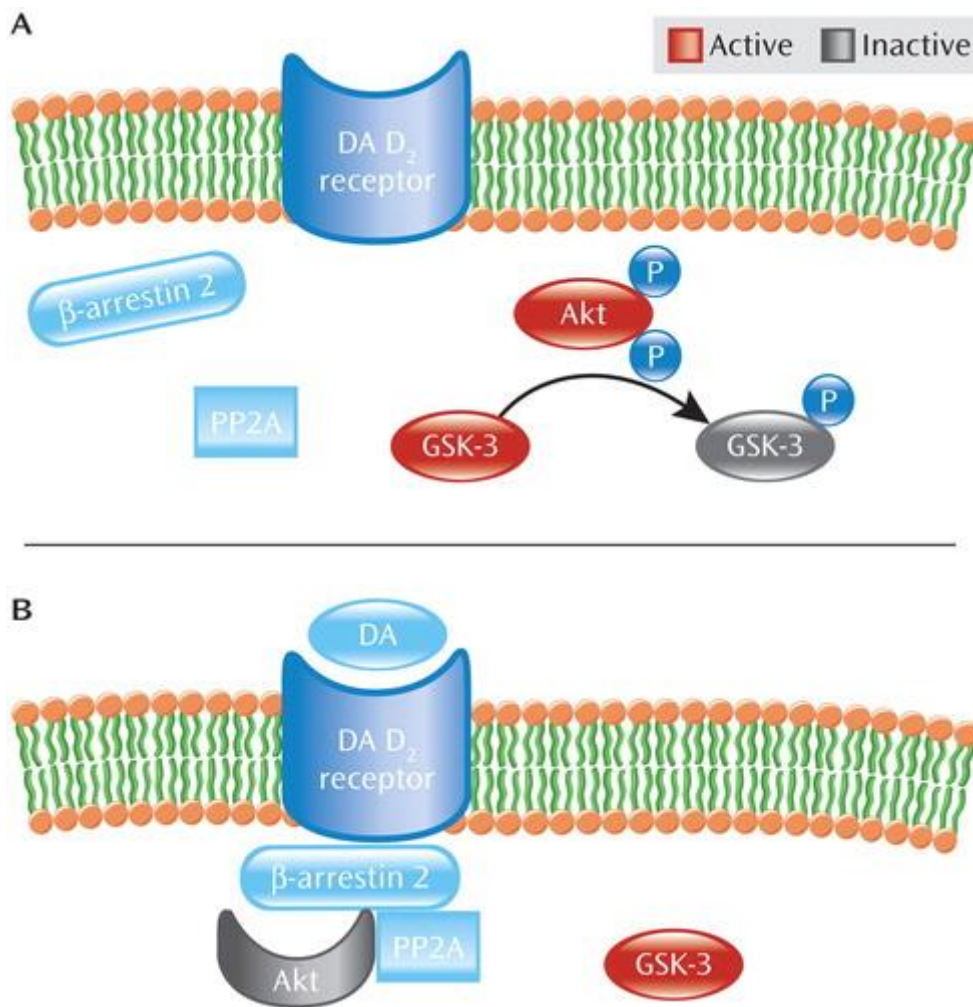


Figure 1. Regulation of GSK-3 activity in schizophrenia by the β -arrestin2-Akt-PP2A complex: role of D2 receptors. (DA: Dopamine, GSK-3: glycogen synthase kinase 3, PP2A: protein phosphatase 2A, P: phosphorus)

Materials and Methods

This study is a cross-sectional study. A total of 115 participants, 65 patients with chronic schizophrenia and 50 healthy individuals, were included in our study. Patients with schizophrenia who were followed up in the psychiatry outpatient clinic of Kahramanmaraş Sutcu Imam University Hospital were included in the patient group. To confirm the diagnosis of this group, a Structured Clinical Interview (SCID) according to DSM-5 was performed by an experienced psychiatrist. The patients were not hospitalized and had been using stable antipsychotic medication for at least the last six months. Patients were clinically stable at enrollment. The control group consisted of 50 healthcare personnel and their relatives. The people in the control group had no history of psychiatric disease and were matched with the patient group in terms of age, gender and body mass index (BMI). To exclude psychiatric disorders in the



control group, healthy participants were also evaluated with SCID according to DSM-5. Inclusion criteria for patients were: (1) absence of neuroinflammatory, neurodegenerative disease, and major medical illness (including multiple sclerosis, Parkinson's disease, stroke, chronic obstructive pulmonary disease, inflammatory bowel disease, rheumatoid arthritis, chronic obstructive pulmonary disease, diabetes, allergies, and infections); (2) not be mentally retarded; (3) free from anti-inflammatory, immunosuppressive, and antioxidant drug use; (4) elevated CRP (> 5 mg/L and absence of signs of acute inflammation such as leukocytosis ($> 10,000$ μ L)); (5) absence of substance use disorders (including alcohol) and regular nicotine use; (6) absence of comorbid psychiatric disorders (7) For clinical stability, a score of four or less was required for each of the items on the Positive and Negative Syndrome Scale (PANSS) scale. Inclusion criteria for the control group included the first five criteria outlined above, in addition to having no current or lifetime diagnosis of psychiatric illness according to DSM-5 diagnostic criteria. Written informed consent was obtained from controls and patients before participating in the study. This study was approved by the Ethics Committee of Kahramanmaraş Sutcu Imam University Faculty of Medicine. The Declaration of Helsinki was complied with during the conduct of the research.

Measurements

Clinical and sociodemographic variables were recorded. PANSS28 scale was applied to the patient group by an experienced psychiatrist to evaluate the severity of symptoms. In this context, items on the PANSS scale had to score four or less in terms of clinical stability.

Biochemical Analysis

Venous blood samples were taken from all participants between 08.30 and 10.30 in the morning after an overnight fast. Samples were immediately transferred to the biochemistry laboratory and centrifuged at 4000 g for 10 min. Serum samples separated after centrifugation were stored at -70 °C until biochemical analysis. Measurement of serum levels of β -arrestin 2 was performed by a quantitative sandwich enzyme immunoassay technique (ELISA) using a commercial kit (MyBioSource Company, USA).

Statistical analyzes

The Mann-Whitney U test was used to determine potential differences in serum beta arrestin 2 levels (ng/mL) between the schizophrenia and control groups. Data are expressed as mean \pm standard deviation (SD). Independent samples t-test was used to compare normally distributed variables. Chi-square test was used to compare groups. Spearman correlation test was used for the relationship between variables. A receiver operating characteristic (ROC) curve was plotted to evaluate the diagnostic performance of β -arrestin 2 in patients with schizophrenia.

Results

There was no difference in age, gender, BMI, education period and marital status between the 65 patients and 50 control groups participating in the study ($p>0.05$). The sociodemographic characteristics of both groups and the symptom severity of the patients are shown in Table 1.



Table 1. Sociodemographic characteristics of schizophrenia patients and healthy controls

Characteristics (mean±SD)	Patients (n=65)	Control (50)	P value
Age (years)	35.11±3.99	35.67±4.10	0.17
Gender, Male/Female	34/31	26/24	0.14
Marital Status	32/33	23/27	0.24
Education Duration	10.02±1.85	10.17±1.24	0.19
Body Mass Index (kg/m ²)	24.71±1.45	24.73±1.67	0.07
Disease Duration	11.67±4.95		
Disease Onset Age	25.78±7.36		
Hospital Stay Duration	3.96±1.52		
Daily Antipsychodosis	701.3±274.3		
PANSS Positive	17.01±3.67		
PANSS Negative	18.48±3.92		
PANSS General	29.99±3.96		
PANSS Total	68.41±8.45		

Median, minimum and maximum values of serum β -arrestin 2 levels in schizophrenia patients and control groups were given in Table 2. β -arrestin 2 levels increased approximately 2-fold compared to control ($p < 0.05$). In Table 3, There was no significant difference found between β -arrestin 2 levels in male and female of patients with schizophrenia compared to control group ($p > 0.05$).

Table 2. The results of β -arrestin 2 levels in patient and healthy control groups

		Patient Group (n=65)	Control Group (n=50)	P value
β -arrestin 2 (pg/ml)	Median	136.98	60.82	<0,001
	(Q1-Q3)	(120.04-153.92)	(46.77-74.87)	

Table 3. The results of β -arrestin 2 levels in patients with schizophrenia according to gender,,

		Female (n=31)	Male (n=34)	P value
β -arrestin 2 (pg/ml)	Median	135.70	138.02	>0.05
	(Q1-Q3)	(121.22-155.33)	(116.27-143.85)	



Table 4, diagnostic performance results for β -arrestin 2 levels are given in the ROC analysis. Sensitivity, specificity and AUC values of β -arrestin 2 were determined as 0.99, 0.98 and 0.964, respectively. The cut-off point was detected as 77.84 pg/mL.

Table 4. Diagnostic values of the ROC curve of β -arrestin 2 levels between schizophrenia patients and the control group

Risk Factor AUC 95%	<i>P</i>	Cut off	Sensitivity (%)	Specificity (%)
0.964 (0.923-1.0)	<0.001	77.83	99.5	98.5

We found a statistically significant positive correlation between serum β -arrestin 2 levels and PANSS positive, general psychopathology and total scores ($p < 0.001$)

Discussion

In the present study, the relationship between β -arrestin 2 and chronic stable schizophrenia patients in outpatient patient with schizophrenia in Türkiye was evaluated. We report three main findings based on the study results. The first of these is that serum β -arrestin 2 levels are increased in the patient group compared to healthy individuals. Second, we found that the β -arrestin 2 parameter has very good diagnostic performance in patients with schizophrenia. Third, we found statistically significant positive correlations between β -arrestin 2 levels and the severity of patients' symptoms.

Recent advances in understanding psychiatric pathophysiological processes have revealed an important role for β -arrestins, which are important regulators of G-protein-coupled receptor (GPCR) function, including desensitization and internalization (13–14). Changes in the levels of β -arrestin proteins can disrupt the signaling in cells or change the direction of functioning of a pathway, causing the disease to progress or pause in its progression. Up to now, there has no studied on measures β -arrestin-2 levels in vitro in the serum of schizophrenia patients. Therefore, we could not compare our results. The increased β -arrestin-2 levels observed in schizophrenia patients in our study may be associated with significantly impaired prognosis in schizophrenia patients. Moreover, this finding may reveal the potential therapeutic role of β -arrestin-2.

In a conclusion, in our study, we found that serum β -arrestin-2 levels in patients with chronic schizophrenia increased compared to healthy controls. Furthermore, the results indicated that β -arrestin 2 may considered a very good diagnostic marker, and further studies should be done to test its validity in patients with schizophrenia. To our knowledge, this is the first study to evaluate the β -arrestin-2 biomarker in humans. This study is of value as the first study to investigate the changes in β -arrestin-2 levels in patients with schizophrenia.

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PLASMA OMENTIN-1 LEVELS IN DRUG-FREE PATIENTS WITH BIPOLAR DISORDER

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ABSTRACT

Bipolar disorder (BD) is a chronic, severe, and highly disabling psychiatric disorder; peripheral markers have been used to assess biochemical alterations associated with BD and/or possibly involved in its pathophysiology. In the present study, we aimed to investigate plasma omentin-1 concentrations in non-obese, drug-free patients with Bipolar disorder (BD) in comparison with healthy volunteers. Sixty patients with BD (55 men and 5 women, mean age=33.2±7years) and 45 control subjects (38 men and 7 women, mean age=32.3±7 years) were recruited. Plasma omentin-1 levels were measured by enzyme-linked immunosorbent assay. Plasma levels of omentin-1 (ng/ml) were found to be markedly lower in patients with BD (median=12.08, range=7.91-16.26) than in controls (median=33.75, range=26.07-41.43, $p<0.001$). No significant difference was found between drug-free ($n = 51$) and drug-naive ($n = 9$) patients with respect to plasma omentin-1 levels ($p>0.05$). Omentin-1 concentrations correlated negatively with severity of illness, suggesting that patients with more severe pathology had lower fasting levels of omentin-1 ($r = -0.387$; $p = 0.019$). The present results suggest that plasma omentin-1 levels are decreased in physically healthy, non-obese, antipsychotic-free patients with BD when compared with physically and mentally healthy individuals. To our knowledge, this is the first study that demonstrated the association between omentin-1 and BD.

Key words: Bipolar disorder, Omentin-1, Non-obese

Introduction

Bipolar disorder (BD) is a common, serious and chronic disease that affects mood and cognitive functions (1). Contrary to the old Kraepelin concept, which suggested that BD follows a cyclical and permanent course, recent evidence shows an accelerated and progressive course (2). The pathophysiology of BD is unknown, however, there is a growing body of evidence shows a complex interaction between susceptibility genes, environmental stressors, and biochemical mechanisms (3).

In recent years, it has been reported that fatty tissue plays a role in the etiology of psychiatric disorders. Adipose tissue is a dynamic structure that plays a role in regulating metabolism in humans by secreting adipokines (4). Adipokines are responsible for a variety of physiological functions, including nutrition, appetite, energy balance, insulin, glucose and lipid metabolism, blood pressure regulation, vascular remodeling, coagulation and inflammation (5).

Omentin (known as intelectin, intestinal lactoferrin receptor, endothelial lectin HL-1, galactofuranose-binding lectin) is a novel adipokine whose gene is expressed primarily in the stromal vascular fraction cells of adipose tissue rather than subcutaneously (6,7). There are two isoforms: omentin-1 and omentin-2. Omentin-2 shows homology with omentin-1 in terms of 83% amino acid. The genes for both isoforms are located side by side at the chromosomal region 1q22–q23. Omentin-1 is the main form circulating in human blood (8).

There are limited studies on plasma omentin-1 levels in psychiatric disorders such as schizophrenia, anxiety and depression. However, there is no study in the literature investigating the potential role of omentin-1 in bipolar patients. In this study, we aimed to investigate plasma omentin-1 concentrations in non-obese, naive-free patients with BD compared to healthy volunteers.



Materials and Methods

Participants

The study was performed in University Hospital at department of psychiatry from February 2022 through August 2023. Sixty patients with BD and 45 physically and mentally healthy control subjects were recruited. Care was taken that the controls and the patients were similar with regard to age, sex, and body mass index (BMI) to the patients with BD. The study was carried out in accordance with the Declaration of Helsinki and the study protocol was approved by the institutional ethics committee of Kahramanmaras Sutcu Imam University. Adequate understanding was ensured and written informed consent was obtained from all participants or their legal guardians. The eligible participants were physically healthy and aged 18 years or older. All subjects maintained their regular diet during the study period.

Bipolar patients

The patients were recruited from the outpatient clinic of the Department of Psychiatry, Faculty of Medicine, Kahramanmaras Sutcu Imam University, Kahramanmaras, Turkey. The sample group consisted of drug-free bipolar patients, of whom 9 were first-episode, drug-naive cases. They were diagnosed through the Structured Clinical Interview (SCID) for DSM-5, applied by a trained psychiatrist, and met the DSM-5 criteria for BD. Patients who met any of the following criteria were excluded from the study: existence of any mental disorders other than BD; alcohol or illicit drug abuse (determined by interview); treatment with any pharmacological agents or vitamin supplements within 6 months before admission; obesity (BMI >30 kg/m²); pregnancy, and heavy smoking (more than 20 cigarettes per day). Clinically significant abnormalities on the baseline physical examination, electrocardiogram or laboratory test results were also regarded as exclusion criteria.

Healthy Volunteers

Volunteers were selected from apparently healthy subjects who visited the Kahramanmaras Sutcu Imam University Hospital for a routine check-up. They were screened for physical condition through clinical examinations, laboratory tests and electrocardiograms. SCID was applied to the control group according to DSM-5 diagnostic criteria before being included in the study. Criteria for inclusion in the study; Being between the ages of 18-65, not having a significant medical disease including endocrine disorders, having a regular menstrual cycle, not receiving hormone replacement therapy, not having any accompanying psychiatric disease in the patient group, and not having received a psychiatric diagnosis or treatment.

Measurements

We applied a sociodemographic data form to record sociodemographic variables and clinical data. The Hamilton Depression Scale was used to evaluate depressive symptoms, and the Young Mania Rating Scale was used to evaluate mania symptoms.

Biochemical Analysis

Blood samples from the patient and control groups were taken between 09.00 and 11.00 in the morning, after fasting. The samples were quickly taken to the biochemistry laboratory and separated into serum samples immediately after being centrifuged at 4000 g for 15 minutes. Separated serum samples were stored at -70 °C until biochemical analysis. To measure omentin-1 levels in serum samples, a commercial kit (Mybiosource, USA) was used together with the quantitative sandwich enzyme immunoassay method (ELISA) following the manufacturer's instructions.

Statistical analysis

Statistical analysis was done by SPSS statistical software (SPSS for Windows 16.0, Inc., Chicago, Ill., USA). Mean ± standard deviation, median and range values were used to present descriptive statistics. Differences between patient and control groups were examined using independent sample t tests (when normally distributed) or Mann-Whitney U tests (when not normally distributed). Pearson correlation test



was used to test the relationship between continuous variables (clinical features-Omentin-1) in the patient group. For all statistical tests, differences with a p value <0.05 were considered significant.

Results

60 bipolar disorder patients (55 men and 5 women, mean age= 33.2 ± 7 years) and 45 controls (38 men and 7 women, mean age= 32.3 ± 7 years) were included in the study. Analysis of sociodemographic data showed no significant differences between the patient and control groups ($p>0.01$).

Omentin-1 was found to be significantly lower in bipolar patients (median=12.08, range=7.91-16.26) than in controls (median=33.75, range=26.07-41.43), ($p<0.001$). However, no significant difference between drug-free and drug-naive patients was found in plasma omentin-1 levels ($p>0.05$) as shown in Table 1 and Figure 1.

Omentin-1 concentrations were negatively correlated with disease severity; This revealed that fasting omentin-1 levels were lower in patients with more severe pathology ($r = -0.387$; $p= 0.019$).

ROC curve was drawn for omentin-1 levels. Areas under the curve (AUC) for omentin-1 were 0.962 ($p <0.001$). These findings showed that omentin-1 levels were diagnostic. The cut-off point for omentin-1 was 17.77 ng/ml, and omentin-1 levels of patient group was below the cut-off point (Table 2 and Figure 2).

Table 1. The levels of omentin-1 in bipolar patients and control individuals

Variable		Bipolar Disorder (n=60)	Control (n=45)	p value
Omentin-1	Median	12.085	33.75	<0.001
(ng/mL)	(Q1-Q3)	(7.91-16.26)	(26.07-41.43)	

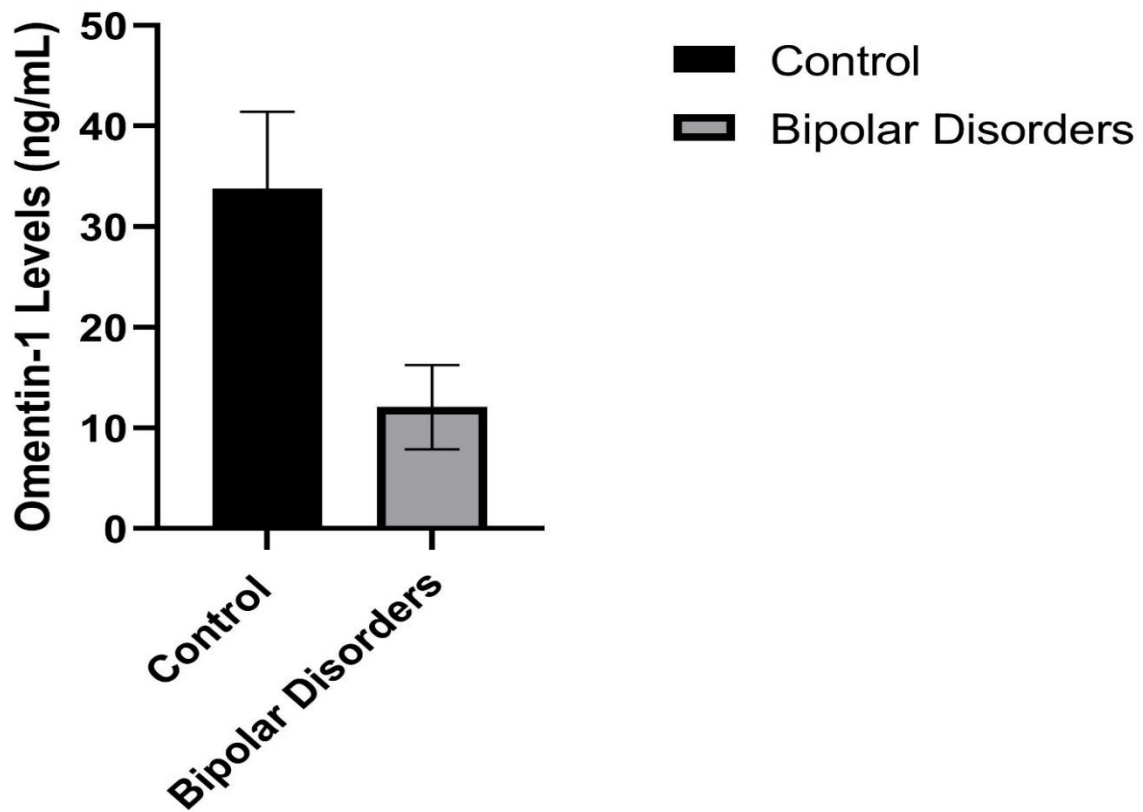


Figure 1. The levels of omentin-1 in bipolar patients and control groups

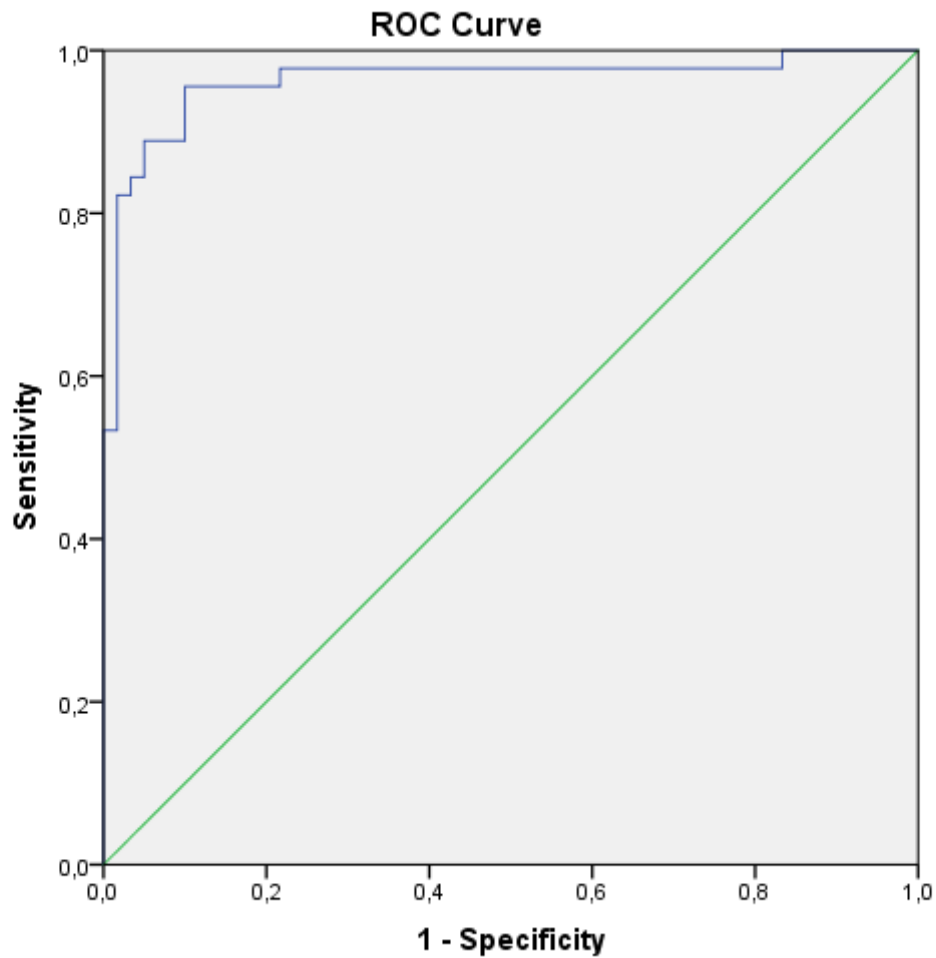


Figure 2. ROC curve for Omentin-1 Levels. This curve combines the information of the true-positive rate and the true-negative rate, and the AUC is a measure of the overall discriminative power of omentin-1.

Table 2. The results of ROC curve analysis

Risk Factor AUC 95%	<i>P</i>	Cut off	Sensitivity (%)	Specificity
0.962 (0.922-1.0)	<0.001	17.77	99.5	99.8

Discussion

This study provided preliminary data on omentin levels in patients with BD. We found that plasma omentin-1 levels in bipolar patients were significantly lower than in healthy controls. Additionally, plasma concentrations of omentin-1 were negatively associated with symptom severity. Only a few studies have been conducted adipokine levels in medication-free with schizophrenia differ from healthy controls. To our knowledge, there is only one study evaluating adiponectin levels as adipokine in medication-naive patients (9,10); According to this study, adiponectin and omentin-levels of schizophrenia patients decrease compared to controls. Our findings support many of the previous studies showing that medication-free bipolar patients exhibit different serum adipokin profiles than healthy individuals. Moreover, in our study, it was shown that plasma omentin-1 concentrations not only in patients with BD who did not use medication, but also in patients who had never used medication were



lower than healthy controls. This may indicate a clear association between bipolar and low plasma omentin levels, regardless of previous antipsychotic treatment.

Bipolar disorder generally has a chronic course and is etiologically heterogeneous. There is currently no specific imaging method or blood test for bipolar patients. Therefore, it is important to identify new diagnostic biomarkers to aid diagnosis and exclude other psychiatric diseases. In ROC analysis, determining the distinctiveness of a value is evaluated based on the area under the curve (AUC). ROC curve: categorized as 0.9–1 = very good, 0.8–0.9 = good, 0.7–0.8 = fair, 0.6–0.7 = poor, and <0.6 = unsuccessful is done (11). In some recent clinical studies on biomarkers, their diagnostic values in mental diseases have been studied. We found satisfactory statistical results in the ROC curve we applied to determine the diagnostic value of omentin-1 levels. We calculated the AUC for omentin-1 to be 0.962. This result provides a very good potential ability to distinguish bipolar patients from healthy controls. Although we obtained very good diagnostic value, we do not consider this result as the discovery of a new biomarker, but we believe that more studies are needed to test the diagnostic value of these parameter. In this study, although omentin-1 showed excellent diagnostic value compared to healthy controls, this biomarker may not be specific to BD. Additionally, low levels of omentin-1 may not indicate a high possibility of BD.

In conclusion, this study revealed that plasma omentin-1 levels in bipolar patients are significantly lower than in controls, there is a negative correlation between omentin-1 levels and bipolar scores, and serum omentin-1 level is valuable in predicting the presence of BD.

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ARTIFICIAL HEART APPLICATIONS IN BIOTECHNOLOGY

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ABSTRACT

Artificial organs are produced to replace vital organs that have lost or are losing their functions, in order to restore some or all of the functions of these organs to the individual. Technological developments involving the production of biocompatible organs from biomaterials using tissue engineering techniques have become a frequently encountered situation in biotechnology. One of these developments is artificial heart technology. Artificial heart devices produced with this technology are devices that enable people with heart failure to survive thanks to mechanical circulatory support until they recover or receive a heart transplant. With this device, the first fully transplantable artificial heart was transplanted to a patient in 2001, and it was designed to not cause any negative effects on the person in terms of functionality.

In this study, studies on artificial heart applications were examined. People to whom this new technology could be applied were investigated. Applications in the field of artificial heart are examined and studies in the world are introduced in terms of both technical features and usage. In this way, it is aimed to be a resource for the studies planned to be carried out in Turkey.

Keyword : Artificial heart, Biotechnology, Biomedical Device Technology

1. INTRODUCTION

Circulatory system diseases are among the diseases that cause the most deaths in today's world. Looking at the 2019 statistics of the World Health Organization (WHO), the biggest cause of death in the world is cardiovascular diseases with 33.5% [1]. One of the most important circulatory system diseases that causes serious health problems and significantly reduces people's quality of life is heart failure.

The circulatory system basically consists of three main components. These components; The heart acts as a pump, the vessels act as pipes, and the fluid transmitted is blood. The heart is one of our vital organs, located in the mediastinum between the lungs and pumping blood to our body. An average human heart beats approximately 100,000 times a day and 5-6.5 liters of blood circulates in the body [20]. In this way, the circulatory system is in a constant cycle to meet the needs of the human body. Through the circulatory system, clean blood, that is, blood rich in nutrients and oxygen, is delivered to the organs in the body, providing nutrition to all tissues and cells along with the organs. In addition, wastes arising from tissues and cells are eliminated from the body through the circulatory system. Hormones are delivered to the target organ and tissue via blood from where they are secreted in the body, and the circulatory system plays an important role in hormonal balance [20].



Nowadays, deaths due to heart diseases are quite high. According to the World Health Organization, heart diseases are the most common cause of death [3]. Cardiovascular diseases have increased by 18.7% since 2010, causing 19 million deaths. [4]. While the number of organ transplants performed in Turkey between 2002 and 2023 was 74 thousand, 1210 of them were heart transplants [4]. Although artificial blood pumps were available before, artificial heart devices were produced and used instead of cardiopulmonary bypass circuits to support inadequate heart function until the 1960s. The first implantable artificial heart was implemented by Liotta in 1963 with a tube-shaped pneumatic valve extending from the left atrium to the aorta [6]. This device was a pneumatic device and was inflated and deflated to pump blood [7]. In 1968, the air-powered balloon pump began to be used in the clinic to transport blood from the descending aorta to the heart and evacuate the left ventricle [8]. In 1969, the pneumatic total artificial heart (TAH) began to be used and a clinical use procedure was established [9]. High death rates were observed due to failure to eliminate device malfunctions, and ventricular assist devices (VAD-Ventricular Assist Device) pioneered the developments in the field of heart [10].

The first VADs were developed, creating a pulsatile flow using one-way artificial valves and diaphragms. These new generation VADs are tried to be applied pneumatically as well as electrically operated. Heart transplantation is a long process, and HeartMate XVE and Berlin Heart EXCOR devices can be given as examples to help waiting patients hold on to life [11].

1.1. Structure of the Heart

The heart is an organ consisting of cardiac muscle, located in the mediastinum between the lungs and regulating blood flow by acting as a pump. The heart consists of four chambers: right atrium, right ventricle and left atrium, left ventricle. The dirty blood collected from the body comes to the right atrium and from there passes to the right ventricle. It travels from the right ventricle to the lungs via the pulmonary artery and is oxygenated in the lungs. Clean oxygenated blood comes to the left atrium of the heart through the pulmonary vein. It then passes from the left atrium to the left ventricle. The blood in the left ventricle is sent to the aorta at high pressure to spread throughout the body. This cycle continues simultaneously and continuously [12].

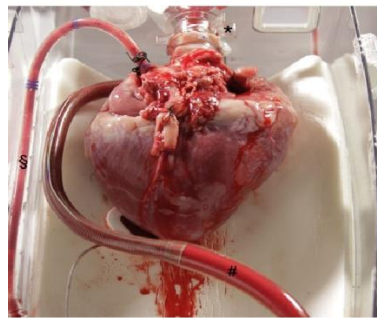


Figure 1. Ex in vivo applications [29].

1.2. Heart diseases

Coronary artery disease is one of the most common heart diseases caused by narrowing or blockage of the coronary arteries that supply blood to the heart muscle. Heart failure occurs when the heart cannot pump enough blood. There are two different types of heart failure: left or right heart failure. Heart rhythm disorders are problems that negatively affect the regular beating of the heart. This is also called arrhythmia. Diseases in the heart valves mostly occur as a result of stenosis, leakage or deformations. Heart Infections are infections that generally affect the heart muscle or valves and can cause serious complications [19].



1.3. Artificial Heart and Its Types

An artificial heart is an electronic device designed to replace or assist the heart. It works like a natural human heart. It serves as a life-saving solution for patients with serious heart disease. Problems arise especially when heart transplantation is not performed immediately.

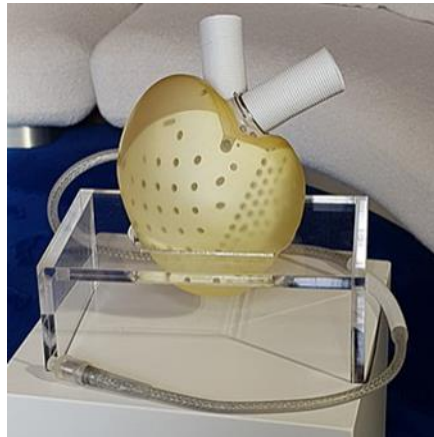


Figure 2. CardioWest (SynCardia) Temporary Total Artificial Heart [17].

Total Artificial Heart (TAH)

TAH is a complete alternative to the natural heart. It extends the time until a suitable human heart is found for transplant. There are currently two complete artificial hearts commercially available. Both devices are for temporary use while waiting for a transplant.

Ventricular Assist Devices (VADs)

VADs support failing ventricles (lower chambers of the heart). They can be a permanent solution or a means of transplantation.

Intra-Aortic Balloon Pump

Although there is no complete change, it helps the heart by reducing the heartbeat [18]. Heart failure is the condition in which heart functions are inadequate and the heart cannot pump enough blood to the body. Heart failure is divided into two categories: acute and chronic. It is a serious health problem. This disease, which has symptoms such as chest pain, arrhythmia (irregular pulse rate), palpitations, abdominal pain, nausea, edema in the hands and feet, and easy fatigue, both reduces the person's quality of life and threatens their vital functions.

1.4. History of the Artificial Heart

Heart diseases are one of the most common diseases suffered by human beings throughout history. Often heart disease can be so severe that the patient has little chance of survival while waiting for a donor heart. Based on the invention of the artificial kidney dialysis machine in 1950, medical scientists began to study the artificial heart. The artificial heart at least provides a ray of hope for patients waiting for a donor to survive until a donor is found.

Dutch inventor of the artificial kidney William Kolff was the first doctor to start working on the artificial heart. In order to point out the problems, Kolff and a group of scientists conducted experiments on animals to test their model in 1957. In 1969, Denton from the Texas Heart Institute. A team led by Cooley used a model they created to keep a human patient alive for more than thirty-six hours [13].

Robert K. Jarvik, designer of the first artificial heart; He studied at the University of Utah and named the first implanted artificial heart after himself. Designed in the shape of a natural heart, Jarvik-7 had two pumps 'each with a disk-shaped mechanism' that pushed blood from the inlet valve to the outlet



valve. The natural heart is alive, while the artificial heart is made of plastic, aluminum and Dacron polyester. As a result, the artificial heart must depend on some external sources to "live" [13].

William Devries formed a team with experienced assistants from the University of Utah in 1982. Together with this team, he implanted Jarvik-7 into a patient. The patient's name was Barney Clark. Clark was a dentist from Provo, Utah. He was too ill to receive a donated heart; Clark's team He decided that his implant should be permanent. However, although the artificial heart extended Clark's life, it also limited his freedom. Clark was hooked up to a fairly large, washing machine-sized air compressor needed to power the heart. Tubes from the compressor passed through Clark's chest wall, trapping him in his bed. The infection was rampant in his body. What's more, Clark's blood clots continued to form as the blood went through the pump. Clark died 112 days after implantation after suffering a series of strokes; This upset everyone. By 1985, five more artificial hearts were implanted in patients. Among these patients, the person who survived the longest thanks to the artificial heart was William Schroeder, who was supported by Jevik-7 for 620 days. By the late 1980s, surgeons at 16 centers, including the Texas Heart Institute, had implanted the Jarvik-7 device in more than 70 patients as a bridge to transplantation [13].

Complete artificial hearts for patients with end-stage heart failure are designed to fully preserve natural heart functions in the long term. Denton in 1969 First Total Artificial Heart (TAH) implantation in humans by Cooley It was accomplished using the Liotta artificial heart and led to transplantation. Figure 3 gives the history of applications of the artificial heart. The patient was able to live a healthy life with this device for three days, but after three days, his kidney functions deteriorated and the researchers had to replace the pump with a donor heart [21]. These devices have been accepted as a suitable tool to protect and support patients in the process until heart transplantation [22]. Jarvik-7 TAH supported a patient in good health for 112 days in 1982. In 1990, the rights of Jarvik-7 devices were transferred to the company called CardioWest and the name of this device was changed to CardioWest TAH. The device was tested between 1993 and 2002 on 130 patients with biventricular failure and therefore unable to use an LVAD. In these studies, the 1-year success rate is 86%, while the 5-year success rate is 64%. This study was carried out by CardioWest. The use of TAH as a bridge to transplantation was made possible by the Food and Drug Administration (FDA) in 2004 [23]. At the same time; The AbioCor device, a fully implantable TAH that does not require a percutaneous line, has been developed. Thromboembolism and atrial There were delays in FDA approval of the device due to complications arising from aspiration, and partial approval was received in 2006 [24]. SynCardia TAH was renamed CardioWest TAH in 2010. This new control set was designed for outpatient treatment and is the first device that allows the patient to be discharged from the hospital (25). Jarvik 7 (Figure 5), SynCardia and Abiocor are the most well-known examples of TAH devices [26].

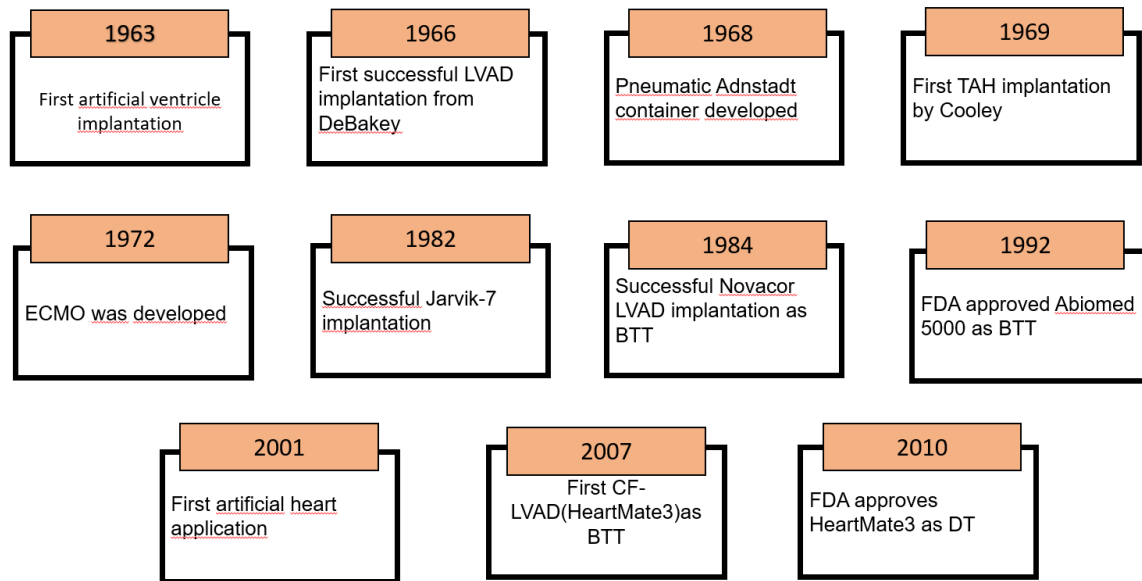


Figure 3. Artificial Heart History Table [27].

2. Artificial Heart Applications

Artificial heart support devices can be used in the presence of heart failure, which can occur due to many different diseases such as congenital heart diseases, coronary artery disease, heart attack, cardiomyopathy, myocarditis, hypertension, diabetes and obesity [14].

Artificial heart application can be performed if the following situations occur:

- If the health conditions of patients waiting for heart transplantation are deteriorating,
- In order to create a bridge to heart transplantation in order to meet the eligibility conditions for heart transplantation,
- Elimination of temporary problems in other organs that prevent the patient from performing a heart transplant.
- In case of permanent health problems that prevent heart transplantation, heart transplantation is intended to be permanent for life [15].

2.1. Artificial Heart Design

The OHSU artificial heart replaced both ventricles with a titanium tube containing a hollow rod that moves back and forth, pushing blood to the lungs and then to the rest of the body.



Figure 4. Artificial heart module [16].



Figure 5. JARVIK 7 artificial heart [28].

with sensors , the algorithm of the device detects the patient's blood pressure according to the activity level and properly adjusts the blood flow accordingly. The entire device weighs approximately 2 kilos and contains batteries that can last approximately 4 hours [16].

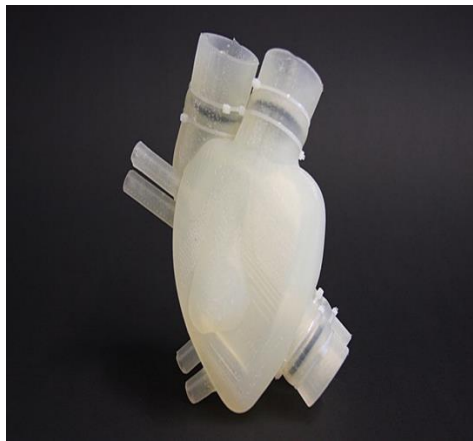


Figure 6. Soft total artificial heart developed in the functional materials laboratory at ETH Zurich [17].

2.2. Studies Conducted in Turkey

The first steps of modern cardiac surgery in Turkey began with closed mitral commissurotomy. It was held in Istanbul in 1953 and in Ankara in 1954. Later, large series of closed Commissurotomy and Pericardiectomy surgeries were performed.

In December 1960, Dr. The first open heart surgery using extra cortical circulation, performed by Mehmet Tekdoğan , was performed at Hacettepe Hospital.

Inflow at the National Turkish Medical Congress held in Istanbul in June 1962 The first clinical applications of occlusion and hypothermia techniques and bypass surgeries were presented independently of each other [30].

According to the data of Ankara University Faculty of Medicine Organ and Tissue Transplantation Center, the first artificial heart transplant in Turkey was performed at Ankara University Ibni Sina Hospital on February 27, 1988 [35]. Additionally, in 2012, Total Artificial Heart (TAH) surgery was successfully performed on a female patient for the first time in Turkey. The 36-year-old female patient became the second female patient in Europe to receive a total artificial heart (TAH) and the 19th in the world. In 2016, for the first time in Turkey, a 50 ml volume Total Artificial Heart (TAH) was developed by Prof. Dr. It was applied to a 15-year-old child patient. It was successfully placed by Rüşan AKAR and his team [36].

In the study of the first patient in Turkey who was discharged from the hospital after TAH implantation and planned for heart transplantation; dilated A 45-year-old male patient, who was receiving medical



treatment for cardiomyopathy , underwent TAH implantation until a suitable donor was found for heart transplantation due to severe biventricular heart failure and the patient's large body structure . He was discharged from the hospital on Freedom Drive on the 60th day after surgery and has been waiting at home for two years for a suitable donor for a heart transplant [33].

Dr. in Ankara The first mechanical heart surgery was performed by Hakkı Akalın and his team on December 27, 1988. Unfortunately, a heart transplant could not be performed because a donor could not be found within the 14 weeks the patient lived. Later, on 19.10.1990, an orthotopic heart transplant was performed on another patient by the same team. Between January and April 1991 at Ege University, Dr. He worked as The first aortic allograft surgeries were performed by İsa Durmaz and colleagues [32].

Özfidan, who had a pacemaker installed in 2017 due to his long-standing heart disease, applied to Başakşehir Çam and Sakura City Hospital 2 months ago after his complaints such as shortness of breath and fatigue increased .

Özfidan , who was treated and referred to the Cardiovascular Surgery Clinic , was placed on the "organ waiting list" of the Ministry of Health due to heart failure.

In the surgery performed for the first time at Başakşehir Çam and Sakura City Hospital, Özfidan was fitted with a left heart support device so that he could continue his life until the heart was found.

Özfidan , who was kept under surveillance in the hospital for a while , was discharged from the hospital with his artificial heart [31].

Oğuzhan Ayyıldız was diagnosed with multiple organ failure due to end-stage heart failure at Koşuyolu Yüksek İhtisas Training and Research Hospital, where he applied due to his health problems. Accordingly, it was decided to implant an "artificial heart" device that will take on the task of pumping blood until the organ is found.

Oğuzhan Ayyıldız postponed his surgery for a week because he wanted to be with his pregnant wife during her upcoming birth. However, that night, he suddenly became ill and was taken to the emergency room. Ayyıldız, whose wife was also hospitalized for birth at the same time, was taken into surgery around the time her son was born. While his wife was holding his child in another hospital, Ayyıldız was fitted with an artificial heart device.

Ayyıldız, who saw her son having a video call with her husband in the intensive care room after the surgery, feels like she was "reborn" with the happiness of the birth of her child, supported by the artificial heart she carries inside. backpack [34].



Figure 7. Artificial Heart Implantation [37].

2.3. Studies Conducted in the World

POLVAD

Zabrze, Poland, has been working to develop an artificial heart since 1991. Today, the cardiac support system in Poland consists of POLCAS, artificial ventricle POLVAD-MEV and three controllers



POLPDU-401.POLPDU-402 and POLPDU-501. The presented device is designed to keep only one patient alive. The 401 and 402 series control units can only be used in hospitals due to their size, control method and power supply type. The 501 series control unit is FRK's latest product. It is a much more mobile solution due to its much smaller size and weight. For this reason, supervised treatments outside the hospital can be used with peace of mind [37].

PHOENIX

In June 1996, a 46-year-old male patient underwent a complete artificial heart implantation at Cheng-Hsin General Hospital in Taiwan. The advanced pneumatic Phoenix-7 Complete Artificial Heart was manufactured by Taiwanese dentist Kelvin K. Cheng, Chinese. TM Kao, MD, and colleagues at the Taiwan TAH Research Center, Taiwan were responsible for the creation of this experimental artificial heart. Thanks to the implantation, the patient's blood pressure was maintained at 90–100/40–55 mmHg and cardiac output was maintained at 4.2–5.8 L/min. Later, the patient received a completely artificial heart and the world's first successful combined heart and kidney transplant was performed [17].

ABIOMED

To recharge the device, a transduction device is used which sends energy to the skin. The device has an internal battery that can last for half an hour and a wearable external battery pack that can last for approximately four hours. On September 5, 2006, the FDA announced that AbioCor, a heart implant, could be used for humanitarian purposes after testing on 15 patients. This device is meant for critically ill patients who are not eligible for a heart transplant or have no suitable donors available. However, the current AbioCor has some limitations. Its size makes it suitable for less than 50% of the female population and only 50% of the male population, and its useful life is only 1-2 years. AbioMed has developed a smaller, more stable heart pump called the valved ventricles Penn AbioCor, which combines control technology and the rotary screw developed at State He designed II. This pump can last up to 5 years and can be implanted in most men and 50% of women. It was tested on animals in 2005 and the company hoped to receive FDA approval for human use in 2008. However, after numerous experiments, AbioMed stopped developing the official whole heart as of 2015. Currently, AbioMed markets heart pumps only, which help pump blood in patients who need short-term support [17].

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EFFECTS OF MILK SOMATIC CELL COUNT ON YIELD, CONSTITUENTS AND FATTY ACID PROFILE OF DROMEDARY CAMEL RAISED UNDER MEDITERRANEAN CLIMATIC CONDITIONS

AKDENİZ İKLİM KOŞULLARINDA YETİŞTİRİLEN DROMEDARY DEVELERDE SÜT SOMATİK HÜCRE SAYISININ SÜT VERİMİ, BİLEŞENLERİ VE YAĞ ASİDİ PROFİLİ ÜZERİNE ETKİLERİ

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ABSTRACT

By declaring 2024 as the International Year of Camelids, the United Nations aimed to raise awareness about their potential. Camels, which have significantly lost their function in transportation, can easily survive in areas where other farm animal species cannot be raised and create resilience against climate change. They make a significant contribution to the lives of people living in arid-semi-arid areas, especially where they are intensively grown, with the products they produce such as meat, milk, wool and leather. In this study, the effects of milk somatic cell count (SCC) determined from milk samples taken once a month from dromedary camel cows raised between 2019-2021 in a dairy camel farm under Mediterranean climate conditions in Türkiye on daily milk yield (GSV), milk components (protein (PC) fat (FC), lactose (LC), ash (AC) and total dry matter (TDM) content) and milk fatty acid profile were investigated. Data were divided into four groups according to milk SCC content (1: ($\leq 200,000$ cells/mL, 2: 200,001-400,000 cells/mL, 3: 400,001-750,000 cells/mL and 4: $> 750,000$ cells/mL) and 3 groups according to lactation period (1st: 6-90 days, 2nd: 91-180 days and 3rd: > 180 days) and were analyzed statistically. Year effect for PC ($P < 0.01$), DM ($P < 0.05$) and most fatty acids, Lactation period effects for AC, unsaturated fatty acids (UFA), Atherogenic Index (AI) and many fatty acids were determined to be statistically significant ($P < 0.05$), while the effects of SCC group was found to be significant on PC ($P < 0.01$), DM ($P < 0.01$), saturated fatty acids (SFA), UFA, short (SCFA), medium (MCFA), long (LCFA) chain fatty acids and AI ($P < 0.05$). The overall means of $\text{Log}_{10}\text{SCC}$, DMY, PC, FC, LC, AC, DM, SFA, UFA, PUFA, SCFA, MCFA, LCFA and AI were 5.62 ± 0.013 (416.869 cells/mL), 3.81 ± 0.24 kg, $3.82 \pm 0.10\%$, $3.62 \pm 0.17\%$, $3.41 \pm 0.14\%$, $0.86 \pm 0.01\%$, $11.75 \pm 0.18\%$, $65.85 \pm 0.44\%$, $37.95 \pm 0.37\%$, $3.94 \pm 0.09\%$, $0.53 \pm 0.03\%$, $59.94 \pm 0.51\%$, $39.55 \pm 0.52\%$ and 1.89 ± 0.04 has been found, respectively. As a result, while the changes in feeding from year to year and seasonally in the farm caused significant variation in the fatty acid profile, it was determined that the increase in SCC was associated with significant changes in PC and DM, two of the milk components, and de novo mammary fatty acid synthesis.

Key words: Dromedary, Daily milk yield, Somatic cell count, Protein content, Fatty acid profile

ÖZET

Birleşmiş Milletler 2024 yılını Uluslararası Deve Yılı olarak ilan ederek devegillerin potansiyelleri konusunda farkındalık oluşturmayı amaçlamıştır. Taşımacılıktaki işlevini önemli ölçüde kaybeden



develer diğer çiftlik hayvanı türlerinin yetiştirilemediği alanlarda yaşamlarını kolaylıkla sürdürürken iklim değişikliğine karşı dayanıklılık oluştururlar. Ürettikleri et, süt, yün, deri gibi ürünleri ile özellikle yoğun olarak yetiştirildikleri kurak-yarı kurak alanlarda yaşayan insanların yaşamlarına önemli katkı sunmaktadırlar. Bu çalışmada Türkiye’de Akdeniz iklim şartları altındaki bir süt devesi işletmesinde 2019-2021 yılları arasında yetiştirilen dromedary deve ineklerinden ayda bir kez alınan süt örneklerinden belirlenen süt somatik hücre sayısı (SHS)’nin günlük süt verimi (GSV), süt bileşenleri (protein (PO), yağ (FO), laktoz (LO) kül (KO) ve toplam kuru madde (TKMO) oranı) ve süt yağ asidi profili üzerine etkileri araştırılmıştır. Veriler süt SHS içeriğine göre dört gruba (1: (≤ 200.000 hücre/mL, 2: 200.001-400.000 hücre/mL, 3: 400.001-750.000 hücre/mL ve 4: >750.000 hücre/mL), laktasyon dönemine göre de 3 gruba (1. Dönem: 6-90 gün, 2. Dönem: 91-180 gün ve 3. Dönem: >180 gün) ayrılarak istatistik olarak analiz edilmiştir. Yıl etkisi PO ($P<0.01$), TKMO ($P<0.05$) ve çoğu yağ asidi için, Laktasyon dönemi etkisi de KO ($P<0.01$) ve doymamış yağ asitleri (UFA) ve Atherojenik İndeks (AI) başta olmak üzere birçok yağ asidi için önemli bulunmuşken, SHS grubu etkisi PO ($P<0.01$), TKMO ($P<0.01$), doymuş yağ asitleri (SFA), UFA, kısa (SCFA), orta (MCFA), uzun (LCFA) zincirli yağ asitleri ve AI üzerine etkisi önemli ($P<0.05$) bulunmuştur. \log_{10} SHS, GSV, PO, FO, LO, KO, TKMO, SFA, UFA, PUFA, SCFA, MCFA, LCFA ve AI genel ortalamaları sırasıyla 5.62 ± 0.013 (416.869 hücre/mL), 3.81 ± 0.24 kg, $\%3.82\pm 0.10$, $\%3.62\pm 0.17$, $\%3.41\pm 0.14$, $\%0.86\pm 0.01$, $\%11.75\pm 0.18$, $\%65.85\pm 0.44$, $\%37.95\pm 0.37$, $\%3.94\pm 0.09$, 0.53 ± 0.03 , $\%59.94\pm 0.51$, $\%39.55\pm 0.52$ ve 1.89 ± 0.04 bulunmuştur. Sonuç olarak, beslemenin işletmede yıldan yıla ve mevsimsel olarak farklılık göstermesi yağ asidi profilinde önemli değişimler meydana getirirken, SHS’nin artışının süt bileşenlerinden PO ve TKMO’da ve meme yağ asidi sentezindeki önemli değişikliklere ilişkili olduğu belirlenmiştir.

Anahtar kelimeler: Dromedary, Günlük süt verimi, Somatik hücre sayısı, protein oranı, Yağ asidi profili

Introduction

Camels, which have significantly lost their function in transportation, can easily survive in areas where other farm animal species cannot be raised and create resilience against climate change. By declaring 2024 as the International Year of Camelids, the United Nations aimed to raise awareness about their potential. They make a significant contribution to the lives of people living in arid-semi-arid areas, especially where they are intensively grown, with the products they produce such as meat, milk, wool and leather.

While 81.3% of the total 918.2 million tons of milk produced in the world is obtained from cattle, the contribution of camels to total milk production is only 0.34% with a production of 3.1 million tons (FAOstat, 2023). Camels, which have significantly lost their function in transportation with the widespread use of vehicles based on fossil fuels, have begun to be used in animal food production, as in other farm animal species. Camels, which are predominantly reared in the extensive system throughout the world, have begun to move from "sand to barn" with intensive production becoming widespread day by day (Konuspayeva et al., 2023) with the increase in demand for their products (Faye and Konuspayeva, 2020).

Camel milk, which is considered "white gold" in arid and semi-arid areas, has begun to attract great attention day by day, not only in traditional producing countries but also in western societies. There are some beliefs that camel milk is good against various diseases and its price is 2-20 times higher than cow's milk, and because desert areas are expanding day by day due to global warming, camels are seen as the animals of the future. It can be said that this situation has led to the acceleration of studies on camel physiology, genetics, nutrition and breeding in recent years.

Nagy and Juhasz (2016) reported that, although it varies significantly according to geographical regions, milk yield in camels varies between 1000 L and 12,000 L during the 8-18 month lactation period, and that they observed daily milk yield above 25 L in only a few animals in a farm in the UAE. Previous studies have reported that the gross composition of camel milk is similar to cattle and goat milk (Konuspayeva, 2020), and the essential nutrients found in bovine milk are also found in camel milk



(Zhao et al., 2015). In addition to the nutrients it contains, camel milk is also considered a functional food due to its fatty acid composition and abundant vitamin C and iron (Gassem et al., 2015; Ali et al., 2019).

Mastitis is one of the diseases known as udder inflammation, which develops as a result of infection and causes significant economic losses by affecting animal health and welfare in camels, as well as in farm animals such as cattle, buffalo, sheep and goats. Although clinical mastitis is easily detected by the operator, milk samples must be analyzed to detect subclinical mastitis, which does not show any abnormality in the udder structure and does not show a visible change in the structure of the milk. Determination of milk somatic cell count (SCC) has become one of the commonly used methods today in the detection of subclinical mastitis due to its high correlation with mastitis. In milk-producing animals, including camels, the quantity and quality of milk are significantly affected by subclinical mastitis (Hadeef et al. 2019). Atasever and Koç (2016) stated that significant milk yield loss occurred in camels due to high SCC.

There are many studies on SCC and milk fatty acid profile, which are used to detect the sub-clinical form of mastitis, which is quite common in farm animal species and is the most challenging and costly disease. However, SCC which is used to detect sub-clinical mastitis cases that do not cause any visible changes in the milk or udder due to damage to mammary epithelial cells and to determine milk quality standards at the farm level (Pegolo et al., 2024).

Although it has been observed that the number of studies on both milk SCC and fatty acid composition in camels is partially limited, no study has been found on the effect of SCC on milk fatty acid composition in camel milk. For this reason, this study focused on the changes caused by SCC in camel milk composition and fatty acid profile in dromedary camel milk.

Material and methods

Animal material, management and nutrition

The animal material of the study consisted of camel cows that gave birth on a camel farm in Incirlioiva District, Aydın Province, Turkey, between 2019-2022. The dromedary camel cows on the farm are mated with Bacterian males, and the F1 hybrid male camel offspring are raised and used in camel wrestling, which is popular in the country. Born female camel calves are raised and used for milk production or tourism purposes.

Lactating camels are kept in shelter throughout lactation because they are milked. The calves, which are raised and separated from their mothers for a while after birth, are taken to their mothers before milking to prestimulate them. In the farm, lactating camels are milked with a mobile milking machine developed for cattle. Milking of the cow is not carried out completely, some residual milk is left in the udder, and this residual milk is allowed to be removed by the camel calf sucking its mother. The teats of cows whose calves have died are washed with warm water and dried with a paper towel before milking, and after a while (1-2 minutes), the milking is started and when the milk flow from the udder stops the milking is stopped.

Depending on the milk production and sales plan of the camel farm, sometimes camel cows with male calves are not milked and are allowed to be suckled entirely by their calves, on the grounds that they will become wrestling camels in the future. Camel milk production is generally carried out by milking camel cows whose calves have died and camel cows whose calves are female.

Milk sampling and analyzing

Milk samples were taken from the milking bucket with a syringe, placed in 15 ml capacity tubes, and then placed in the ice box. From each cow, 4 milk samples were taken for each milking. The milk samples were analyzed at Aydın Adnan Menderes University and Erciyes University.

Milk yield and constituents of raw camel milk

In the milk samples taken, total dry matter (DM) and ash (AC) contents (AOAC, 1990), fat content (FC) according to the Gerber method (EAS, 2006), protein content (PC) according to the Kjeldahl method



(AOAC, 1990) were determined and lactose content (LC) was determined by subtracting the sum of FC, PC and AC from the dry matter (DM). Additionally, SCC was determined according to the Direct Microscopic Somatic Cell Count method (IDF, 1995).

Fatty acid analysis

To determine the fatty acid composition of camel milk, fat extraction was performed according to Liu et al. (2018) and using a capillary column (60 m x 0.25 mm ID x 0.250 µm (cat. # 13199)) with Gas Chromatography (GC, Shimadzu GC 2010 Plus) fatty acid levels were determined.

Statistical analysis

Statistical analysis of the data was performed according to SAS (2004) and comparison of subgroups was made according to Tukey (P <0.05). SCC values were transformed into log (Schook, 1982) before statistical analysis. The following variables were assessed: DMY, FC, PC, LC, AC, DM, SCC, milk FA profile, total saturated FAs (SFA), total unsaturated FAs (UFA), total polyunsaturated FAs (PUFA), short chain FAs (SCFA), medium chain FAs (MCFA), long chain FAs (LCFA) and atherogenic index (AI). The statistical model was:

$$Y_{ijkl} = \mu + a_i + b_j + c_k + e_{ijkl} \dots\dots\dots(1)$$

where Y_{ijkl} : observation value of the traits emphasized, μ : overall mean of the traits, a_i : calving year effect ($i=2019, 2020$ and 2021), b_j : lactation stage effect ($1=1$ (6-90 days), 2 (91-180 days) and 3 (>181 days), c_k : SCC group effect ($k=1$ (≤ 200.000 cells/ml), 2 (200.001-400.000 cells/ml), 3 (400.001-750.000 ml) and 4 (>750.000 cells/ml), e_{ijk} : refers to random error.

Results and Discussion

The effects of calving year on PC and DM, parity only on AC, and SCC group on PC and DM were found to be significant ($P>0.05$). The effects of the factors on the fatty acid profile are discussed under the relevant heading.

Somatic Cell Count, SCC

While the effect of calving year and parity on $\text{Log}_{10}\text{SCC}$ was insignificant ($P>0.05$), as expected, the effect of the SCC group on it was found to be significant ($P<0.01$), and the overall mean of $\text{Log}_{10}\text{SCC}$ was calculated as 5.62 ± 0.013 (416,869 cells/ml; Table 1). While the SCC level was found to be below 750,000 cells/ml in 84.3% of the milk samples, 15.7% was above this value. In 27.1% of the milk samples, the SCC average was detected below 200,000 cells/ml, and the rate of samples below 400,000 cells/ml was 51.4%.

Table 1. Changes of $\text{Log}_{10}\text{SCC}$ according to calving year, lactation period and SCC group

Factors	$\text{Log}_{10}\text{SCC}$		Min	Max
	n	$\bar{X} \pm S_{\bar{X}}$		
Calving year		NS		
2019	21	5.68±0.025 (478.630 cells/mL)	4.96	6.30
2020	22	5.67±0.026 (467.735 cells/mL)	4.90	6.49
2021	27	5.66±0.020 (457.088 cells/mL)	5.25	6.31
Lactation period		NS		
1 (6-90 day)	27	5.65±0.023(446.683 cells/mL)	4.90	6.27
2 (91-180 day)	28	5.70±0.020(501.187 cells/mL)	4.96	6.49
3 (>181 day)	15	5.67±0.029 (467.735 cells/mL)	5.26	6.30
SCC group, cell/ml		**		
1(≤ 200.000)	17	5.16±0.028 (144.544 cells/mL) ^a	4.90	5.35
2(201.000-400.000)	15	5.53±0.027 (338.844 cells/mL) ^b	5.42	5.60
3(401.000-750.000)	19	5.76±0.023 (575.440 cells/mL) ^c	5.64	5.88
4(>750.000)	19	6.24±0.033 (1.584.893 cells/mL) ^d	6.07	6.49
Overall	70	5.62±0.013 (416.869 cells/mL)	4.90	6.49



SCC: Somatic cell count, NS: Not significant, **:P<0.01, a,b,c,d: The difference between groups with the same letter is insignificant.

The SCC average obtained in this study is similar to that of Atigui et al. (2013) in Tunisian camels, while Nagy et al. (2013) in UAE camels, Guliye et al. (2002) in Israeli camels reported values very close to the SCC average obtained in this study. Atigui et al. (2013) reported the SCC averages of 299,750 cells/ml and 312,362 cells/ml in milk samples taken during estrus and non-estrus in 8 Tunisian Moorish camels, respectively, and stated that estrus is not related to the SCC level in milk.

Nagy et al. (2013) reported the average SCC of 394×10^3 cells/ml in milk samples taken from tank milk for UAE camels for two years, while Guliye et al. (2002) reported that the average of bacteria-positive samples in milk samples taken from the udder quarters of 22 multiparous Israeli dromedary camels was 414,954 cells/ml, and the average of bacteria-negative samples was 215,774 cells/ml.

In their study, Ayadi et al. (2013), on the amount and composition of mammary cistern and alveolar milk in dromedary camels in the 9th month of lactation, found the general averages of $\text{Log}_{10}\text{SCC}$ and SCC to be 5.16 ± 0.46 and 189,800 cells/ml, respectively, which were higher than the average obtained in this study and also the average obtained in the last period of lactation (5.67 ± 0.029 ; 467.735 cells/mL) found in this study.

Daily milk yield

The means and standard errors for DMY and milk components are given in Table 2. The mean DMY was 3.78 ± 0.23 kg, and the effect of all factors on DMY was insignificant ($P > 0.05$). Considering that in the farm where this study was conducted, camels were milked once a day and some residual milk was left in the udder for the calf to suckle, it can be predicted that the average DMY would be higher. In this study, it was determined that the amount of milk produced by the cows in the last group with high SCC was 1.2 kg lower than the cows in the 1st Group with low SCC, 0.74 kg lower than the cows in the second group and 1.15 kg lower than the cows in the third group (Table 2). In other words, cows in the group with high SCC produced 21% to 30% less milk than cows in the groups with low SCC, respectively. In a study they conducted to estimate the decrease in milk yield caused by the SCC level in camels, Atasever and Koç (2016) estimated that the increase in SCC in milk caused a daily decrease of 1.36 kg in milk yield and a decrease of 496.4 kg per lactation.

Although statistically insignificant, the DMY average shows an increase over the years, similar to Musaad et al. (2017) and Hadeef et al. (2018), it was observed that milk yield in camels in the middle of lactation was higher than at the beginning and end of lactation.

Although the DMY average obtained in this study is similar to that of Ishag et al. (2017) in Arabi and Rashaida ecotypes of Sudan, it is higher than the value reported in the same study for camels reared in a semi-intensive system (2.80 ± 0.53 Lt), but it is lower than the value reported in camels raised in an intensive system (6.22 ± 1.2 L).

Nagy et al. (2013) reported the mean DMY (5.8-6.7 kg) higher than the mean obtained in this study in all SCC groups. Similar to Nagy et al. (2013), in this study, DMY was found to be higher in groups with low SCC levels and lowest in the group with high SCC levels.

Milk constituents

The averages of PC, FC, LC, AC and DM were found to be $3.82 \pm 0.10\%$, $3.62 \pm 0.17\%$, $3.41 \pm 0.14\%$, $0.86 \pm 0.09\%$ and $11.75 \pm 0.18\%$, respectively. In 2021, when DMY was at its highest level, the averages of PC ($3.34 \pm 0.16\%$), FC ($3.41 \pm 0.27\%$) and DM ($11.26 \pm 0.29\%$) were low, while the averages of LC ($3.63 \pm 0.23\%$) and AC ($0.90 \pm 0.014\%$) were higher than other years (Table 2).

While the averages of FC ($4.30 \pm 0.39\%$), AC ($0.91 \pm 0.020\%$) and DM ($12.29 \pm 0.42\%$) were higher in the last period of lactation, where the lowest DMY was obtained, in the 2nd period, which represents the middle of lactation, where the DMY average was highest, PC ($3.82 \pm 0.17\%$) and DM ($11.80 \pm 0.30\%$) averages were found to be the lowest.



When milk components were evaluated according to SCC groups, it was determined that PC and FC levels increased in parallel with the increase in SCC (Table 2). However, unlike studies in dairy cattle, a similar trend did not seen in the LC. Studies conducted on dairy cattle have stated that the milk component most affected by the increase in SCC is LC, and some researchers (Barlowska et al., 2009; Forsbäck, 2010; Koç, 2015) even stated that the changes in LC is a sign of mastitis, based on the fact that the increase in SCC significantly reduces the milk LC level. Considering the LC values obtained from this study, it would be controversial to say that a similar trend may also apply to camels. Similar to Konuspayeva et al. (2009), in this study, a lower LC was obtained in camel milk than in bovine milk. Considering that the milk LC is especially related to the water balance of milk, it can be said that the lactose synthesis mechanism in camels differs more or less compared to cattle.

Çizelge 2. Daily milk yield, milk constituents and somatic cell count of camel milk

Factors	n	DMY, kg	PC, %	FC, %	LC, %	AC, %	DM, %
		$\bar{X} \pm S_{\bar{X}}$	$\bar{X} \pm S_{\bar{X}}$	$\bar{X} \pm S_{\bar{X}}$	$\bar{X} \pm S_{\bar{X}}$	$\bar{X} \pm S_{\bar{X}}$	$\bar{X} \pm S_{\bar{X}}$
Calving year		NS	**	NS	NS	NS	*
2019	21	3.22±0.5	4.20±0.20 ^a	3.83±0.3	3.24±0.2	0.85±0.017	12.11±0.36
2020	22	1	4.36±0.21 ^a	3	8	0.85±0.019	^{ab}
2021	27	3.45±0.5	3.34±0.16 ^b	4.31±0.4	2.89±0.3	0.90±0.014	12.61±0.39
		4		1	4		^a
		4.02±0.3		3.41±0.2	3.63±0.2		11.26±0.29
		9		7	3		^b
Lactation period		NS	NS	NS	NS	**	NS
1 (6-90 day)	27	3.70±0.4	4.17±0.18	3.35±0.3	3.42±0.2	0.78±0.016 ^a	11.89±0.33
2 (91-180 day)	28	8	3.82±0.17	1	6	0.90±0.015	11.80±0.30
3 (≥181 day)	15	3.84±0.3	3.91±0.23	3.83±0.3	3.20±0.2	^b	12.29±0.42
		9		2	7	0.91±0.020	
		3.15±0.5		4.30±0.3	3.13±0.3	^b	
		7		9	2		
SCC group, cell/ml		NS	**	NS	NS	NS	**
1(≤200.000)	17	3.99±0.5	3.27±0.22 ^a	2.95±0.3	3.31±0.3	0.83±0.019	10.38±0.40
	15	7	3.77±0.21 ^{ab}	7	1	0.87±0.018	^a
2(201.000-400.000)	19	3.53±0.5	4.33±0.19 ^b	3.99±0.3	2.89±0.3	0.88±0.017	11.65±0.38
	19	5	4.50±0.26 ^b	6	1	0.87±0.022	^{ac}
3(401.000-750.000)		3.94±0.4		4.13±0.3	3.68±0.2		13.02±0.34
		4		4	8		^b
4(>750.000)		2.79±0.6		4.49±0.4	3.13±0.3		12.94±0.47
		3		5	2		^{bc}
Overall	70	3.81±0.2	3.82±0.10	3.62±0.1	3.41±0.1	0.86±0.009	11.75±0.18
		4		7	4		

DMY: Daily milk yield, PC: Protein content, FC: Fat content, LC: Lactose content, AC: Ash content, DM: Dry matter, NS: Not significant, *:P<0.05, **:P<0.01, a,b,c: The difference between groups with the same letter is insignificant.

Similar to PC and FC, the lowest DM average was obtained in 2021, when DMY was high in this year. Interestingly, the DM percentage increased until the 3rd SCC group, where SCC increased, and the DM rate decreased in the 4th SCC group. The lowest DM percentage was obtained in the first group (10.40±0.40%), where SCC was the lowest and DMY was the highest. It is clearly seen that the low rate of DM seen in the first SCC group is also due to the low percentages of PC, FC and AC.

While the average milk components obtained for dromedary camels in this study are generally similar to the values reported in the literature for both dromedary and Bactrian camels, except for LC, it can be said that animal genotype, nutrition, climatic and seasonal factors are effective in the differences



obtained between the literature and this study. On the other hand, when compared to dairy cattle, the milk LC ratio is lower in dromedary camels, but considering the LC average in Bactrian camels reported by Xiao et al. (2022), the LC average in Bactrian camels is higher than in dromedary camels, and is even similar to or even higher than the LC ratio reported for dairy cattle.

Fatty acids profile

It has been observed that there are significant changes in the fatty acid profile of camel milk due to the herd composition and feeding changing from year to year (Table 3). The effect of calving year was found to be significant ($P < 0.05$) for almost all traits except C8:0, C16:0, CLA, Total UFA and SCFA. It is thought that the changes in the feed given to the animals according to the seasons are also responsible for the significant effects of the lactation period on the levels of some fatty acids.

The effect of SCC on Caproic Acid (C6:0), Tridecanoic Acid (C13:0), Myristic Acid (C14:0), Pentadecanoic Acid (C15:0), Pentadecenoic Acid (C15:1), Palmitic Acid (C16:0), Stearic Acid (C18:0), Oleic Acid (C18:1n9), Eicosadienoic Acid (C20:2), Docosadienoic Acid (C22:2), Docosahexaenoic Acid (C22:6n3), Total SFA, Total UFA, SCFA, MCFA, LCFA and AI were significant ($P < 0.05$).

In camel milk, the major fatty acids were determined to be palmitic (C16:0), oleic (C18:1n9c), stearic (C18:0), myristic (C14:0) and palmitoleic (C16:1) and the averages are $31.37 \pm 0.29\%$, $21.34 \pm 0.39\%$, $13.46 \pm 0.26\%$, $12.59 \pm 0.19\%$ and $12.01 \pm 0.21\%$, respectively and it was observed in the studies of Gorban and Izzeldin (2001) and Zibae et al (2015) that the major fatty acids were the same as those obtained in this study.

Similar to what was obtained in this study, Gorban and Izzeldin (2001) reported that the major UFA acids in camel milk are oleic (C18:1n9c) and palmitoleic (C16:1) acids, however, the means obtained in this study for oleic and palmitoleic acids are higher than those reported by Gorban and Izzeldin (2001).

Similar to the major fatty acids in the first period of lactation determined in dromedary camels in this study, Xiao et al. (2022) also reported oleic (26.25-32.20%), palmitic (29.42-31.69%), myristic (11.06-13.22%), stearic (8.58-10.25%) and palmitoleic (8.69-9.47%) acids as the the major fatty acids in the first 90 days of lactation in Bactrian camels. The levels of stearic ($12.71 \pm 0.48\%$) and palmitoleic ($12.90 \pm 0.40\%$) acids obtained in the first lactation period were higher than the averages reported by Xiao et al. (2022) in the same period in Bactrian camels, additionally, palmitic ($31.40 \pm 0.53\%$) and myristic ($11.36 \pm 0.35\%$) acid levels are similar to the averages reported by Xiao et al (2022), however, the level of oleic acid ($22.54 \pm 0.72\%$) is lower than the value of Xiao et al (2022).



Table 3. Dromedary deve sütü yağ asidi profili (%)

Factors	n	SFA	UFA	PUFA	SCFA	MCFA	LCFA	AI
		$\bar{X} \pm S_{\bar{X}}$	$\bar{X} \pm S_{\bar{X}}$	$\bar{X} \pm S_{\bar{X}}$	$\bar{X} \pm S_{\bar{X}}$	$\bar{X} \pm S_{\bar{X}}$	$\bar{X} \pm S_{\bar{X}}$	$\bar{X} \pm S_{\bar{X}}$
Calving year	21	** 61.67±0.88	NS 38.22±0.74	** 3.40±0.18	NS 0.61±0.05	* 58.67±1.02	* 40.70±1.04	** 1.36±0.07 ^a
	2019	a 22	39.33±0.79	a 3.67±0.19	a 0.45±0.05	ab 57.62±1.07	ab 41.94±1.10	b 1.65±0.08 ^b
	2020	a 27	62.81±0.93	37.89±0.61	a 3.67±0.19	a 0.49±0.04	a 57.62±1.07	a 2.38±0.06 ^c
	2021	b 69.32±0.72	4.43±0.15	b 61.19±0.83	b 38.31±0.85			
Lactation period	27	* 62.06±0.81	** 40.33±0.68	NS 3.81±0.16	NS 0.52±0.05	NS 59.56±0.94	NS 39.95±0.96	** 1.38±0.07 ^a
	1 (6-90 day)	a 28	37.13±0.61	a 3.88±0.14	a 0.54±0.04	a 59.61±0.83	a 39.87±0.85	b 1.98±0.07 ^b
	2 (91-180 day)	b 15	67.04±0.72	b 37.13±0.61	b 3.81±0.21	b 0.49±0.06	b 58.29±1.19	b 41.22±1.21
	3 (≥181 day)	ab 64.71±1.03	ab 37.98±0.87					
SCC group, cells/ml	17	* 65.33±0.99	** 37.69±0.83	NS 4.09±0.20	* 0.66±0.06	* 62.32±1.14	** 37.03±1.16	** 1.99±0.08 ^a
	1 (≤200.000)	ab 15	a 37.69±0.83	a 3.78±0.19	a 0.66±0.06	a 62.32±1.14	a 37.03±1.16	ab 1.81±0.08 ^{ab}
	2 (201.000-400.000)	ab 19	a 64.83±0.93	a 37.88±0.79	a 3.80±0.16	ab 0.52±0.05	ab 50.01±1.08	ab 40.48±1.10
	3 (401.000-750.000)	a 19	a 66.51±0.80	a 36.94±0.68	b 3.67±0.23	b 0.44±0.05	ab 58.90±0.93	ab 40.68±0.95
	4 (>750.000)	b 61.73±1.14	b 41.42±0.97		ab 0.44±0.07	b 56.40±1.32	b 43.18±1.35	b 1.47±0.10 ^b
Overall	62	65.85±0.44	37.95±0.37	3.94±0.09	0.53±0.03	59.94±0.51	39.55±0.52	1.89±0.04

NS: Not significant, *:P<0.05, **:P<0.01, a,b,c: The difference between groups with the same letter is insignificant.

SFA: Saturated fatty acid, UFA: Unsaturated fatty acid. PUFA: Polyunsaturated fatty acid, SCFA: Short chain fatty acid (Σ C4:0 to C10:0); MCFA: Medium chain fatty acid (Σ C12:0 to C16:1); LCFA: Long chain fatty acid (Σ C17:0 to C20:0).

NS: Not significant, *:P<0.05, **:P<0.01, a,b: different letters in the same column show significance for P<0.05.

Atherogenic index (AI) = (C12:0+(4*C14:0)+ C16:0)/ (C14:1+C16:1+C18:1+C18:2+C18:3)

On the other hand, while MCFA had the highest percentage in this study (59.94±0.51%), it was followed by LCFA with 39.55±0.52%, and SCFA showed a very low value with 0.53±0.03%. Similar to what Gorban and Izzeldin (2001) and Konuspayeva et al. (2007) reported in dromedary camel milk, and Xiao et al. (2022) in Bactrian camel milk in the first 90 days of lactation (0.35-0.57%), the SCFA level in camel milk was found to be low (0.53±0.03%). In their study, Gorban and Izzeldin (2001) reported the SCFA level as 0.1%, lower than that found in this study, and Konuspayeva et al. (2007) reported it as 0.89±0.55%, higher than that found in this study. The difference could be attributed to the difference in the type of feed given to the animals and also the camel genotypes.

It was observed in this study in dromedary camels and Bactrian camel milk by Xiao et al. (2022) showed that the SCFA level is considerably lower than that in bovine milk, and Barłowska et al. (2011) stated that the SCFA level in camel milk was 6-8 times lower than cattle, sheep, goat and buffalo milk. Additionally, the SCFA level determined in dromedary camel milk in this study was 12.5 times lower than the value reported by Turini et al. (2020) for Italian Holstein-Friesian cows.



In this study, the SFA rate in dromedary camel milk was the highest with $65.85 \pm 0.44\%$, while UFA was the lowest value with $37.75 \pm 0.37\%$ and PUFA with $3.94 \pm 0.09\%$. On the other hand, unlike Gorban and Izzeldin (2001), higher PUFA levels were obtained in this study. The SFA ($65.85 \pm 0.44\%$) and PUFA ($3.94 \pm 0.09\%$) levels obtained in this study are similar to the values obtained by Turini et al. (2020) in Italian Holstein-Friesian dairy cattle. Turini et al. (2020) determined the SFA and PUFA values as 65.5% and 4.12%, but in this study, the UFA ($37.95 \pm 0.37\%$) level obtained in camel milk was higher than that reported by Turini et al (2020).

SFA level obtained in this study in dromedary camel milk ($65.85 \pm 0.44\%$) was slightly higher than the level reported for Bactrian camel milk in the first 90 days of lactation (52.56-58.84%) by Xiao et al. (2022), however, Markiewicz-Kęszycka et al (2013) reported higher levels for goat (68.79%), sheep (64.23%) and cow (68.72) milk. Additionally, the UFA/SFA ratio in camel milk is higher compared to the milk of cattle and other mammal species (Konuspayeva et al. 2007).

In this study, while the CLA percentage was $0.11 \pm 0.01\%$, the mean AI, which is highly associated with the incidence of coronary heart disease in consumers, was 1.89 ± 0.04 . Konuspayeva et al. (2020) stated that AI is lower in camel milk (2.7) than in standard fed cow's milk (3.3-3.5). In this study, a result in this direction was obtained, and the average AI found (1.89 ± 0.04) was lower than the average (2.75 ± 0.91) reported by Konuspayeva et al. (2007) in dromedary milk, and is close to the average (1.6 ± 0.33 and 2.08 ± 0.16) reported in Bactrian milk by Xiao et al. (2022). On the other hand, it was noted in this study that the average AI increased in parallel with the progress of lactation. The average AI (1.89 ± 0.04) obtained in this study is lower than the values reported by Markiewicz-Kęszycka et al. (2013) for sheep (2.01), goat (2.88) and cow (2.55) milk. On the other hand, it was observed that the AI average moved inversely proportional to the SCC level and the AI average decreased as the SCC increased (Table 3).

Although it has been clearly demonstrated by studies that increased SCC level causes significant changes in the milk composition of different farm animal species, there are almost no studies on the effect of SCC level on the milk fatty acid profile. One of these studies was conducted in Italian Holstein Friesian dairy cattle (Turini et al., 2020), and the researchers reported that the milk SCC level significantly affected the *de novo* synthesis and biohydrogenation factors, and stated that the *de novo* synthesis factor values decreased significantly from the healthy udder to the mastitis udder. Additionally, Turini et al. (2020) stated that the very low level of SCC in milk is associated with optimal fatty acid synthesis in the mammary gland.

Conclusion

In this study, in addition to revealing the changes in DMY, milk components and fatty acid profile in dromedary camels according to year and lactation period, the changes caused by SCC in these traits were also revealed. It was determined that DMY decreased by up to 30%, especially in the high SCC group, and it was determined that there was a need for studies to reveal whether the threshold value for udder health in camels was different from cattle. Moreover, although SCC creates significant changes in PC and DM, unlike cattle, no significant decrease in LC level was detected in camels due to the increase in SCC in this study. Considering the low LC level in camel milk obtained in the literature, it can be evaluated that LC, which has an important relationship with the water balance of milk, may differ more or less in camels compared to cattle. It is thought that the changes caused by the year of calving, especially in the dromedary milk fatty acid profile, cause significant variation in the feed given to the animals from year to year, as well as the changing animals in camels due to the birth of offspring every two years. While it can be said that seasonally changing feeding and environmental temperature and humidity are also effective in changing the levels of some fatty acids according to the lactation period, it can be said that *de novo* mammary fatty acid synthesis is associated with the increase in milk SCC level.

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ZAMAN YÖNETİMİ VE HEMŞİRELİKTE ZAMAN YÖNETİMİNİN ÖNEMİ TIME MANAGEMENT AND IMPORTANCE OF THE TIME MANAGEMENT IN NURSING

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ÖZET

Zaman, durdurma, devretme ve biriktirme olanağı olmayan ve tüm bireylere eşit miktarda dağıtılmış eşsiz bir kaynaktır. Çağımız insanı için zaman yetersizliği en önemli sorunlardan biridir. Mevcut zaman dilimi içerisinde eldeki tüm kaynakların etkili ve verimli kullanımı anlamına gelen zaman yönetimi, çalışma ve özel yaşamın dengelenmesi açısından büyük önem taşımaktadır. Hemşirelik mesleğinin doğası gereği hemşireler birçok işi aynı anda yapmak ve hızlı karar vermek zorunda kaldıklarından zaman yönetimi ayrı önem taşımaktadır. Hemşirelerin boşa harcadıkları zaman, bakımın kalitesinin doğrudan olumsuz etkilenmesine ve bakım sonuçlarının kötüleşmesine neden olabilir. Hemşirelik eğitimi sırasında mesleki bilgi ve becerinin yanı sıra zaman yönetimi bilgi ve becerisinin kazandırılması hemşirelerin yönetim yeteneklerinin gelişmesine, insan kaynaklarının korunmasına ve stresin azalmasına yardımcı olabilir. Bu derlemede, zaman yönetiminin önemi, ilke ve yöntemleri hakkında genel bilginin yanı sıra hemşirelerde zaman yönetimi ile ilgili çalışma sonuçlarına yer verilmiştir. Bu yolla her kademedeki görev alan hemşirelerin zaman yönetim yaklaşım ve yöntemlerini uygulayarak zamanlarını etkili ve verimli kullanmalarına katkı sağlamak amaçlanmıştır. Yapılan literatür incelemesinde hemşirelerin zamanlarının azımsanmayacak bir kısmını doğrudan bakım uygulamalarının dışındaki işlere harcadıkları, birçok zaman tuzağına düştükleri belirlenmiştir. Bununla birlikte hemşirelerde zaman yönetiminin yaş ve mesleki deneyimle birlikte arttığı, cinsiyet ve medeni duruma göre değiştiği, iyi zaman yönetimi eğitimi ile hasta bakım kalitesinin ilişkili olduğu sonucuna varılmıştır.

Anahtar Kelimeler: Hemşirelik; zaman yönetimi; zaman yönetim teknikleri

ABSTRACT

Time is a unique resource that cannot be stopped, transferred or accumulated and is equally distributed to all individuals. Lack of time is one of the most important problems for the modern man. Time management, which means the effective and efficient use of all available resources in the current time frame, is of great importance in terms of balancing work and private life. Due to the nature of the nursing profession, time management is of particular importance as nurses have to do many things at the same time and make quick decisions. The time nurses waste can directly affect the quality of care and worsen care outcomes. In addition to professional knowledge and skills during nursing education, gaining time management knowledge and skills can help nurses to develop their management skills, protect human resources and reduce stress. In this review, general information about the importance, principles and methods of time management, as well as the results of the study on time management in nurses are given. In this way, it is aimed to contribute to the effective and efficient use of time by the nurses



working at all levels by applying time management approaches and methods. In the literature review, it was determined that nurses spend a considerable part of their time on works other than direct care practices, and they fall into many time traps. In addition, it was concluded that time management in nurses increases with age and professional experience, changes according to gender and marital status, and good time management education is associated with patient care quality.

KeyWords: Nursing; time management; time management techniques

GİRİŞ

Bireylerin sahip olduğu önemli bir kavram olan zaman; hissedilen, satın alınamayan, değeri sürekli artan, harcanan, yavaşlatılıp hızlandırılmayan, durdurulamayan, yerine konulamayan ve geri döndürülemeyen soyut bir değerdir (Akcoltekin, 2015; Cyrıl, 2015; Çimen, Ekinci, Altınok ve Özdilek, 2017).

Zaman yetersizliği çağımız insanı için büyük sıkıntı oluşturan önemli sorunlardan biri halini almakta olup zaman yetersizliğinin çözümü insanların zamanı etkili ve verimli bir şekilde kullanmaları için önemli olmaktadır (Erdem, Pirinççi ve Dikmetaş, 2005). Zamanın etkili ve verimli kullanılması için sahip olunan her dakika ve saat, belirli bir hedef ve amaç doğrultusunda planlanarak kullanılmalıdır. Burada planlanmak istenen sınırlı olan zamanı artırmak değil sınırlı zaman içinde yapılan faaliyetlerin niteliğinin artırılması yani zamanın iyi yönetilmesidir (Tutar, 2015).

Zaman yönetimi, kişinin özel ve iş hayatında amaçlarına etkili ve verimli bir şekilde ulaşabilmesi için planlama, organize etme, yöneltme ve kontrol etme gibi yönetim fonksiyonlarını kendi faaliyetlerine uygulama sürecidir (Eroğlu ve Özgür, 2016). Zaman yönetimi tüm alanlarda olduğu gibi sağlık hizmetinin yürütülmesinde de oldukça önemlidir.

Sağlık hizmeti 24 saat boyunca devam eden bir hizmettir. Sağlık hizmetlerinde zaman yönetimi hasta bakım ve tedavisinin aksamadan devamını sağladığı gibi günün her anını verimli bir şekilde planlama kolaylığı da sağlamaktadır. Zamanın doğru yönetilmemesi diğer sektörlerde maddi kayıplara neden olabileceken, sağlık sektöründe hem maddi kayıplara hem de can kayıplarına neden olabilir (Boduç ve Baykal, 2021). Hemşirelik mesleğinde, kısa sürede hayati işlerin doğru ve kaliteli yapılması için zaman yönetimi çok önemlidir.

Hemşirelik bakımı çok yönlü ve hasta gereksinimlerine göre sürekli değişen dinamik bir süreçtir. Hemşire, bakım sunduğu kişilerin sağlık durumuna uygun öngörülebilir ve planlanmış bakım sunarken; bakım gereksinimlerinde ortaya çıkan ani değişimlerle birlikte artan bakım talepleri ile sıkça karşılaşabilmektedir. Zamanın iyi yönetilmemesi durumunda: Taleplerin zamanında ve etkin karşılanamaması, bakım hizmetinin ertelemeye uygun hizmet özelliğinde olmaması nedeniyle hemşirenin iş yükü ile baş etmede zorlanması ve hasta bakım sonuçlarında kötüleşme ve ölüm ile sonuçlanabilir. Hemşirelerin etkisiz zaman yönetimi ile ilgili sonuçlar sadece kendilerini ve hastaları değil; iş arkadaşları, aileleri ve çalıştıkları tüm organizasyonu etkileyerek önemli sorun kaynağı olabilmektedir. Hemşirelikte zaman israfının ve zaman yönetiminde yaşanan eksikliklerin iş verimsizliğine ve performans düşüklüğüne neden olacağı belirtilmektedir (Ziapour, Khatony, Jafari ve Kianipour, 2015).

Zaman yönetimi hemşirelerin etkili iletişim, planlama, öncelik belirleme ve yetki devriyle, daha kısa sürede daha çok hastanın gereksinimini karşılamasına, bakmakta olduğu kişileri daha iyi tanımalarına ve tıbbi hataların azalmasına olanak sağlar. Bu sonuçlar, hasta ve sağlıklı bireye verilen hizmet kalitesinin artmasına, hastaların iyileşme sürecinin hızlanmasına neden olacaktır (Kuşçu Karatepe ve Atik, 2015). Zaman yönetimi hemşirelerin iş yaşantısının yanı sıra kişisel yaşamlarında da büyük önem taşıdığından her kademedeki hemşirelerin (yönetici hemşireler, öğrenci hemşireler, klinikte çalışan hemşireler gibi) zaman yönetimini başarıyla gerçekleştirmesi gerekmektedir (Mirzaei, Ravari, Oskouie ve Raffi, 2012).

Bu derlemede, her kademedeki görev alan hemşirelerin zaman yönetimi konusunda bilinçlenmelerine, çalışma ve özel yaşamlarında zaman yönetim yaklaşımları ve yöntemlerini uygulayarak zamanlarını etkili ve verimli kullanmalarına katkı sağlanması amaçlanmıştır.



1.Zaman Kavramı

Zamanı ölçmek için tarih boyunca pek çok metot denenmiştir. Zaman ayrımı ilk çağlarda sadece mevsimlere göre yapılmış ilerleyen dönemlerde daha küçük ayrımlara gidilerek, aylara, haftalara, günlere ihtiyaç duyulmuştur (Başak, Uzun ve Arslan, 2008). Sümer Uygarlığı yılları ve günleri ilk tanımlayanlardır. Ardından Mısırlılar, Yunanlılar ve Romalılar bu konu ile ilgili çalışmalar yapmışlardır. Bu çalışmalarla birlikte zaman içinde yıllar, aylar, günler derken saatler, dakikalar ve saliseler de ölçülmeye başlanmıştır (Çağlıyan ve Göröl, 2009).

Zamanın bireylere, ortamlara göre anlamı değişebilme olup Türk Dil Kurumu (TDK, 2021) sözlüğüne göre zaman: Bir işin, bir oluşun içinde geçtiği, geçeceği veya geçmekte olduğu süre, vakit; bu sürenin belirli bir parçası; belirlenmiş olan an; çağ, mevsim; bir işe ayrılmış veya bir iş için ayrılmış saatler, vakit; dönem, devir olmak üzere altı ayrı anlamda tanımlanmaktadır. Zaman kavramı, satın alınamaz, biriktirilemez, üretilemez, başka bir şeyle değiştirilemez ve durdurulamaz tek kaynaktır. Bu nedenle, hayat boyunca en iyi şekilde kullanılması gerekir (Türe, 2013).

Zaman herkes için eşittir. Her bireyin günde 24 saati; haftada yedi günü vardır. Zaman yaşamdır denilebilir. Yaşam çok çeşitli ve çok yönlü eylemlerle doludur. Eylemlerin değeri de çoğu kez zamanla ölçülür. İşlerin zamanında başlaması, bitmesi, zamanında işe gelme ve gitme, söz verme, insan ve diğer varlıkların gelişimi hep zamanla değerlendirilir. Sınırlı bir yaşam süresine sahip olunduğu için zamanı en iyi şekilde değerlendirmek gereklidir (Güçlü, 2001). Zaman kullanımının bazı faktörlere göre (kişi, coğrafya, içinde bulunulan kurum, kültürel ve sosyal yapı gibi) farklılık gösterebileceği de unutulmamalıdır (Türe, 2013).

Hissedilen zaman ile saatin gösterdiği zaman birbirinden farklıdır. Konu ile ilgili bilimsel yazılar ele alındığında, bu farklı algılamayla ilgili sınıflandırmaların yapıldığı görülmüştür. Bunlar; gerçek zaman, psikolojik zaman, biyolojik zaman, sosyolojik zaman, örgütsel zaman, yönetsel zaman, çalışma zamanı ve boş-serbest zamandır (Akatay, 2003).

2. Zaman Yönetimi

Zaman yönetimi; zamanı etkin ve etkili bir biçimde kullanma ve denetleme sistemidir. İhtiyaçları tanımlamayı, bu ihtiyaçları karşılayacak hedefleri ve amaçları belirlemeyi, gereken görevleri öncelik sıralamasına koymayı, bu görevleri planlama, listeleme ve zaman programına koyarak zamanla ve kaynaklarla uyumlu hale getirmeyi içermektedir (Uyar, Kıraç ve Kıraç Çiftci, 2020). İnsanın kendini, işlerini ve diğer faaliyetleri yönetme, kendine daha kaliteli vakit ayırarak geleceğini planlama ve yeni fikirler üretme olanağı sağlamaktadır. Bu durumda zaman yönetimi, üretkenliği kolaylaştıran ve stresi azaltan faaliyetler olarak tanımlanabilir (Yüksel ve Özişli, 2021). Diğer yandan zaman yönetimi yalnızca işlerin örgütlenmesi veya programlanması değil, öz kontrol (öz yönetim) yapabilmektir. Bu durumda da tüm herkese uyan sabit bir zaman yönetim tarzı yoktur. Her birey kendi ihtiyaç ve sorumluluğuna göre zaman yönetimini düzenlemelidir (Kuşçu Karatepe ve Atik, 2015; Sever Aslan, 2021).

2.1. Zaman yönetiminin faydaları

İlgili literatüre göre (Başak, Uzun ve Arslan, 2008; Adar Uyaniker, 2014; Ebrahimi, Hosseinzadeh R, Zaghari ve Hosseinzadeh S, 2014; Elsbahy, Sleem ve El Atroush, 2015; El-Shaer,2015; Aeon ve Aguinis, 2017; Boduç ve Baykal, 2021) etkin zaman yönetiminin başlıca faydaları aşağıda belirtilmiştir;

- Sağlıklı bir iş-yaşam dengesinin kurulması,
- Zaman kısıtlılığı ve zamanın esiri olmak kavramlarını azaltması,
- Kısıtlı zamanın kişiler üzerinde oluşturduğu baskı ve stresi azaltmaya yardımcı olması,
- Zaman tuzaklarını (plansızlık, mükemmeliyetçilik, hayır diyememe, erteleme...) ortadan kaldırarak kişisel ve mesleki yaşamların düzenlenmesine yardımcı olması ve hedeflere ulaşmayı kolaylaştırması,
- Bireylerin kendilerine ayırdıkları zamanı artırarak, stratejik düşünce ve uygulamalara, yeni fikir ve projeler oluşturmaya, kariyer planlama ve geleceğe hazırlanmaya, teknolojik gelişmeleri takip



etmeye, eğlenmeye, dinlenmeye, rahatlamaya, aile, arkadaş ve diğer kişilere daha fazla zaman ayırabilme ve gerçek potansiyellerinin sınırlarını öğrenerek genişletebilmelerine olanak sağlaması,

- Başlangıç ve bitişi belirlenmiş zaman dilimleri içinde daha çok işin yapılmasını sağlayarak , işletmelere üretim ve pazarlama faaliyetlerinde rekabet üstünlüğü oluşturması,
- Kalite ve verimliliğin artmasını sağlaması,
- İş performansı ve iş memnuniyetinin artması,
- Tükenmişlik duygusunun azalması,
- Değişime uyumun kolaylaşmasını sağlaması,
- Yöneticilerin kesintileri daha iyi denetleyebilmelerini sağlaması,
- Erteleme ve oyalama durumlarını azaltması ya da engellemesi,
- İşletmelerde toplantıların daha etkin ve verimli yapılmasını sağlaması,
- Çalışanlar arasında takım ruhunun daha kolay oluşmasını sağlamaya yardımcı olması,
- Çalışanların ve yöneticilerin kendine olan güvenlerini artırmalarına yardımcı olması,
- İşletmelerde disiplin anlayışının gelişmesine yardımcı olması,
- Astların sorumluluk duygusu ve becerilerinin gelişmesine katkıda bulunması,
- Çalışanlarda, nerede oldukları ve onlardan nelerin beklediği konusunda farkındalığı arttırması

2.2. Zaman yönetimini etkileyen faktörler

Zaman yönetimini iyi yapabilmek için sadece zamanın nasıl kullanılacağını bilmek yeterli olmamakta, etkileyen faktörlerin de bilinmesi gerekmektedir. Zaman yönetimini etkileyen birden çok faktör bulunmaktadır. Zamanın etkili ve verimli kullanılmasının önüne geçerek, kötü yönetilmesine neden olan bu olumsuzluklara zaman tuzakları da denilmektedir (Boduç ve Baykal, 2021).

Kişilik yapıları ve çalışma alışkanlıkları zaman yönetimini etkileyen faktörlerin başında gelmektedir. Zaman yönetimini iyi yapmak isteyen kişinin öncelikle kendini denetleyebilmesi ve kendini iyi tanıması gerekmektedir. Bireylerin doğuştan, aldığı eğitimden veya yaşadığı çevreden kazandığı alışkanlıklardan dolayı bazı farklılıklara sahip olması beklenir. Bu farklılıklar zaman kullanımında önemli bir etkiye sahiptir. Çünkü plansız ve dağınık çalışma, kendini denetleyememe, aceleci davranma, bir iş bitmeden diğerine başlama, analitik düşünme becerisine sahip olmama, bireysel hedeflerin belirsiz olması, iş akışının farkında olmama, başkalarına fazla güvenme, işi yaparken oyalanma, işleri erteleme, etkisiz iletişim kurma, kararsız kişilik yapısı gibi özellikler zaman kaybına neden olmaktadır. Yeniliklere direnme, aşırı mükemmeliyetçilik, hayır demeyi bilmeme, aşırı sosyal ya da asosyal ilişkiler, açık kapı uygulaması, stres ve zaman baskısı gibi kişisel tutum ve alışkanlıklar da zaman kaybının diğer nedenleridir (Özer, 2012; Kibar, Fidan ve Yıldiran, 2014; Baykal ve Türkmen, 2014: 125, 139; Ekici, 2017: 228, 234).

Yönetim anlayışından kaynaklanan planlama, yürütme, örgütlenme ve denetim işlevlerinin tam yapılmaması faktörleri de zaman yönetimini etkilemektedir. Kurumun amacının açık olmaması, yapılacak işlerin planlı olmaması, uzun süren gereksiz toplantılar, merkezi yönetim anlayışının olması, çalışanlar arasında yeterli işbirliğinin ve koordinasyonun sağlanamaması, emir-komuta zincirinin işlememesi, yetersiz iletişim, yetki devrinden kaçınma ya da gereksiz yetki devri yapma, görev ve iş tanımlarının yapılmaması, personel sayısının yetersiz olması, çalışanlar arasında gruplaşma ve çatışmanın var olması da zaman tuzaklarının yönetsel faktörlerdir (Kibar, Fidan ve Yıldiran, 2014; Baykal ve Türkmen, 2014: 125, 139; Tutar, 2015: 14-24; Ekici, 2017: 228, 234; Sever Aslan, 2021; Boduç ve Baykal, 2021) .

İşten kaynaklanan yetersiz sekreteryaya, beklenmeyen ziyaretçiler, çalışma arkadaşlarıyla yapılan gereksiz konuşmalar ve telefon görüşmeleri, örgütsel belirsizlik ve kriz durumları, ergonomik olmayan çalışma ortamı, iş kazaları, bürokrasi ve kırtasiyecilik te zaman tuzaklarına neden olan diğer faktörlerdendir



(Özer, 2012; Kibar, Fidan ve Yıldırım, 2014; Baykal ve Türkmen, 2014: 125, 139; Tutar, 2015: 14-24; Ekici, 2017: 228, 234; Sever Aslan, 2021; Boduç ve Baykal, 2021). Bunlara ek olarak bilgi sistemleri de doğru kullanılmadıkları ve nasıl kullanılacağına bilinmemesi durumunda zaman zaman tuzağına dönüşmektedir (Aydın ve Koçak, 2016).

2.3. Zaman yönetimi süreci

Zaman yönetimi süreci, ilgili literatüre göre (Akgemci, Çelik, Aydoğan ve Akatay, 2003: 32, 52) sekiz aşamadan oluşmaktadır. Bunlar; Zaman kullanımını analiz etme, Zaman problemlerini tanımlama, Kendini tanımlama, Amaç, hedef ve öncelikleri belirleme, Program hedeflerini uygulama planlarına aktarma, Günlük, haftalık planlar ve programlar hazırlama, Zamanı etkin kullanma yöntemlerini geliştirme, Süreci analiz etme ve yeniden izlemedir.

2.4. Zaman yönetimi yaklaşımları

Zaman kaybına neden olan problemlerin üstesinden gelmek ve zaman yönetimi üzerinde etkinliğin daha fazla olabilmesi için geliştirilen her birinin kendi içinde güçlü ve zayıf yönlerinin olduğu zaman yönetimi yaklaşımları bulunmaktadır. İlgili literatüre (Gürbüz ve Aydın, 2012; Özer, 2012; Sever Aslan, 2021) göre bunlar; düzenli yaşama (kendini toparla) yaklaşımı, savaşçı (hayatta kalma ve bağımsız üretim) yaklaşımı, hedef belirleme (başarı) yaklaşımı, ABC (önceliklerin sıralanması ve değerlerin belirlenmesi) yaklaşımı, sihirli araç (sistem ve teknoloji) yaklaşımı, beceri (101) yaklaşımı, iyileştirme (rehabilitasyon/ özbilinç) yaklaşımı ve kendini akıntıya bırakma (uyum ve doğal ritimler) yaklaşımıdır.

2.5. Zamanı etkin kullanma yöntemleri

Zamanı etkin kullanmak, asıl amaçlara ulaşmak için yapılacak eylemlere zaman ayırmayı gerektirir. Zamanı etkin kullanma yöntemleri, zaman yönetimi becerilerini geliştirerek çok fazla çalışmak yerine etkili çalışma yeteneğini kazandırmayı amaçlamaktadır (Meiring, 2017; Boduç ve Baykal, 2021). İlgili literatüre (Özer, 2012; Sever Aslan, 2021) göre bu yöntemler; planlamaya önem verme, zaman tutanağı hazırlama ve gün sonu analizi, zaman kullanım matrisi, pareto analizi, aktivite mekanizmasının analizi, enerji periyotlarını tanıma, yetki devrinin yaygınlaştırılması, stres yönetimi, ertelemekten kaçınma, "Hayır" demeyi öğrenme, etkin ve hızlı okuma tekniklerini geliştirme, etkili iletişim sağlama, masa düzeni ve dosyalama sistemi, ziyaretçi planlaması, ajanda kullanımı, sekreterlik hizmetlerinin etkin kullanımı, etkili toplantı yönetimi ve iletişim araçlarının etkin kullanımınıdır.

3. Hemşirelikte Zaman Yönetimi

Hemşirelik, büyük çaba gerektiren bir meslek olmakla birlikte, sağlık çalışanlarının sayısal olarak çoğunluğunu oluşturan ve bakım hizmetinin kalitesini önemli boyutta etkileyen bir güçtür. Hemşirelik mesleğinin doğası gereği hemşireler birçok işi aynı anda yapmak ve aynı zamanda bazı kararları da vermek zorunda kaldıklarından zaman yönetimini iyi yapmaları gerekmektedir (Ebrahimi ve arkadaşları, 2014; Ziapour ve arkadaşları, 2015; Habib A, Afzal, Hussain, Naseer, Habib T ve Gilani, 2018). Çünkü hemşirelikte geç kalınan ya da doğru yapılmayan bir hemşirelik uygulaması hastanın iyileşme süresinin uzamasına, sakat kalmasına ya da ölümüne neden olabilmektedir (Boduç ve Baykal, 2021).

Hemşirelerde bireysel anlamda kariyeri daha iyi planlama, geleceğe hazırlanma, daha fazla okuma ve öğrenme, yeni teknolojiyi ve gelişmeleri takip etme, dinlenme, eğlenme yeni fikirler yaratma, projeler oluşturma ve mesleki hedeflere ulaşmak için zamanı kullanmanın en iyi yolu zaman yönetimidir. Hemşirelerde zaman yönetimi, becerilerin ve olumlu davranışların gelişimine katkı sağlamaktadır (Yüksel ve Özişli, 2021; Boduç ve Baykal, 2021). Hemşirelik öğrencilerinden başlayarak hemşireliğin tüm alanlarında zaman yönetim becerileri ve davranışlarının geliştirilmesi başarılı hemşireler yetişmesine ve hemşirelik mesleğinin en iyi şekilde yapılmasına katkı sağladığı görülmektedir (Başak, Uzun ve Arslan, 2008; İz ve Özen, 2010).

Sağlık sisteminde; yetersiz hastaneler ve donanımları, sağlık insan gücü planlamasındaki eksiklikler, hasta sayısındaki fazlalık, çalışma koşullarının kötü olması, ergonomik olmayan fiziksel ortamlar, ekip içi çatışmalar, fazla iş yükü, uzun ve düzensiz mesai saatleri, mesleki riskler, adil ve şeffaf yönetim anlayışının olmaması, rol ve iş tanımındaki belirsizlikler, hasta bakımının yarattığı kaygılar, hasta ve



hasta yakınıyla iyi bir iletişimin kurulması ve sürdürülmesi zorunluluğu, karmaşık teknolojik cihazları kullanma, alandaki yenilikleri takip etme gereği gibi birçok konuda zorlukların olması hemşireler için zaman yönetimini önemli kılmakta ve zaman yönetiminin; yaklaşımlarının, yöntemlerinin ve süreçlerin iyi bilinmesini gerektirmektedir (Ekici, 2017: 228, 234; Tuna, Kahraman ve Ödül Özkaya, 2020; Chousein ve Aslan, 2022).

Hemşirelik hizmetlerinde mesleki misyona yönelik uzun, orta ve kısa vadeli amaçların belirlenmesi, bu amaçlara yönelik veri toplanması, problemlerin saptanması, bu problemlere yönelik çözüm yollarının araştırılması, uygulanması ve sonuçların gözden geçirilerek değerlendirilmesi zaman yönetim süreçlerini oluşturur ve zamanın etkin yönetilmesi için bu süreçlerin kullanılması gerekir (Sever Aslan, 2021). Çünkü zamanın etkin yönetilmemesiyle ortaya çıkan zaman yetersizliği bazı hemşirelik uygulamalarının daha kısa sürede yapılmasına, yeterli bakımın hemşireler tarafından verilememesine ve hasta bakımında gözden kaçırılan durumların oluşmasına neden olmaktadır. Bu durum zaman yönetimi davranışlarının bakımın kalitesini etkilemede önemli etkiye sahip olduğunu göstermektedir (Ebrahimi ve arkadaşları, 2014; Ghiasvand, Naderi, Tafreshi, Ahmedi ve Hosseini, 2017; Goudarzian, Ranjbar, Babaei Hatkehlouei ve Heidari Gorji, 2017; Boduç ve Baykal, 2021). Zaman yetersizliği ayrıca hasta memnuniyetinin azalmasına, hastanın hastanede kalış süresinin uzamasına, bakım maliyetlerinde artış olmasına, hemşirelerde; iş doyumunun azalmasına, iş kazaları ve meslek hastalıklarının artmasına, yoğun stres duygusunun yaşanmasına, yorgunluğa ve tükenmeye de neden olmaktadır (Ebrahimi ve arkadaşları, 2014; Goudarzian ve arkadaşları, 2017; Habib A. ve arkadaşları, 2018). Bu döngü sadece örgütsel amaçlara ulaşmayı zorlaştırmamakta aynı zamanda tüm sağlık çalışanlarını olumsuz etkileyerek sağlık hizmetinin aksamasına neden olmaktadır (Ebrahimi ve arkadaşları, 2014; Boduç ve Baykal, 2021). Bu aşamada zaman yönetimi süreçlerinin bilinmesi ve uygulanmasından faydalanılarak birçok görevin yerine getirilip aksamaların giderilmesi sağlanabilir.

Hemşireler zaman yönetiminin birçok uygulamada farklı yöntemlerini kullanırlar. Bu yöntemler çok çalışmak yerine planlı çalışmayı, hangi aktiviteye ne kadar zaman harcanacağına bilinmesi, hangi personelin bu aktivite için uygun olacağına ön görülmesi, yapılacak işlerin yönetilmesi, zaman baskısının oluşturduğu gerilimin azalması, psikolojik iyi halin oluşması vb. gibi birçok duruma katkı sağlamaktadır (Uyar, Kırac ve Çiftci Kırac, 2020). Zaman yönetimi yöntemlerine başlamadan önce ilk olarak hemşirelerin kendilerini hazırlamaları, değişime açık, istekli ve çabalarının olduğunu bilinmesi gerekmektedir (Yüksel ve Özişli, 2021).

Hemşireler için zaman yönetimini etkileyen birçok faktör vardır. Hasta sayısı, sirkülasyon, hastanın bakım gereksinimlerinin niteliği ve yoğunluğu yanında hemşirenin bilgi, beceri ve donanımı, hasta-hasta yakınlarının beklentileri ve algılama düzeyleri, beklenmeyen ziyaretçiler, gereksiz toplantılar, gerekli malzemeye zamanında ulaşım ulaşamama durumu, kurumun çalışma sistemi, bilgi sistemleri ve personel sayısı (hekim hemşire, destek personel vb.) bu faktörlerden bazılarıdır. Bahsedilen tüm unsurların dikkate alınarak iyi bir zaman yönetimi planlanması yapılması mümkündür (Kılıç, Aydın ve İsmailoğlu, 2014; Nayak, 2018; Sever Aslan, 2021; Chousein ve Aslan, 2022).

Hemşirelerin iş gününü önceden planlaması, ilk önce en önemli işlere odaklanması, iş yaparken bölünmelere ayırması, aralara izin vermesi, düzenli olması, gerektiğinde görevini devretmesi gibi zaman yönetim yaklaşımlarını kullanmaları gerekmektedir. Bu yaklaşımlar, zaman tasarrufu sağlamayı, erteleme davranışını en aza indirmeyi, stresi azaltmayı, motivasyon, performans, iş başarısı, iş verimi ve iş tatmininin artması gibi durumları sağlayarak çalışma yaşamlarının iyileşmesine katkı da bulunmaktadır (Eldeeb ve Eldosoky, 2016; Uyar, Kırac ve Çiftci Kırac, 2020; Boduç ve Baykal, 2021). Ayrıca; çoğunluğu kadınlardan oluşan hemşirelerin çalışma saatleri dışında, önemli ailevi ve sosyal sorumlulukları bulunması nedeniyle zamanı iyi yönetmeleri gerekmektedir. Böylece akıp giden zamanın kaybedilen değil, kazanılan zamana dönüştürülmesi sağlanabilir (Eroğlu ve Özgür, 2016; Sever Aslan, 2021).

Araştırma sonuçlarına göre hemşirelikte zaman yönetimi ile ilişkili değişkenler incelendiğinde bazı özellikler dikkat çekmektedir. Bunlar aşağıda sıralanmaktadır.

- Kadınlarda zaman yönetiminin erkeklerden daha iyi olduğu (Başak, Uzun, Arslan, 2008; Kıldak, 2011; Ebrahimi ve arkadaşları, 2014; Demir, Erbil ve Çopur, 2018; Yüksel ve Özişli, 2021);



- Yaş arttıkça zaman yönetim becerisinin arttığı (Başak, Uzun ve Arslan, 2008; Sökmen, 2012; Aydemir, 2018; Gezginerler ve Lorcu, 2019; Kuşcu Karatepe, Özcan Yüce ve Öztürk Yıldırım, 2020).
- Mesleki deneyim süresi arttıkça zaman yönetiminin daha iyi olduğu (Ebrahimi ve arkadaşları, 2014; Ziapour ve arkadaşları, 2015; Gezginerler ve Lorcu, 2019)
- Eğitim durumu yüksek olan kişilerin, bir alt eğitim durumundaki kişilere göre zaman planlaması, zaman tutumları ve zaman yönetimi davranışlarının daha yüksek, stres durumlarının daha az olduğu (Ziapour ve arkadaşları, 2015; Uğurluoğlu Aldoğan ve Aykora, 2017; Gezginerler ve Lorcu, 2019)
- Evli olanların bekâr olanlara göre zamanı daha iyi yönettikleri (Sökmen, 2012; Gezginerler ve Lorcu, 2019)
- Zaman yönetimi eğitimi alan hemşirelerin zaman yönetimi puanlarının daha yüksek olduğu (Elsabahy ve arkadaşları, 2015; Ghannad, Elani, Shariati ve Malehi, 2018; Gezginerler ve Lorcu, 2019) saptanmıştır.

Ayrıca yapılan çalışmalarda doğrudan hasta bakımına ayrılan sürenin yeterli olmadığıda belirlenmiştir. Chousein ve Aslan' ın (2022) çalışmasında kliniklerde genel olarak hemşire faaliyetlerinin ortalama %16,6'sını dolaylı, %27,9'unun ise kişisel faaliyetlere harcadığı, Tuna, Baykal, Türkmen ve Yıldırım' ın (2015) yaptığı çalışmada da doğrudan hasta bakımı ile ilgili işlere %50.28 (1064.6 dakika) zaman ayrıldığı, kalan zamanın % 30.43 (644.3 dakika) nün dolaylı işlere, %1.23 (26 dakika) servisle ilgili işlere ve %18.06 (382.3 dakika) kişisel işlere harcadığı bulunmuştur. Yıldırım (2006) ve Possari, Gaidzinski, CostaLima, FugulinTogeiro ve Herdman' ın (2015) çalışmasında da benzer sonuçlar bulunmuştur.

4. SONUÇ VE ÖNERİLER

Hemşirelerin sürekli değişen ve gelişen sağlık teknolojisi bilgi birikimini kullanarak etkili sağlık bakımı sunmaları ve bunu yaparken özel yaşamla iş yaşamının dengesini koruyabilmeleri için zamanı etkin yönetmeleri gerekmektedir. Hemşirelerde zaman yönetimi ile ilgili çalışma sonuçlarından yola çıkarak aşağıdaki öneriler sunulmuştur.

- Hemşirelerin çoğunun zaman yönetimi konusunda yetersiz olduğu ve zaman yönetimi konusunda eğitim almadıkları belirlenmiştir. Bu sonuçlardan hareketle hemşirelerin zaman yönetimi eğitimi almaları önerilmektedir.
- Çalışma saatlerinde zamanı etkin kullanmayı önleyen zaman tuzaklarına hemşirelerin de düştükleri belirlenmiştir. Bu nedenle hemşirelere zaman tuzaklarına karşı dikkatli olmaları, zaman yönetim yaklaşım ve yöntemlerini uygulamaları önerilmektedir.
- Kliniklerde iş akış şemalarının oluşturulması, iş süreçlerinin ve kurallarının açık ve anlaşılır şekilde olması önerilmektedir.
- Zaman kaybı nedenlerinden birinin de hemşire yetersizliği olduğu bilinmektedir. Bunun için her birimin hasta bakım gereksinimlerine göre hemşire insan gücü planlaması yapılması önerilmektedir.
- Hemşirelerin doğrudan hasta bakımı ile ilgili olmayan uygulamalardan sorumlu tutulmayacak şekilde personel planlamasının yapılması önerilmektedir.

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CONSIDERACIONES COMERCIALES PARA DISTRIBUCIÓN Y VENTA DE UN PRODUCTO ORGÁNICO Y ARTESANAL: UN ESTUDIO DE CASO

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RESUMEN

El objetivo de este estudio cualitativo es conocer el sistema de empaquetado para la conservación y la distribución de butifarra para su comercialización. Se realizó un recorrido histórico sobre la butifarra, su llegada y adopción en las cocinas jalpanecas como un platillo de gran sabor; su preparación y sustento para la economía de muchas familias y que hasta el presente existen locales establecidos que cuentan con regulaciones para su venta y consumo. El enfoque de esta investigación es cualitativo con metodología de estudio de caso, utilizando las técnicas de revisión documental y entrevista semiestructurada, obteniendo información clave de diversas fuentes primarias y secundarias. Dentro de los hallazgos obtenidos a partir de la investigación se destaca el logro o el impulso económico a este embutido gastronómico, sin embargo, aún se requiere un trabajo profundo de difusión, elaboración, producción y distribución a través de envases eficientes, específicos y modernos para incursionar en mercados nacionales e internacionales.

Palabras claves: Requerimientos comerciales, empaquetado, conservación, distribución, butifarra.

Introducción

En esta presente investigación, se hace una remembranza sobre la historia de la butifarra, sus orígenes, preparación y como con el paso del tiempo se consolidó como un platillo típico en las mesas de los Jalpanecos, se entrevistó a algunos productores locales, se recaudó información en, notas, videos, fotos, diarios, o aquella información que permitiera construirlo, para la búsqueda de la información fue importante ir a los lugares donde datan los orígenes de la butifarra como el merendero de san Francisco, biblioteca pública y ayuntamiento del municipio de Jalpa de Méndez donde cuentan con registros actuales e históricos, se realizó en el mes de febrero del año 2023, a esta fecha se muestran datos actuales y pueden cambiar según los emprendedores del municipio, con base en lo recaudado se reconoce que la butifarra es un producto casero de consumo frecuente entre los locales, su grato sabor atraído a comensales de otras regiones para conocerlo y probarlo, por otra parte el municipio en los últimos años ha promovido su venta, consumo y consolidación, siendo así que surge el interés de conocer y proponer formas de empaquetado para su conservación y distribución a otras zonas, proyectando también posibles ventas en el país y el mundo con un sistema sólido, competitivo apegado a las normas de distribución.

La butifarra hoy en día se considera parte de la gastronomía de los habitantes de Jalpa de Méndez, se destaca por su sabor, consistencia, preparación y receta culinaria que fascinan a quien las prueba, es un atractivo importante hoy en día, para quien decide conocer el municipio y probar este platillo, los emprendedores y gobierno municipal, estatal han visto en los últimos años una derrama económica, se debe reconocer que aun falta mucho por hacer, elaborar estrategias que promuevan su crecimiento a escales nacionales e internacionales, es necesario que el gobierno y emprendedores hagan equipo para



capacitarlos, apoyarlos en la inversión, publicidad y recursos necesarios para lograr estas innovaciones necesarias para el impulso y competitividad en los mercados.

Como impulso a la gastronomía el gobierno en los últimos años ha decidido darle difusión a este platillo local, acertando con el evento denominado “ la feria de butifarra” el cual acertadamente ha apoyado a los productores locales atrayendo a la ciudadanía local y del estado hacia el municipio, estas actividades se han planeado en los meses de octubre y noviembre (XEVT, 2022) pero en su último festival celebrado en octubre del 2022 se instituyó por parte de la presidenta municipal Nuris López al último domingo de octubre como el Día de la Butifarra, en reconocimiento a este delicioso embutido tabasqueño y toda la historia, cultura y tradición que lo rodean, y su aportación a la gastronomía Jalpaneca.

Si bien ya hay promoción y difusión del producto en los últimos años, falta infiltrarse en el mercado nacional y con visión internacional, el producto se ha posicionado muy bien a nivel local, pero se requieren métodos y estrategias que permitan su empaquetamiento, conservación y distribución, para ello se requiere conocer el procesamiento actual y la durabilidad del producto, otra barrera es que al ser un producto alimenticio es delicado y requiere cumplir con estándares de conservación que permitan una caducidad prolongada para su consumo posterior a su elaboración.

El crecimiento del producto en los últimos años requiere innovaciones para competir como un producto auténtico y original apoyado por diferentes instancias, el proponer nuevas formas de venta a través del envasado esto permitirá reducir el crecimiento bacteriano y, por lo tanto, extiende la vida útil de sus productos alimenticios, sin la necesidad de agregar conservantes. Entonces tiene la ventaja de usar, vender y servir sus productos durante un período de tiempo prolongado.

También se requieren conocer los métodos de empaquetado, producción, normativas que son importantes para el cuidado de este producto que debe cuidar la higiene, sabor, calidad, nutrientes, libre de bacterias que garanticen una mayor durabilidad, a través de capacitaciones a los productores para cumplir con estos requisitos, así como la importancia de trabajar en equipo por el crecimiento regional a través de uniones, consorcios de emprendedores impulsados y asesorados por las instancias correspondientes ya que el crecimiento impactara en una derrama económica local y estatal generando autoempleo, empleos, comercio activo, por lo que urge modificar los métodos de distribución actual, no solo para el consumo inmediato sino también para su conservación.

Marco contextual

La butifarra es un platillo por excelencia referenciado por su preparación, sabor de las cocinas Jalapanecas, si bien ha ganado reconocimiento en el estado, se ha promovido en sus ferias locales y estatales aún hay mucho por hacer, su comercialización se ha trabajado como un producto artesanal de preparación fresca para su consumo inmediato, para hacer tan exquisito platillo se ocupan los siguientes ingredientes (Méndez, 2022).

Dentro de la problemática que persiste es la proyección, su crecimiento económico, en infraestructura, cultural, rescate y promoción de tradiciones desde una transformación que le permita consolidarse como un municipio que tenga que ofrecer a sus visitantes, actualmente el gobierno municipal se encuentra trabajando en impulsar al municipio como un “pueblo mágico” dentro de los requerimientos esta considerar el valor agregado censal bruto turístico, (VACBT). El cual es un indicador que determina en cada pueblo mágico la importancia económica de la actividad turística. También se consideran atributos históricos y culturales de localidades consideradas únicas, impactando en el progreso, bienestar, empleo y fomento de la inversión.

Ante este proyecto el municipio ha trabajado en la remodelación del centro histórico, limpieza, seguridad promoción, artesanías, gastronomía que son aspectos por considerar y se encuentran trabajando en ello (Pérez, 2023). La convocatoria para promover los pueblos mágicos requiere que se acrediten que existen en la localidad un área o unidad administrativa del turismo, directorio de servicios turísticos de la región, inventario de recursos y atractivos turísticos, información georreferenciada sobre conectividad y comunicación, tener un plan de desarrollo turístico, la presidenta Nuris López reconoce que al municipio aún le falta completar requisitos como hotelería y restaurantes.



La gastronomía entonces es un atractivo potencial del municipio, su butifarra, en los últimos años se han realizado eventos de promoción denominada “feria de la butifarra” han crecido comercios locales que ofrecen el producto y encuentran innovando con el mismo, su forma de venta es “para comer ahí o llevar”, quienes deciden llevar este producto, lo reciben en platos desechables y su traslado no debe ser largo, puesto que es producto perecedero, ante ello se debe transformar esta forma de comercializar para para consolidar en un futuro la exportación a planos nacionales e internacionales, incursionando en nuevos mercados y compitiendo en grandes cantidades y tiendas de conveniencia, con marcas consolidadas que hoy en día venden y transitan su producto en todas partes del mundo, es necesario capacitar y orientar a los productores sobre la conservación y empaquetamiento del producto, así como de apoyo económico para crecer en panoramas industriales, a través de uniones o consorcios de empresarios locales que busquen esta meta en común, ya que en cuestión de costos es caro la inversión, el producto debe mantener sus propiedades y la accesibilidad de los clientes, contar con un plan de negocios con metas claras y objetivos alcanzables.

Marco histórico

Desde el descubrimiento de América, en algunos pequeños pueblos del estado existían asentamientos chontales que fueron percibidos por los conquistadores los cuales a su paso iban dominando estos territorios e invadiendo con fuerza bruta y armada, sometiendo a sus habitantes, esto por los años de 1526 donde se asentaron algunos españoles, entre ellos el encomendero don Ximon Diez Ballesteros, posterior a ellos pasaron siglos de esclavitud y la lucha nacional por la libertad y expulsión de estos extranjeros quienes se habían asentado y colonizado los pueblos indígenas, el 24 de abril de 1827 se decreta a Jalpa como localidad al que pertenecían pueblos como Jalupa, Soyataco, Mecoacan, Ayapa, Iquiuapa, Amatitan, Chichicapa, Cupilco, San isidro, Comalcalco, tecoluta de las montañas y paraíso, después de algunos años el gobierno del estado separa a Chichicapa, Tecolotilla, Comalcalco y paraíso, en este transcurso del tiempo nace el héroe Jalpaneco Gregorio Méndez Magaña y su valentía por defender las tierras expulsando a los franceses de tabasco el 27 de febrero de 1864, a partir de ello, los pobladores inician su crecimiento local con libertad y deseos de ser una localidad próspera, autosuficiente y desarrollada, es así que desde 1895 inicia la transformación con un primer reloj público, la construcción del palacio en 1910, construcción del parque en 1927, escuelas, plazas, llegó la iluminación en 1934 y muchas construcciones que iniciaron la transformación y progreso de un municipio próspero.

Es aquí donde llegamos a los años 60 (Méndez, 2022) donde de manera particular existían locales como la cervecería “Cuauhtémoc Moctezuma” en donde se acompañaban tales bebidas con una carne de res con cerdo y le llamaban chorizo, este puesto era atendido por un joven llamado Armando Ulin Martínez, en un día común llegaron unos turistas españoles y pidieron su cerveza y botana, al probarlo uno de ellos exclamó ¡esta sí es la verdadera butifarra! A lo que don Armando pregunto ¿que era eso? Este le explico que en su país así se le llamaba a ese embutido parecido en textura, le pidió que le escribiera el nombre en papel, posterior a ello el señor Ulin se lo cuenta a su esposa Sra. Elba Hernández de Ulin, quien preparaba dicho embutido y desde ese entonces lo nombraron como butifarra, cabe decir que este sazón fue heredada por una combinación de comida local “chontal” con la mezcla extranjera de los invasores de aquellos siglos pues consigo trajeron especies y guisos que permitió a la cocina Jalpaneca adquirir su sabor.

Posterior a sus primeros fabricantes, surgieron otras personas que se sumaron a su elaboración encontramos a la Sra. Esperanza Ramírez, quien fue pionera en la elaboración de este famoso embutido, así como el Sr. Juan Izquierdo Valenzuela quien también propago este platillo naciente entre la sociedad local.

Hoy en día en el municipio existen muchos fabricantes establecidos y no, por los años 90 en la escuela preparatoria del municipio CBTA 94, en sus asignaturas agropecuarias, dentro de sus talleres como parte de la educación integral a sus jóvenes se les enseñaban las recetas caseras locales, que producían con productos que ellos cultivaban o criaban como lo era la carne de cerdo, res, jamones, quesos, etc., esto permitió que la ciudadanía lo conociera más y aprendiera a elaborarlo para su autoempleo, tradición



emblemática, arraigando las costumbres de estos sabores, permitiendo que cada familia jalpaneca lo conociera y se sintiera el orgullo de permanecer a un municipio con tan importantes aportaciones a la comida regional.

En el año 2015 a través del gobierno de Domingo García Vargas se pensó en proyectar a la butifarra a niveles nacional, dando inicio al festival de la butifarra un gran proyecto municipal que en los últimos años ha tomado relevancia atrayendo a locales y visitantes, permitiendo una gran derrama económica al municipio, crecimiento comercial, en infraestructura, reconocimiento, social, cultural e histórico.

Marco Legal

NORMA OFICIAL MEXICANA NOM-051-SCFI/SSA1-2010 ESPECIFICACIONES GENERALES DE ETIQUETADO PARA ALIMENTOS Y BEBIDAS NO ALCOHOLICAS PREENVASADOS - INFORMACION COMERCIAL Y SANITARIA

Esta Norma Oficial Mexicana tiene por objeto establecer la información comercial y sanitaria que debe contener el etiquetado de los alimentos y bebidas no alcohólicas preenvasados de fabricación nacional o extranjera, así como determinar las características de dicha información (Mexico, 2010).

Campo de aplicación

Esta Norma Oficial Mexicana es aplicable a todos los alimentos y bebidas no alcohólicas preenvasados de fabricación nacional y extranjera destinados al consumidor en territorio nacional.

Esta Norma Oficial Mexicana se complementa con las siguientes normas vigentes:

NOM-002-SCFI-1993: Productos preenvasados-Contenido neto-Tolerancias y métodos de verificación, publicada en el Diario Oficial de la Federación el 13 de octubre de 1993.

NOM-008-SCFI-2002: Sistema General de Unidades de Medida, publicada en el Diario Oficial de la Federación el 27 de noviembre de 2002.

NOM-030-SCFI-2006: Información comercial-Declaración de cantidad en la etiqueta especificaciones, publicada en el Diario Oficial de la Federación el 6 de noviembre de 2006.

NOM-043-SSA2-2005: Servicios básicos de salud. Promoción y educación para la salud en materia alimentaria. Criterios para brindar orientación, publicada en el Diario Oficial de la Federación el 23 de enero de 2006.

NOM-086-SSA1-1994: Bienes y servicios - Alimentos y bebidas no alcohólicas con modificaciones en su composición. Especificaciones nutrimentales, publicada en el Diario Oficial de la Federación el 26 de junio de 1996.

La SEDEC es una instancia local que surge por la necesidad de atender la normativa O51 quien marca las especificaciones generales de etiquetado para alimentos y bebidas no alcohólicas preenvasados, a través del análisis del producto de manera farmacológica, tomando en cuenta reactivos, y haciendo un estudio nutrimental para avalar su expedición o sugerir mejorar para emprendedores que requieren vender sus productos con calidad y certificaciones, ante un nuevo panorama de competitividad para promover y colocar sus productos en el mercado.

Dentro del etiquetado se hace la siguiente declaración nutrimental:

- Contenido energético
- Por envase
- Por 100g



- Proteínas
- Grasas totales
- Hidratos de carbono disponible
- Azucares
- Azucares añadido
- Fibra dietética
- Sodio

El Instituto Mexicano de Propiedad Industrial [IMPIE] otorga por 10 años el uso exclusivo de la marca, producto o servicio con base en los siguientes documentos a entregar (Mexico, 2023).

- [Solicitud de Protección de Signos Distintivos A](#) (Marcas, Marcas Colectivas, Marcas de Certificación, Aviso Comercial o Nombre Comercial) o [Solicitud de Protección de Signos Distintivos B](#) (Marca Holográfica, Marca Sonora, Marca Olfativa, Imagen Comercial o la combinación de las anteriores) (Por duplicado)
- [Hoja adicional complementaria al punto "Datos generales de las personas.](#)
- Comprobante de pagos.
- Documento que acredita la personalidad del mandatario (este documento puede presentarse en copia certificada y su presentación es opcional).
- Constancia de inscripción en el Registro General de Poderes del IMPI (opcional).
- Reglas de uso, solo si el signo distintivo se presenta por más de un solicitante (cotitularidad).
- Hoja adicional complementaria al punto "Productos o servicios en caso de Marca o Aviso Comercial/Giro comercial preponderante"***
- Hoja adicional complementar al punto "Leyendas o figuras no reservables" **.
- Traducción de los documentos presentados en idioma distinto al español, en su caso.
- Legalización o apostilla de los documentos anexos provenientes del extranjero, en su caso.
- Otros, por ejemplo, carta consentimiento o documentos que acrediten la adquisición de un carácter distintivo derivado del uso en el comercio. Original o copia certificada.

LEY PARA EL DESARROLLO DE LA COMPETITIVIDAD DE LA MICRO, PEQUEÑA Y MEDIANA EMPRESA

La presente Ley tiene por objeto promover el desarrollo económico nacional a través del fomento a la creación de micro, pequeñas y medianas empresas y el apoyo para su viabilidad, productividad, competitividad y sustentabilidad. Asimismo, incrementar su participación en los mercados, en un marco de crecientes encadenamientos productivos que generen mayor valor agregado nacional. Lo anterior, con la finalidad de fomentar el empleo y el bienestar social y económico de todos los participantes en la micro, pequeña y mediana empresa. La Ley es de observancia general en toda la República y sus disposiciones son de orden público (Unión, 2019).

CANACINTRA

La Cámara Nacional de la Industria de Transformación es el organismo empresarial que representa los intereses legítimos del Sector Industrial de México, considerada por su cobertura, representatividad e infraestructura, como la más importante a nivel Latinoamérica, que le permite atender eficazmente las necesidades de sus industrias afiliadas.



Marco conceptual y teórico

La butifarra es un embutido de carne de res y cerdo, tiene orígenes en España, pero gracias a las conquistas de siglos pasados se asentaron en las cocinas chontales, así como la confirmación de este platillo por parte de turistas, cuando se dieron cuenta que en el municipio ya se preparaba, este platillo se expende en pequeños locales, plazas o personas que los venden en cubetas. En el pasado este producto se comercializaba en los pequeños puestos que servían el producto en jícaras, hojas de plátano y platos de peltre, la población era consiente de llevar una canasta, jarro o recipiente donde se pudiese transportar, en estos inicios no había reglamentos, normativas ni mucho menos regulaciones de elaboración distribución.

El tiempo fue responsable de la transformación y con la llegada de los plásticos, desechables de unicel, los comerciantes optaron por venderlas en platos desechables para comer en el lugar o llevar, ante ello surge la necesidad de pensar en una transformación de venta para quienes disgustan y quieren llevar el producto, por ser casero se requiere pensar entonces en formas de empaque duraderos conservando la calidad, sabor y consistencia del producto, en esta búsqueda se plantean tipos empaque que sean de utilidad para este producto, asimismo acciones que colaboren al medio ambiente (Legislatura, 2020) contribuyendo a la ley de reducción de plásticos donde los principales aspectos que se abordan en las propuestas son: inhibición del uso de las bolsas de plástico, desde su prohibición gradual o en su caso total, incluyendo en algunos casos el cobro de las mismas; fomentar las bolsas biodegradables; establecer un impuesto al plástico, e implantar programas efectivos de reciclaje.

Al ser un producto cocido este proceso se somete a tratamientos térmicos suaves, también deben conservarse en refrigeración a ciertas temperaturas, debe contar con conservadores y desecación de agua, así como tratamientos frigoríficos para inhibir el desarrollo microbiano, además de la temperatura, se tienen en cuenta otros factores de conservación como la humedad relativa, la presencia de luz, oscilaciones de temperatura, el periodo de tiempo de conservación, etc. Considerando estos elementos se puede plantear la oportunidad de crear un rediseño particular para el producto Jalpaneco que permita su exportación, a través de un nuevo sistema de empaquetado de plástico flexible con características especiales de grosor y peso.

Los tipos de envase y empaque se definen por el material del que están hechos, de esto depende su funcionalidad y uso (AERSA, 2023):

- Polietileno de baja densidad (LDPE). Es de los primeros en usar en la industria en la industria de embutidos y actualmente es el más usado, se usa como sellantes en bolsas y bandejas esta característica lo toma por su temperatura entre 110° y 160° C, debido a esto pone una barrera al vapor de agua y evita la pérdida de peso de los alimentos por la evaporación y la absorción de agua, este material es propicio para usarlo en máquinas empacadoras automáticas.

- Polietileno lineal de baja densidad (LLDPE)

Tiene semejanza al polietileno de baja densidad, aunque el polietileno lineal cuenta con temperaturas menores de sellado. El polietileno lineal se mezcla con el de baja densidad para que mejore sus características y desempeño en las máquinas empacadoras.

Dicha mezcla tendrá mayor resistencia mecánica durante el envase y el empaque y ésta será superior a las del LDPE.

- Polietileno de alta densidad (HDPE). En el envase y empaque, este material sólo tiene aplicación en envases rígidos. La bolsa hecha con este material tiene mejor resistencia mecánica que el LDPE, pero necesita mayor temperatura para el sellado. Es usado en la industria cárnica como protector de canastas.

- Polipropileno biorientado (BOPP). Es usado en la industria de los embutidos en el envase y empaque de la capa impresa de estructuras laminadas. Esto debido a que, por su baja elongación, alto brillo y transparencia, aporta buena barrera a las grasas, aromas y al vapor de agua.



- **Poliamida (Nylon).** Es uno de los plásticos para envase y empaque más reciente en la industria de los embutidos, aunque existe hace ya varias décadas. Tiene sobresaliente resistencia mecánica, barrera a las grasas, aromas y sabores. Su brillo y transparencia son algunas de sus ventajas. No se consideraban las poliamidas como materiales de barrera al vapor de agua, pero existen hoy en día poliamidas químicamente amorfas que sirven para esto.
- **Poli Vinil Cloruro (PVC).** Su aplicación en la industria cárnica para el empaque y envase se limita a envases semirrígidos, usados con sistemas de atmósfera modificada. Existían restricciones para su uso en alimentos, sin embargo, han desaparecido y se han permitido nuevas aplicaciones de este material en la industria. Por el grosor en el que normalmente tiene, su barrera es adecuada para garantizar la estabilidad deseada en los alimentos.
- **Poliestireno.** Como el PVC, tiene aplicaciones casi exclusivas en envases rígidos y semirrígidos. Este material es muy usado en la industria de las carnes frescas el pollo, aunque también sirve para embutidos. Se caracteriza en el envase y empaque por el uso de materiales extensibles (PVC, EVA). Estos cubren en su totalidad la bandeja de poliestireno, expandiendo el alimento sobre la bandeja.

Metodología

El presente trabajo cualitativo se realizó empleando las técnicas de revisión documental y entrevista semi-estructurada a diversos locatarios del municipio de Jalpa de Méndez, así como a personal del H. Ayuntamiento del municipio.

Técnica y procedimiento

Para realizar el presente trabajo de investigación se realizaron entrevistas a locatarios, investigación en biblioteca pública, solicitud de información en el H. ayuntamiento, así como búsqueda en notas de periódicos, videos y comentarios para poder construir este estudio. Las entrevistas se realizaron de manera personal en los locales del municipio, La Morena, La Auténtica Butifarra, El Merendero de don Francisco y el Rincón de la Abuelita, locales más reconocidos entre la comunidad Jalpaneca, visitantes locales, nacionales y hasta internacionales.

Hallazgos

Se realizaron visitas a locales consolidados en el mercado jalpaneco, reconocidos en la localidad y el estado, la mayoría sigue realizando sus ventas en sus pequeñas fondas, restaurantes, para llevar, el producto se realiza fresco y se lleva a congelación para guardarlos. Por otro lado, se analizó que el producto se puede empaquetar al vacío siguiendo las normativas estipuladas por los organismos establecidos, se encontró que dentro del municipio una emprendedora comercializa el producto empaquetado lo cual le ha permitido el crecimiento de su local, tuvo que capacitarse, documentarse, empaparse de la normatividad y requisitos para innovar, este caso de éxito puede ser referente para que otros productores se unan y busquen el crecimiento sano para promover al producto regional y ser competitivos ante otras grandes industrias de embutidos, se requiere inversión en capacitación e implementación de maquinaria adecuada para hacer el proceso de empaquetado.

A través de la búsqueda de información, se determina que la mayoría elabora los productos de manera artesanal, con pequeñas modificaciones en las medidas e ingredientes, su proceso de embutido es con la tripa y el proceso de cocción es hervido en fogones apegados a la cocina chontal, su venta es en plato desechable, los comensales lo adquieren frito, quienes desean llevarlo a distancias largas lo empacan en bolsas de plástico y congelados. De acuerdo con el área de Fomento Económico (XEVT, 2022) se mencionó que en el 7mo. festival de la butifarra que existe el registro de 50 productores que cuentan con la regularización administrativa y 50 más que se encuentran en trámites de ser negocios regulados.

La mayoría expenden el producto tradicional de carnes de res y cerdo, condimentos como pimienta, sal, otras especies, acompañados de su tradicional salsa, platanitos o frijoles para atraer a comensales exigentes, el producto es vendido para consumo en sus locales o servidos en platos desechables para llevar, esta forma de venta es la más usual. Dentro de esta búsqueda de información se encontró que dentro de los productores locales existe un establecimiento que recientemente inicio con el empaquetado



de sus productos, así como una línea gourmet que ha sido parte de su distinción e innovación que le está dando un valor agregado a este producto tradicional.

Sus innovaciones consisten en butifarras con quesos de Tenosique, ahumado, de puerco, hebra, Cotija, enjamonadas, tamaños de 45 a 50 gr, maneja empaquetados al vacío con alto grado alimenticio con una maquina americana, los empaques son conseguidos por pedido en otras partes de la república, en presentaciones de ¼, ½, 1 kg y mega paquetes, con una duración ya abierto guarda el sabor y consistencia del producto, cuidando la materia prima hasta su conservación hasta de 1 año. El envasado al vacío es una técnica de conservación de alimentos natural que consiste en la extracción del aire de la bolsa o recipiente, eliminando el oxígeno, principal factor de deterioro de alimentos. Con el envasado al vacío, conseguimos:

- Extender la vida útil de cualquier producto perecedero entre 2 y 4 veces.

1. Proteger el producto de influencias externas. Quitando el aire que rodea al producto, se inhibe el crecimiento bacteriano, de moho y hongos, ya que necesitan oxígeno para crecer. Una vez que se elimina el aire y se sella la bolsa, los niveles de oxígeno continúan bajando mientras crecen los niveles de dióxido de carbono. Esto reduce el crecimiento de organismos responsables del deterioro, permitiendo prolongar la vida útil del producto.

2. Aumenta el tiempo de conservación: gracias a este tipo de envasado al vacío el producto se conserva en perfecto estado para consumo por mucho más tiempo. A través del envasado al vacío se evita el crecimiento de microorganismos que necesitan oxígeno para subsistir como serían la Salmonella o la E. Coli, causantes de múltiples enfermedades.

3. Evita la sequía de los alimentos: dentro del congelador o refrigerador, la humedad de ciertos ingredientes puede evaporarse, causando que se evapore la humedad y los alimentos adquieran una apariencia decolorada y pierdan sabor. Gracias al envasado al vacío es posible conservar la humedad de los alimentos y evitar estos estragos.

4. Los alimentos no pierden sus propiedades originales: una de las ventajas más grandes del envasado al vacío es que los productos no cambian de textura ni apariencia una vez son almacenados de esta manera, con excepción de la carne.

- Realizando bien el proceso **es posible reducir a tan solo un 1% el oxígeno** que se encuentra en torno a un producto alimenticio. Con estos bajos niveles de oxígeno es posible evitar la oxidación y por tanto se retarda la posibilidad de que crezcan hongos y bacterias, permitiendo que el alimento sea apto para el consumo por mucho más tiempo.

- El proceso de envasado al vacío consiste principalmente en almacenar los alimentos dentro de un material que va a sellarse, habitualmente el plástico, y **plegarlo sobre el producto para que se impida el paso de aire** y líquidos de manera hermética. Así como nada entra, lo ideal es que tampoco nada se derrame desde la bolsa de sellado hacia afuera.

Con base en el estudio del mercado local, productores, se identificó que aún hay mucho campo de crecimiento, los locatarios requieren conocer, certificarse en áreas que les permitan la exportación procurando normas y cuidados de sus productos para tener el nivel requerido por las organizaciones que lo avalan. El sistema de empaquetado es una posibilidad de crecimiento económico, pero es un proyecto inicial de solo un comercio establecido, que se ha capacitado debidamente y logrado las certificaciones para hacerlo, su forma de empaquetado es al vacío, porque ello permite que el producto que es un embutido no adquiera bacterias, dure mas tiempo y conserve sus propiedades, esto le permite a esta productora guardar el producto en empaquetados y ofrecerlo a sus clientes quienes ya lo han llevado a otras partes de la república y el extranjero, por lo tanto si hay un proyecto y un proceso de exportación, se requiere impulsar y asesorar a otros productos para encaminarse en esta posibilidad de crecimiento.



Conclusión

Se logró un reconocimiento sobre la historia de la butifarra, su elaboración y surgimiento en las cocinas jalpanecas, la influencia que ha tenido su elaboración y distribución como producto local en los distintos tipos de mercados, su desarrollo se dio a conocer en los años 60, por las familias jalpanecas que vieron como una oportunidad de autoempleo, emprendimiento, sustento y crecimiento económico desde lo familiar, social y comunitario.

Desde esa época a la actualidad se han innovado los procesos de elaboración, así como líneas diversas de presentaciones, implementando ingredientes que le dan valor agregado a este platillo tan milenario e importante, ganando reconocimiento local, estatal y con perspectiva nacional e internacional, hoy en día ir al municipio de Jalpa de Méndez es referente en probar estas ricas butifarras acompañadas con su distintiva salsa.

Por otro lado, el municipio se ha enfocado en promover este platillo donde se vislumbra un crecimiento económico en la región, a través de la difusión e invitación a comensales a asistir al municipio y consumirlas, dentro de las estrategias se tienen las ferias locales, feria de la butifarra, feria estatal, uso masivo de redes sociales y sobre todo la recomendación de quienes la prueban.

Los locales que comercian este platillo tienen aún mucho panorama de crecimiento desde su elaboración, producción y venta, al ser un producto casero, perecedero se deben tomar en cuenta estas características para proponer estrategias de distribución a otros mercados nacionales y hasta internacionales, se debe hacer un estudio profundo, un plan de negocios que desarrolle una estructura comercial para su colocación e impacto, se consideró que al ser un producto embutido y a través del análisis de la forma de empaque que existen en el mercado actual, que manejan otros productos consolidados y de grandes empresas, se deben seguir las normas de comercialización NOM 051, de la SEDEC, de la propiedad industrial, apegarse a los requerimientos para cumplir con los estándares y normativas del producto, posterior a ello el emprendedor consolidado puede crecer a través de la exportación y venta, incluyendo procesos de empaquetamiento a través del vacío, un método eficaz y de los más comunes en el embalaje de alimentos.

Al retirar el aire del interior de un envase y reducir el oxígeno -primer factor de la oxidación y putrefacción de alimentos-, se amplía el periodo de caducidad del alimento que contiene y, por lo tanto, aumenta su vida útil. Es un sistema muy práctico y sencillo que, si se realiza correctamente, deja una cantidad de oxígeno residual inferior al 1% en el interior.

El envasado al vacío es un proceso en el que se retira el aire que existe en el interior de un envase dejándolo vacío, con el objetivo de aumentar el plazo de caducidad del alimento que contiene. Al extraer el aire mediante bombas de vacío, se detiene la actividad de las bacterias aerobias, es decir, de los organismos que necesitan oxígeno para desarrollarse, si se realiza correctamente, el vacío deja una cantidad de oxígeno residual inferior al 1% en el interior del envase.

Recomendaciones

Para consolidar al municipio en el mercado nacional y extranjero se sugiere lo siguiente:

- Apoyar a los pequeños productores que inician con el emprendimiento de la butifarra.
- Asesorar legalmente a los comercios para cumplir con las normativas de calidad.
- Apoyar a los productores consolidados con maquinaria que permita empaquetar el producto para su conservación.
- Capacitar a los emprendedores para lograr que su producto se proyecte a otros mercados.
- Seguir promoviendo al producto a través de ferias, medios de comunicación para llegar a más personas.
- Distribuir los productos empaquetados cuidando los costos para la accesibilidad del público.



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Anexos

Figura 1

Butifarra empaquetada



Figura 2

Butifarra lista para su consumo



Figura 3

Pueblo Mágico de Jalpa de Méndez





APPRAISAL OF MILK YIELD, QUALITY, TEAT END HYPERKERATOSIS AND BODY DIRTINESS SCORE OF HOLSTEIN-FRIESIAN AND RED-HOLSTEIN COWS RAISED UNDER MEDITERRANEAN CLIMATE CONDITIONS

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ABSTRACT

The aim of this study was to appraise daily milk yield (DMY), milk quality, teat end hyperkeratosis (TEH) and body dirtiness scores (BDS) of Holstein-Friesian (HF) and Red-Holstein (RH) cows raised together under Mediterranean climate conditions in Aydın province, Türkiye. During this study, the DMY; the milk quality traits such as milk Fat Content (FC), Non-Fat Dry Matter Content (NFDMC) and Somatic Cell Count (SCC); TEH and BDS of HF and RH dairy cows were determined and traits were recorded monthly from April to September 2023. The effects of breed, parity, Lactation Month (LacMon), Sampling Month (SampMon), TEH and BDS on milk yield and quality on one hand, and the effects of breed, parity, LacMon and SampMon on TEH and BDS were then determined. In this study, the effect of sampling month on $\text{Log}_{10}\text{SCC}$, NFDMC and the breed and sampling month on FC were found statistically significant ($P < 0.01$) and the overall means for DMY, $\text{Log}_{10}\text{SCC}$, NFDMC and FC were 24.98 ± 0.47 kg, 5.44 ± 0.03 (275 423 cells/ml), $9.44 \pm 0.04\%$ and $3.24 \pm 0.03\%$, respectively. In addition, the effects of sampling month on TEH and the parity and sampling month on BDS were also found significant ($P < 0.01$) and the overall means of TEH and BDS were 1.94 ± 0.03 and 3.57 ± 0.04 scores, respectively. There was not any important effect on DMY ($P > 0.05$) in this study and also the TEH and BDS effects on milk quality were not important ($P > 0.05$). As result, RH had a higher FC than the HF breed, but no significant differences were observed between the breeds in terms of other traits. Even though the TEH and BDS did not show any important significance on milk yield and quality, the sampling month showed a great importance on milk quality appraisal, thus the milk producers and dairy industry may consider it as an important criterion during milk quality appraisal.

Key words: Dairy cows, Breed, Milk Quality, Milk Fat Content, Non-fay Dry Matter, Somatic Cell Count

Introduction

Milk yield and quality constitute an important preoccupation for milk producers, processors into milk products, consumers of raw milk as well as milk products. Animal scientists have worked days and nights selecting genetically and phenotypically in order to obtain cattle breeds that can produce more milk. This resulted in breeds that are ameliorated for output production such as for example Holstein-Friesian (HF) and Red-Holstein (RH) cows. Even though the breed maybe selected for high yield, it was shown that there are some additional factors that can affect the production level. The example was given on HF cows that are raised under intertropical climate conditions in Burundi, which, due the bad management, can produce less than 5 kg of milk daily (Ndhokubwayo and Koç, 2024). The milk yield is then affected by so many factors such as mainly cow breed, parity, feeding system, season, lactation month, lactation stage, milking time where the yield is higher in the morning than evening milking (Koç and Kızılkaya, 2009).



Regarding milk quality, on one hand, it is expressed by milk components such as fat, protein, solid non-fat, lactose, mineral contents, etc. On the other hand, the milk quality is conditioned by hygienic conditions, milking management, dirtiness of the barn, level of teat end hyperkeratosis (TEH) and this result in increase of somatic cells in the milk and a high number of bacteria. The level of somatic cell count (SCC) in the milk is mainly influenced by season, more in summer than winter (Koç, 2011), milking time, low in morning milking and higher in evening milking (Koç, 2015), TEH score (Ndiokubwayo and Koç, 2021; Koç et al., 2021). The breed, age, parity (Koç, 2006), lactation period (Koç, 2008), environmental and physiological stage (Harmon, 1994) are also factors affecting SCC in the milk. Giving some examples, Dohoo and Meek (1982) stated that the number of SCC is generally below 200 000 cells/ml in a healthy udder lobe by that value can be below 100 000 cells/ml or lower especially in primiparous cows (Koç, 2006). It was also reported a positive correlation between TEH and milk SCC and thus a high risk of intramammary infection (Gleenson et al., 2004; Emre, 2009; Michel et al., 1974; Francis, 1984). While Munro et al. (1984) reported a daily milk yield loss of 0.92 kg in primiparous and 1.52 kg in multiparous due the increase in milk SCC, it was also reported a change in milk components (Atasever and Erdem, 2013; Koç, 2015) and the lactose content decreases and whey protein increases due to increased SCC (Koç, 2015). As a factor of SCC in milk, the TEH is seen in machine milked cows as a consequence of high vacuum pressure exercised on the teats and over milking. The cow breed and lactation month have also found to have an impact on TEH and it was higher in high producing cows especially during the fourth month of lactation (Francis, 1984)

Another factor that is thought to have an impact on milk quality is the Body Dirtiness Score (BDS). The BDS is the score of dirtiness given by analysing some cow's body parts such as mainly the udder, hind legs and flanks. A high score of dirtiness provides an idea on the hygienic conditions of the barn where a dairy cow is sheltered, bedding and, if applicable, the litter quality. Bad hygienic conditions of the barn are susceptible to favourite the proliferation of harmful microorganisms that could cause mammary infection. In order to ensure milk quality, farmers may keep the cows clean, by not keeping animal in wet and muddy areas (Erdem and Okuyucu, 2019), by keeping a clean and providing good litter and clean woodchips (O'Driscoll et al., 2008). It was reported a positive correlation between udder cleanliness and SCC (Erdem and Okuyucu, 2019) even though our previous study (Ndiokubwayo and Koç, 2021) did not show any impact of BDS on milk quality or milk yield.

This study was aimed at appraising milk yield, quality, teat end hyperkeratosis and body dirtiness score of HF and RH cows raised together in a farm, under Mediterranean climate conditions in Aydın, Türkiye.

Material and Methods

This study was performed on HF and RH cows raised together under Mediterranean climatic conditions in Cincin village of the Kocarlı county in the province of Aydın, Türkiye and samples were taken monthly during the period of April to September, 2023. The realisation of this study was approved by the Ethic Committee staff of Aydın Adnan Menderes University, Faculty of Agriculture (year 2023 VIII. in session and No: 64583101/136).

Animal Material and Milk Sampling

In this study, a total of 727 records such as 537 records of HF and 190 records of RH were used. Cows were in different parities and were grouped in 1 to 5+ parities. The lactation months (LacMon) were 1 to 10+ months and the sampling months (SampMon) were April, May, June, July, August and September. The farm was visited once a month during morning milking and milk samples (50 mL) from each cow were taken for laboratory analysis. The average daily milk yield (DMY) was registered from the data base of the farm.

The TEH and BDS scores were also registered during the visit of the farm. The TEH was scored by analysing the teat end hyperkeratosis level after the milking of the cows and a score varying between 1 and 4 was assigned (Mein et al., 2001). Also, the BDS was recorded by analysing the level of dirtiness of the udder, flank and hind legs and a score between 1 and 5 was given.



Laboratory analysis

After milk sampling, samples were directly conducted to the laboratory of Animal Science Department, Faculty of Agriculture in Aydin Adnan Menderes University, Türkiye. In the laboratory: The SCC was determined by the Direct Microscopic Somatic Cell Count Method (IDF, 1995; Fitts, 2016); the NFDMC was processed using portable milk refractometer (Brand: ATC Refractometer 0-32% BRIX) and the milk FC was determined by using the Gerber method (EAS 164, 2006).

Statistical analysis

Statistical analysis of the data was made in the SAS (2004) package program and the comparison of subgroups was made according to Tukey test ($P < 0.05$). SCC data were analysed using Log_{10} transformation before statistical analysis. The following statistical model was used in the statistical analysis of TEH, BDS, DMY, FC, NFDMC, and $\text{Log}_{10}\text{SCC}$ traits:

$$y_{ijklmno} = \mu + a_i + b_j + c_k + d_l + f_m + g_n + e_{ijklmno} \dots\dots\dots(5)$$

Here $y_{ijklmno}$; observation value of the traits, μ ; the mean of the traits, a_i ; breed effect ($i = \text{HF, RH}$), b_j ; parity effect ($j = 1, 2, 3, 4, 5+$), c_k ; lactation month effect ($k = 1, 2, \dots, 10+$), d_l ; sampling month effect ($l = \text{April, May, June, July, August, September}$), f_m : TEH ($m = 1, 2, 3, 4$), g_n : BDS ($n = 1, 2, 3, 4, 5$) and $e_{ijklmno}$; error term. The TEH and BDS factors included into the statistical model only for $\text{Log}_{10}\text{SCC}$, FC, DMY and NFDMC traits.

Results and Discussion

The least square means (LSM) and standard errors (SE) of $\text{Log}_{10}\text{SCC}$, FC, NFDMC, DMY of HF and RH cows and the effects of breed, parity, lactation month (LacMon), sampling month (SampMon), TEH and BDS were presented in Table 1. Additionally, the LSM and SE of TEH and BDS and the effect of breed, parity, LacMon and SampMon were presented in Table 1. The overall means for $\text{Log}_{10}\text{SCC}$, FC, NFDMC, DMY, TEH and BDS were found to be 5.44 ± 0.03 , $3.24 \pm 0.03\%$, $9.44 \pm 0.04\%$, 24.98 ± 0.47 kg, 1.95 ± 0.03 score and 3.57 ± 0.04 score, respectively.

As for the TEH, the results showed that only the SampMon effect on TEH was important and this effect was found statistically significant ($P < 0.01$) and the overall mean was 1.95 ± 0.03 . It was found that the TEH was not influenced by breed, parity and LacMon ($P > 0.05$) in this study, results that are similar to the findings of Ndiokubwayo and Koç (2021), even though the overall mean found here was lower.



Table 1: LSM and SE of Log₁₀SCC, FC, NFDMC, DMY, TEH and BDS of HF and RH dairy cows

Factor	n	TEH	BDS	DMY, kg	FC, %	NFDMC, %	Log ₁₀ SCC
Breed		NS	NS	NS	**	NS	NS
HF	537	1.91±0.05	3.57±0.05	25.00±1.00	3.20±0.05 ^a	9.43±0.09	5.50±0.07
RH	190	2.04±0.07	3.64±0.08	23.31±1.14	3.38±0.06 ^b	9.59±0.11	5.50±0.08
Parity		NS	**	NS	NS	NS	NS
1	150	2.00±0.08	3.47±0.08 ^a	24.10±1.22	3.31±0.07	9.52±0.11	5.34±0.08
2	357	1.98±0.06	3.60±0.06	25.31±1.01	3.29±0.05	9.57±0.09	5.43±0.07
3	88	2.17±0.10	^{ab}	24.66±1.52	3.27±0.08	9.38±0.14	5.56±0.10
4	48	1.73±0.13	3.62±0.11	23.89±1.96	3.35±0.11	9.27±0.18	5.57±0.13
5+	84	2.03±0.10	^{ab}	22.79±1.60	3.23±0.09	9.83±0.15	5.60±0.11
			3.40±0.14 ^a				
			3.93±0.11 ^b				
LacMon		NS	NS	NS	NS	NS	NS
1	73	1.80±0.11	3.43±0.12	24.18±1.64	3.33±0.09	9.57±0.15	5.56±0.11
2	57	1.97±0.13	3.58±0.13	23.92±1.87	3.17±0.10	9.44±0.17	5.50±0.13
3	50	2.00±0.14	3.69±0.14	24.17±1.98	3.42±0.11	9.60±0.18	5.39±0.13
4	74	1.97±0.11	3.83±0.12	23.16±1.72	3.32±0.09	9.43±0.16	5.42±0.12
5	74	2.05±0.11	3.75±0.12	23.20±1.69	3.28±0.09	9.32±0.16	5.44±0.11
6	77	2.03±0.11	3.47±0.12	28.02±1.60	3.37±0.09	9.27±0.15	5.74±0.11
7	87	2.07±0.10	3.68±0.11	23.51±1.59	3.23±0.09	9.56±0.15	5.46±0.11
8	75	2.02±0.11	3.56±0.12	23.48±1.65	3.30±0.09	9.61±0.15	5.49±0.11
9	75	1.98±0.11	3.51±0.12	23.66±1.63	3.25±0.09	9.73±0.15	5.56±0.11
10+	85	1.92±0.10	3.52±0.11	24.18±1.55	3.23±0.08	9.59±0.14	5.51±0.10
SampMon		**	**	NS	**	**	**
April	143	1.81±0.08 ^a	3.41±0.09 ^a	23.87±1.33	3.67±0.07 ^a	9.90±0.12 ^a	5.60±0.09 ^{ab}
May	146	2.03±0.08 ^{ab}	3.42±0.09 ^a	26.05±1.29	3.70±0.07 ^a	9.41±0.12 ^b	5.67±0.09 ^a
June	124	1.92±0.09 ^a	4.21±0.09 ^b	23.16±1.46	3.04±0.08 ^{bc}	9.23±0.14 ^b	5.32±0.10 ^b
July	113	1.84±0.09 ^a	3.09±0.10 ^a	24.29±1.36	2.85±0.07 ^b	8.29±0.13 ^c	5.36±0.10
August	115	1.95±0.09 ^a	3.60±0.10	23.92±1.45	3.24±0.08 ^c	10.07±0.13 ^a	^{bc}
September	86	2.33±0.11 ^b	^{ac}	23.61±1.61	3.24±0.09 ^c	10.18±0.15 ^a	5.37±0.10
			3.89±0.01				^{bc}
			^{bc}				5.68±0.11
			^{ac}				
TEH		-	-	NS	NS	NS	NS
1	263	-	-	23.59±1.05	3.35±0.06	9.51±0.10	5.48±0.07
2	299	-	-	24.26±1.02	3.28±0.06	9.56±0.10	5.52±0.07
3	105	-	-	23.58±1.44	3.22±0.08	9.57±0.13	5.46±0.10
4	60	-	-	25.17±1.75	3.31±0.09	9.42±0.16	5.54±0.12
BDS		-	-	NS	NS	NS	NS
1	18	-	-	24.48±3.11	3.51±0.17	9.69±0.29	5.69±0.21
2	88	-	-	23.27±1.48	3.14±0.08	9.69±0.14	5.36±0.10
3	240	-	-	23.52±1.02	3.20±0.06	9.42±0.09	5.44±0.07
4	225	-	-	25.38±1.01	3.27±0.05	9.39±0.09	5.53±0.07
5	156	-	-	24.10±1.16	3.34±0.06	9.37±0.11	5.49±0.08
Overall	727	1.95±0.03	3.57±0.04	24.98±0.47	3.24±0.03	9.44±0.04	5.44±0.03

NS: Not important; **: P<0.01; a,b,c: different letters in the same column show significance for P<0.05.



In this study, the effect of Parity and SampMon on BDS was found significant $P < 0.01$ and the overall average was 3.57 ± 0.04 . The effects of breed and LacMon on BDS were not important ($P > 0.05$). Even though the parity was found significant on BDS, there was not seen a remarkable variation with parities. As for the effect of SampMon, the dirtiest month was June and the cleanest month was July. Other months were almost similar in scores. In this study, both TEH and BDS did not show any significant effect on milk yield and quality of HF and RH cows. But it was seen that there was a little difference in means of TEH score and BDS between both breeds where they were higher in HF and lower in RH cows.

In this study, the means of FC regarding parity, LacMon, TEH and BDS were not different, only the means according to the SampMon showed big differences. The means were higher for samples taken in April and May but were lower in summer samples (June, July, August, September) (Figure 2). However, the overall mean FC found in this study was lower than the findings of Ndiokubwayo and Koç (2021) in HF cows raised in different farms, also lower than Koç et al. (2021). The best way to improve milk FC of a herd is to implement a good nutrition management.

In this study, even though there was not any significant effect on DMY among studied factors, the values showed that HF cows produce a little higher DMY than RH cows. The average DMY was seen to be lower in primiparous, increased in second and third parities but was decreasing with fourth and plus parities.

The effect of breed and SampMon on milk FC were found statistically significant ($P < 0.01$) and the overall mean was found to be $3.24 \pm 0.03\%$. Other effects such as parity, LacMon, TEH and BDS on SCC were not found important ($P > 0.05$). Regarding the breed, RH cows have higher milk FC ($3.38 \pm 0.06\%$) than HF cows ($3.20 \pm 0.05\%$). This corresponds to expected results because RH cows have higher fat rate in their milk than HF but their milk production is a little lower (23.31 ± 1.14 Kg) than HF (25.00 ± 1.00 kg), as well as other milk components.

As for SCC, the effect of SampMon on milk NFDMC was found statistically significant ($P < 0.01$) and the overall mean was found to be $9.44 \pm 0.04\%$. Other effects such as breed, parity, LacMon, TEH and BDS on SCC were not found important ($P > 0.05$). As expected, even though the breed effect was not found statistically significant, the RH cows have high milk NFDMC ($9.59 \pm 0.11\%$) than HF ($9.43 \pm 0.09\%$). Another important factor was the SampMon. The lowest concentration rates of NFDMC were found in the months of June and July. Similarly, to the previous researches, the TEH and BDS did not show any impact on NFDMC in milk.

In this study, only the effect of SampMon on milk SCC was found statistically significant ($P < 0.01$) and the overall mean of $\text{Log}_{10}\text{SCC}$ was found to be 5.44 ± 0.03 . When the $\text{Log}_{10}\text{SCC}$ is taken backwards, the overall mean is 275 423 cells/mL. The effects of breed, parity, LacMon, TEH and BDS on SCC were not found important ($P > 0.05$).

Considering the results by breed, there was no difference of mean between HF and RH cows ($5.50 \pm 0.07 \approx 316\,228$ cells/mL). The $\text{Log}_{10}\text{SCC}$ increased with parity from 5.34 ± 0.08 (218 776 cells/mL) in primiparous to 5.60 ± 0.11 (398 107 cells/mL) in fifth and plus parities. This corresponds to the findings of Göncü and Özkütük (2002) and Topaloğlu and Güneş (2005) stipulating the increasing of milk SCC with increasing parities. Contrary to previous studies by Ndiokubwayo and Koç (2021) and Koç et al. (2021), the $\text{Log}_{10}\text{SCC}$ did not increase with the increased TEH score. Also, the SampMon effect on $\text{Log}_{10}\text{SCC}$ was highly significant ($P < 0.01$) where it was higher in April and May because it was the rainy season, lower in June, July and August and became higher again in September (Figure 1). The high SCC in September may be related to the first month of lactation in the farm due to the high number of births in August and September. As a matter of fact, Koç (2008) stated that, in a study on HF cows, the SCC was higher in the first month of lactation, but decreased dramatically in the following months and increased again towards the end of lactation. Similar to Koç (2008), in this study, the SCC level (363 078 cells/mL) in the first month of lactation was higher than the following months and increased towards the end of lactation.

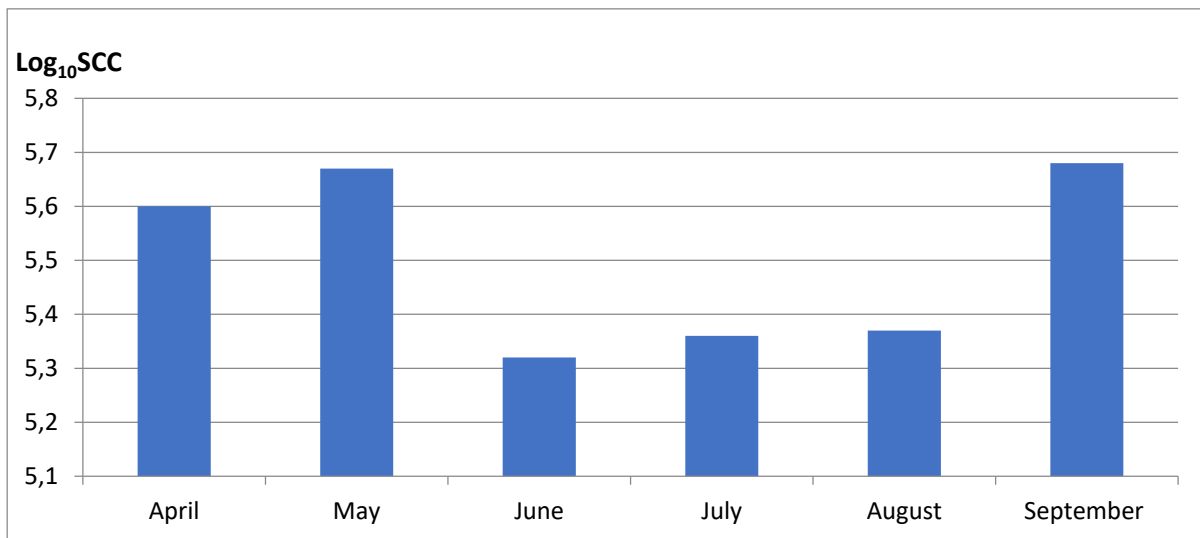


Figure 1. Change in Log₁₀SCC according to the sampling month

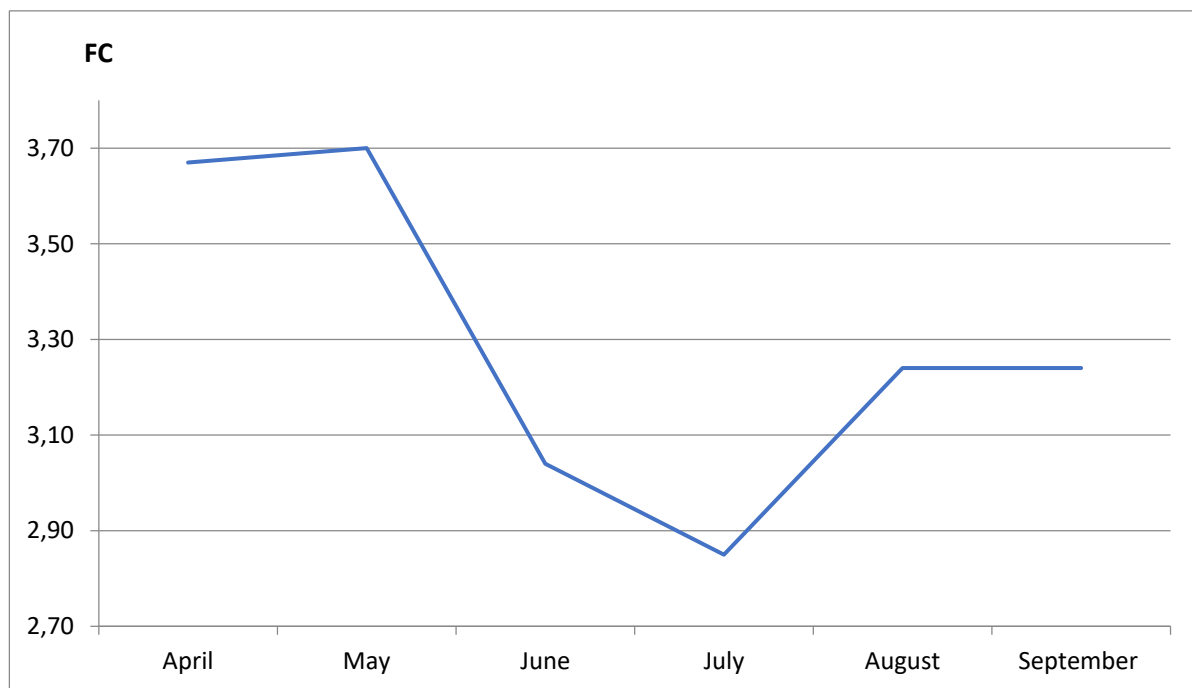


Figure 2. Means of milk FC according to the sampling month.

In this study, the overall mean found here was similar to the findings of Kaya et al. (2011) who found 264 200 cells/mL calculated in HF cows in different months, but it was higher than the findings of Ndiokubwayo and Koç (2021), Ng-Kwai-Hang et al. (1984), Koç (2008; 2009, 2011, 2015), Topaloğlu and Güneş (2005), Yılmaz (2010). Unless some values of Kaya et al. (2011) that were higher than our overall mean, there were not so many studies whose results were so higher.

Conclusion

In this study, factors affecting milk yield and quality were appraised and the non-genetic factors such as TEH and BDS that could affect milk quality and yield were also determined. The milk yield was not affected by any of the studied factors even though HF cows had a little higher milk yield than RH, but the RH cows' milk components were generally higher than HF cows. Thus, the improvement of milk yield will depend on nutrition and farm management by ameliorating environmental factors. Regarding milk quality, it was seen the SCC showed a variation by the sampling month where Log₁₀SCC means



were higher in April and May, were lower in summer months and became higher again in September samples. In addition, there was not any difference between both breeds in terms of $\text{Log}_{10}\text{SCC}$ even though RH cows had a little higher TEH score than HF cows. Fore more, there was a significant difference between breeds regarding milk fat rate. RH cows had higer FC than HF cows, the same than other milk components such as NFDMC. Generally, milk samples of RH cow have been found to have high milk constituents than HF cows but HF samples have higher SCC and high milk yield. Even though the TEH and BDS did not have any effect on milk yield and quality, it was seen that the sampling month is important for different traits, thus the milk producers and dairy industry may consider it as an important criterion during milk quality appraisal and farm management.

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ÇEVRESEL SORUNLAR VE SÜRDÜRÜLEBİLİR BESLENMEYE İLİŞKİN MÜDAHALELER

ENVIRONMENTAL CHALLENGES AND SUSTAINABLE NUTRITION INTERVENTIONS

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ÖZET

Günümüzde dünya nüfusunun artışı ve gıda israfı ile birlikte her geçen gün gıda talebi artmaktadır. Dünya nüfusunun artış hızına bakılarak 2030’da 8 milyarı, 2050’de 9 milyarı geçmesi bekleniyor. Buna dayalı olarak sanayileşmenin artması ve tüketim düzeyindeki artışlar ile iklim değişikliği, kaynakların yetersizliği ve dağılımındaki eşitsizlik, açlık, şişmanlık gibi sorunlar karşımıza çıkmaktadır. Dünya genelinde 2,5 milyardan fazla insan yetersiz beslenmekte iken yaklaşık 2 milyar yetişkin aşırı kilolu veya obez durumdadır. Hem besleyici gıdaların yetersiz tüketimi hem de zararlı olanların aşırı tüketiminden kaynaklı düşük kaliteli beslenme dünyada hastalık ve ölümlerin önde gelen bir nedenidir. Bunlara ilaveten mevcut gıda üretim sistemlerine bağlı olarak gezegen sağlığı da bozulmaktadır. Tarımsal üretime bağlı olarak sera gazı emisyonu her geçen gün daha fazla artmaktadır. Tüm insanlar için sağlıklı beslenme, kaynakların eşit dağılımı, sağlıklı bir çevre ve refah hak olduğundan dolayı sürdürülebilirlik kavramının ortaya çıkması kaçınılmaz olmuştur. Bu kavramın kullanılması oldukça eskilere 17. yüzyıla kadar dayanmaktadır. İlk olarak Almanya’da ormancılar tarafından “ağaç kesmek için yeni ağaçların yetişmesini beklemelisin” anlamında kullanılıyordu. Günümüzde Birleşmiş Milletler Gıda ve Tarım Örgütü (FAO) sürdürülebilir beslenmeyi; “besleyici, dengeli, ekonomik, ulaşılabilir, çevreye uygun ve doğal kaynaklı” olarak tanımlamaktadır. Sürdürülebilir beslenme ile özellikle bireyin sağlığının korunması, üzerinde yaşadığımız gezegenimizin daha az zarar görmesi ve kaynaklarının sürekliliği amaçlanmaktadır. Sürdürülebilir beslenme; az işlenmiş gıdaların, yerel ve mevsimine uygun ürünlerin, doğal kaynaklı ve israf edilmeden doğru kullanıldığı bir beslenme şeklidir. Küresel çapta oluşturulan beslenme modellerini uygulamada tüm ülkeler aynı oranda ilerleme sağlayamamaktadır. Bunun sosyal, ekonomik, kültürel, tarımsal vb. bazı nedenleri bulunmaktadır. Küresel bir beslenme modeli olarak önerilen gezegen sağlığı diyetinin sadece maliyetinin 1.58 milyar insanın toplam hane halkı gelirini aştığı yaklaşık 3 milyar insanın ise toplam gelirinin yarısına denk geldiği görülmektedir. Tüm bu sorunlara bakıldığında sürdürülebilir beslenme diyet modeli şart olduğu gibi diyetin uygulanabilirliğini arttırmak adına bazı gereklilikler bulunmaktadır. Bu makalede beslenme kaynaklı çevresel sorunlar ve bu sorunlara müdahale için sürdürülebilir beslenmeye ilişkin sosyo kültürel ve ekonomik uyum, beslenme şekli, tarımsal sorunlar, kaynak eşitsizliği ve israf konularına değinilmek istenmiştir.

Anahtar Kelimeler: Sürdürülebilirlik, Sürdürülebilir Beslenme, Çevresel Sorunlar



ABSTRACT

Today, with the increase in the world population and food wastage, the demand for food is increasing day by day. Considering the growth rate of the world population, it is expected to exceed 8 billion in 2030 and 9 billion in 2050. Based on this, problems such as climate change, inadequacy and inequality in the distribution of resources, hunger and obesity arise with the increase in industrialisation and increases in consumption levels. More than 2.5 billion people worldwide are undernourished, while approximately 2 billion adults are overweight or obese. Poor quality nutrition resulting from both inadequate consumption of nutritious foods and excessive consumption of harmful ones is a leading cause of morbidity and mortality in the world. In addition, the health of the planet is deteriorating due to current food production systems. Greenhouse gas emissions due to agricultural production are increasing day by day. Since healthy nutrition, equal distribution of resources, a healthy environment and welfare are rights for all people, the emergence of the concept of sustainability has been inevitable. The use of this concept dates back to the 17th century. It was first used by foresters in Germany to mean "you have to wait for new trees to grow before you can cut trees". Today, the Food and Agriculture Organisation of the United Nations (FAO) defines sustainable nutrition as "nutritious, balanced, affordable, accessible, environmentally friendly and naturally sourced". Sustainable nutrition aims to protect the health of the individual, less damage to the planet we live on and the continuity of its resources. Sustainable nutrition is a way of eating in which less processed foods, local and seasonal products, naturally sourced and wasted products are used correctly. Not all countries can make progress at the same rate in implementing nutrition models created globally. There are some reasons for this such as social, economic, cultural, agricultural, etc. It is seen that only the cost of the planetary health diet, which is proposed as a global nutrition model, exceeds the total household income of 1.58 billion people and corresponds to half of the total income of approximately 3 billion people. Considering all these problems, sustainable nutrition diet model is a must and there are some requirements to increase the applicability of the diet. In this article, it is aimed to address the environmental problems caused by nutrition and the issues of socio-cultural and economic harmony, diet, agricultural problems, resource inequality and waste related to sustainable nutrition for intervention to these problems.

Keywords: Sustainability, Sustainable Nutrition, Environmental Issues

GİRİŞ

Dünya nüfusu 1950’de 2,6 milyar iken bu sayı 2017 yılında neredeyse 3 katına çıkarak 7,6 milyar olmuştur. Nüfusun artış hızına bakılarak 2030’da bu sayının 8 milyarı 2050’de 9 milyarı geçmesi bekleniyor (Murray et al., 2018). Günümüzde nüfusun artması, insanların beslenme şeklinin değişmesi, ihtiyaç fazlası tüketim ve bunun yanında sanayileşme ile ultra işlenmiş gıdanın üretimi kaçınılmaz olmuştur. Bakıldığında sanayileşme ile birlikte gıdaya erişimin daha kolay olduğu ve açlığın önüne geçilmesi için olumlu bir gelişme sağlandığı düşünülse de kendi sağlığımız ve gezegenimizin sağlığı için zararlı bir durum ortaya çıkmıştır. Sanayileşme ile hızlı üretim kaynaklı bu gıdalar sağlığımız için zararlı olan trans yağ, doymuş yağ ve şeker gibi maddeleri ve ürünlerin raf ömrünü uzatmak için kullanılan birçok katkı maddelerini içermektedir (Willett et al., 2019). Yine bu gıdaların üretim aşamasında atmosferi, su kaynaklarımızı, toprağımızı ve bütün diğer canlıların da yaşamını etkileyen sera gazı etkisi gibi çevresel zararlar ortaya çıkmıştır.

Tüketim seviyesindeki artışlar, kaynakların sınırlı olması, verimli kullanılmaması, israf gibi durumlar beraberinde sürdürülebilirlik kavramını gerekli kılmıştır. Sürdürülebilirlik kavramı bu noktada hem insan hem de çevremizin sağlığının iyileştirilmesini hedeflemektedir. Sürdürülebilirlik ismi ilk olarak 1987’lerde Birleşmiş Milletler Dünya ve Çevre komisyonu tarafından kullanılmıştır. O zamanlar bu kavram sadece çevresel açıdan kaynakların korunması anlamında kullanılıyordu. Bugün ise sürdürülebilirlik; çevresel, sosyal ve ekonomik açıdan da ele alınmaktadır (Kuhlman & Farrington, 2010). Çevresel sorunların insan kaynaklı olumsuz etkisi birçok alanda görülmektedir. Biyolojik çeşitliliğin azalması, küresel ısınma, ormanlık alanların tahrip edilmesi, aşırı ve bilinçsiz avlanma, su ve hava kirliliği gibi sorunların çoğunluğu insan kaynaklıdır. Beslenme şekli, besinlerin üretimi, işleme,



kullanımı aşamalarındaki hatalar, israf ve fazla enerji tüketimi ile hem çevresel sorunlar hem de gıda güvencesizliği oluşmaktadır (Martin-Rios et al., 2018).

Sürdürülebilir beslenme; az işlenmiş, doğal, lezzetli, yerel, mevsimine uygun, ekonomik, bitkisel bazlı beslenmenin çok olduğu bir anlayış olarak kabul edilmektedir (von Koerber et al., 2017). Sürdürülebilir beslenme açısından günümüzde yaşanan problemlerin giderilmesi ve iyileştirilmesi için gerekenler: ekonomiklik, sosyo kültürel uyum, çevresellik, gıda kaybı ve israf gibi kavramlardır (FAO, IFAD, UNICEF, 2018). Bu makalede, insan sağlığı ve gezegen sağlığının devamlılığı, iyileştirilmesi ve çevresel sorunların azaltılması için sürdürülebilir beslenmenin uygulanmasında gerekli olan müdahaleler ele alınmıştır.

Sürdürülebilir Beslenme Kavramı ve Kalkınma Hedefleri

“Sürdürülebilirlik” kavramı oldukça eski bir terimdir. Yıllar içinde gereklilikleri, ihtiyaçları, kapsadıklarına göre tanımı değişmiştir. İlk olarak 17.yy ‘da Almanyada ormancılar tarafından ağaçların kesiminde yeni ağaçlar yetişmeden eskileri kesmemek üzerine kullanılan bir kavramdı (Scoones, 2007). 1987’de yayımlanan Brundtland raporunda sürdürülebilirlik, “Gelecek nesillerin kendi ihtiyaçlarını karşılama yeteneklerinden ödün vermeden bugünün ihtiyaçlarını karşılayan bir gelişim” şeklinde ifade edilmektedir (Keeble, 1988). Beslenme anlamında ilk olarak 1986 yılında gelecek nesillerin kaynaklarına saygılı ve sağlıklı bir beslenmeyi tarif etmesi açısından “sürdürülebilir diyet” kavramı kullanılmıştır (Grosso et al., 2020). Yakın zamanda Gıda Tarım Örgütü (FAO) ve Dünya Sağlık Örgütü (WHO) sürdürülebilir sağlıklı diyeti “Çevresel etkisi düşük olan, besin ve beslenme güvencesini ve günümüz ve gelecek nesiller için sağlıklı yaşamı destekleyen diyetlerdir” diye tanımlamaktadır (WHO-FAO, 2019).

Birleşmiş Milletler tarafından sürdürülebilir kalkınma farklı tarihlerde ele alınmıştır. İlk konferans 1972’de Stockholm’de çevre konulu bir oturumda gerçekleştirilmiştir. 26 ülkenin katıldığı konferansta ekonomik gelişme, hava, su ve okyanus kirliliği konularına değinilmiş, 1992’de Rio’da BM tarafından sürdürülebilir kalkınmanın tüm dünyada kabul gören ve tüm insanlık için bir hedef olması gerektiği sonucuna varılmıştır. Yakın tarihimize bakıldığında 2015 New York ve 2022 Stockholm konferanslarına 150’den fazla ülkenin katılımıyla gerçekleştirilmiş, bu konferanslarda 2030 Gündemi ve Sürdürülebilir Kalkınma modeli benimsenmiştir ve onun uygulanabilirliği üzerinde durulmuştur. Hedefler olarak yoksulluğun giderilmesi, herkes için refah, çevreyi korumak ve iklim değişikliği ile mücadele gibi konular ele alınmıştır (United Nations., n.d.). Onyeddi madde ile 2030 gündemi farklı birçok konudan bahsetmektedir. Tüm hedefler ile beslenmenin bağlantısı bulunmaktadır. Tablo 1’de sürdürülebilir kalkınma hedefleri ve beslenme ile olan ilişkileri gösterilmiştir (Grosso et al., 2020).

Tablo 1. Sürdürülebilir Kalkınma Gündemi ve Beslenme İle Olan İlişkisi

Sürdürülebilir Kalkınma Hedefleri	Beslenmeyle bağlantı
1. Yoksulluğa son	Yoksulluk, yeterli gıda alımına erişimi kısıtlıyor ve beslenme önerilerine ulaşmayı zorlaştırıyor
2. Sıfır açlık	Sürdürülebilir olmayan gıda üretimi yetersiz beslenmeye neden oluyor
3. Sağlık ve refah	Sağlıklı ve sürdürülebilir beslenme, bulaşıcı olmayan hastalıklar da dahil olmak üzere erken ölümleri azaltabilir



Sürdürülebilir Kalkınma Hedefleri

Beslenmeyle bağlantı

- | | |
|--|--|
| 4. Kaliteli eğitim | Kötü beslenme öğrenme yeteneklerini etkilerken, daha yüksek farkındalık sağlıklı ve sürdürülebilir gıda seçimlerini etkileyebilir |
| 5. Cinsiyet eşitliği | Kadınların haklarını talep etme konusunda güçlendirilmesi, yaşam ve beslenme kalitesinin iyileşmesine yol açar; Doğru beslenme, öğrenme performansını artırır ve bu da daha iyi iş fırsatlarına dönüştürülebilir |
| 6. Temiz su ve sanitasyon | Güvenli içme suyuna ve sanitasyona erişim yetersiz beslenmeyi azaltabilir |
| 7. Uygun fiyatlı ve temiz enerji | Fosil yakıtlardan bağımsızlık, sera gazı emisyonlarını ve çevre kirliliğini azaltacak, gıda güvenliğini sağlayacak |
| 8. İnsana yakışır iş ve ekonomik büyüme | Ekonomik dönüşüm besin güvencesini artırır ve sürdürülebilir tarımı kolaylaştırır |
| 9. Sanayi, yenilik ve altyapı | Tarımın gelişimi sağlar ve gıda güvenliği için teknolojilere ve altyapıya uygun fiyatlı erişim koşulunu kolaylaştırır |
| 10. Eşitsizliklerin azaltılması | Eşitsizlikler gelir, gıda, sağlık ve eğitime erişimde eşitsizliklere neden olur |
| 11. Sürdürülebilir şehirler ve topluluklar | Kırsal alana yayılma, gıda ihtiyacını artırır, gıda ve su kaynakları için rekabeti artırır ve son olarak gıda alımlarına bağımlılık yaratır. |
| 12. Sorumlu tüketim ve üretim | Kontrolsüz ve verimsiz gıda üretimi sera gazı emisyonlarına ve toprağın bozulmasına neden olduğundan, artan küresel nüfusun beslenme ihtiyaçlarının karşılanması, gıda üretimi ve suya erişim için sürdürülebilir çözümler gerektirir. |
| 13. İklim eylemi | İklim değişikliği küresel gıda üretimini ve gıda güvenliğinin yanı sıra tatlı su kaynaklarına erişimi de etkiliyor |



Sürdürülebilir

Kalkınma Hedefleri

Beslenmeyle bağlantı

14. Suyun altındaki yaşam	Su ürünleri yetiştiriciliği açlığı önler ve iyi beslenmeyi sağlar; ancak aşırı avlanma biyolojik çeşitliliği sınırlar
15. Karada Yaşam	Arazi kullanımının değişmesi toprağın bozulmasına neden olurken biyolojik çeşitliliği ve gıda üretimini ve tatlı suya erişimi azaltır
16. Barış ve adalet	Savaş, yetersiz/güvensiz gıda kaynakları ve gıdaya erişimin azalması nedeniyle yetersiz beslenme ve ölüme neden oluyor
17. Hedefler için ortaklıklar	Hedeflere ulaşmak için hem farklı sektörler hem de hükümetler arasında ortaklığa ihtiyaç duyulur

Açlık, gıda güvensizliği ve her türlü yetersiz beslenme açısından değerlendirilince 2030 hedeflerinden ülkelerin çok uzakta olduğu görülmektedir. Tabii bu gerilemeye bilinemeyen, tahmin edilmeyen Covid-19 pandemisi ve eşi benzeri görülmemiş Doğu Afrikadaki çekirge salgınlarının da neden olduğu düşünülmektedir. (Marco et al., 2020). Avrupa Birliği ülkelerinin Sürdürülebilir Kalkınmada ilerleyişinin izlendiği bir çalışmada da kaydedilen ilerlemeler açısından hedef göstergelerinin ve hedeflerinin kullanımında henüz çok az ilerleme sağlandığı belirtilmiştir. Sürdürülebilir Kalkınma Hedefleri'nin Avrupa düzeyinde pratikte uygulanmasıyla ilgili bir dizi zorluklar olduğu AB üye devletlerinde eğitim, gelir ve sağlık eşitsizliklerinin hâlâ mevcut olduğu görülmüştür. Ayrıca AB'nin kendisi, kamu sağlığı konusunda oldukça sınırlı bir ortak yetkiye sahiptir ve önemli sayıda üye devlet kendi özerkliğine tabidir. Bu yüzden henüz tek sesli bir teklif taslağı hazırlanamamış ve çoğu ülke Sürdürülebilir Kalkınma Hedeflerini kendi bağlamı içerisine entegre etmeyi amaçladığından, ne Avrupa düzeyinde ne de uluslararası düzeyde tek bir deneyim ortaya konulamamıştır (Brimont et al., 2016).

SOSYOKÜLTÜREL VE EKONOMİK UYUM

Yaşamın devamı için insanların ihtiyaçlarını karşılaması gerekmektedir. Bunun yanında tüketimde asıl amaç; yeterlilik, ihtiyaca uymak, israftan uzak durmak gibi değerler olmalıdır. Burada bireyleri; hayat tarzları, toplumsal normları, tüketim ve değerlerinin arasındaki uyum etkilemektedir (BAŞ, 2022). Günümüzde uygulanan gıda sistemlerinin çevresel ve sağlık açısından zararları göz önüne alındığında çevre ile daha uyumlu, ekonomik ve besleyici sürdürülebilir bir beslenmeye ihtiyaç duyulmamaktadır. Ayrıca bu diyetlerin sosyo-kültürel ve ekonomik açıdan da uygulanabilir olması gerekmektedir (WHO-FAO, 2019). Dünyada FAO, IFAD, UNICEF, WFP, WHO gibi 5 kuruluşun 2020'de hazırladığı "Dünyada Gıda Güvenliğinin Durumu ve Beslenme" raporunda dünya geneli açlığın giderilmesinde hedeflerden çok uzak olduğu ve bunda sağlıklı beslenme maliyetlerini karşılayamamanın çok önemli olduğu belirtilmiştir. Dolayısıyla milyonlarca insan gıda güvensizliği ve yetersiz beslenmeyle karşı karşıya kalmıştır (Marco et al., 2020). Mevcut beslenme alışkanlıkları devam ederse mortalite ve diyetle bağlı bulaşıcı olmayan hastalıkların artması kaçınılmazdır. Dolaylı olarak sağlık harcamaları maliyetler üzerine yüksek paya sahip olacaktır. Dünya genelinde sağlık giderlerinin 2030 yılına kadar yaklaşık 1.3 trilyon ABD dolarını bulabileceği ön görülmektedir. Hatta beslenme şekline bağlı olarak sera gazı emisyonunun maliyetinin 2030 yılına kadar küresel çapta 1,7 trilyon ABD doları gibi daha yüksek bir maliyete çıkacağı düşünülmektedir (Marco et al., 2020).



Dünyada Sera Gazı Emisyonunun %27'si gıdaların üretimi, işlenmesi, dağıtımı ve tüketim aşamasından kaynaklanmaktadır. Gıdanın bu yüzdesinin içinde taşımacılık kısmının sera gazına etkisi %19 meyve ve sebzelerde %36 olmaktadır (Willett et al., 2019). Beslenmenin yerel, kültürel ve ulaşılabilirliğinin kolay olması oldukça önemlidir. Bu veriler ışığında sürdürülebilir beslenme, maliyetleri azaltmak için oldukça elzem ve hızlıca yerine getirilmesi gereken bir programdır. Maliyetleri azaltmada gıda sistemleri tamamen incelenerek maliyeti arttıran faktörler ele alınmalıdır. Özellikle küçük ölçekli üreticilerin düşük maliyetle gıda pazarlarına ulaşmaları sağlanmalıdır (Marco et al., 2020).

Sürdürülebilir bir diyet oluştururken her ülkeye özgü olması, doğal kaynaklı, basit ve uygulanabilirlikle beraber kültürel uyumu da içermesi dikkate alınmalıdır. Hedef bireylerin; sağlıklı, yeterli ve dengeli beslenmesini sağlamak, bulaşıcı olmayan hastaların riskini azaltmak, biyoçeşitliliği korumak, kaynakların gelecek nesiller için kullanılmasını sağlamak, açlık ve fazla kiloluğun (şişmanlık) önüne geçmek olmalıdır (Rehber, n.d.). Bunun sağlanması için yerel besinlerin, bitkisel kaynaklı besinlerin tüketilmesi, mevsimine uygun beslenilmesi, besin kaybı ve israfın azaltılması, işlenmiş et ve kırmızı et şeker tüketiminin azaltılması gerekmektedir. Bitkisel bazlı beslenme hem sağlık açısından hem de çevreye uyum olarak faydalı bir beslenme anlayışıdır. Birçok çalışma bitki bazlı beslenme ve sürdürülebilir beslenme arasındaki uyumu göstermiştir. Fakat bu diyet modellerinin uygulanabilmesi için sosyo ekonomik yeterliliklerin sağlanması şart koşulmuştur (Hirvonen et al., 2020; Katz & Meller, 2014). Bitki bazlı diyet modelinin maliyetinin 159 ülkede 744 gıda fiyatı ile incelendiği kapsamlı bir çalışmada EAT- Lancet referans diyetinin 2011'deki minimum günlük maliyetinin gelişmemiş ülkelerde 2,42 dolar ile gelişmiş ülkelerde 2,66 dolar arasında değiştiği bulunmuştur. Bu referans diyetleri karşılamak için gerekli olan maliyet bazı ülkelerde hane halkı gelirlerinin %90'ına denk gelmektedir. Hatta çoğunluğu Sahra Altı Afrika ülkeleri ve Güney Asya ülkelerinin olduğu yaklaşık 1,58 milyar insan için bu diyet modelini uygulayacak toplam hane halkı geliri yetersiz iken yaklaşık 3 milyar insanın bu diyet modeli için toplam gelirinin yarısını vermesi gerekmektedir (Hirvonen et al., 2020).

İSRAF VE KAYNAK DAĞILIMINDAKİ EŞİTSİZLİK

İsraf her zaman toplumların önemli bir sorunu olmuştur. Sanayileşmenin artması ve tüketimin ihtiyaçtan fazla olması ile israf günümüzde daha büyük bir sorun haline gelmiştir. BM Gıda ve Tarım Örgütü gıdaların üretiminden perakende kısmına kadar %14'ünün israf edildiğini bildirmişti (HLPE, 2014; WHO-FAO, 2019). Sağsız bir çevrenin, kaynakların yetersizliğinin bir diğer sebebi de yine israfın yaygınlığıdır. Küresel çapta günümüzde ihtiyaç fazlası üretim ve tüketim kaybı ile toplamda besinlerin 1/3'ü israf edilmektedir (Willett et al., 2019). Ülkemizde de israf açısından durum pek parlak değildir. Türkiye İsraf Raporu'na göre hanelere daha girmeden satına alınan gıdaların %22,8'inin, hanelerde ise kullanım sırasında gıdaların %10,4'ü israf edilmektedir (İslamoğlu & Altunışık, 2017).

2018'de 1.3 milyar insan yeterli besine düzenli olarak erişmekte sorun yaşadığı bu yüzden gıda güvencesizliğiyle kaşı karşıya olduğu belirtilmiştir. Dahası 820 milyon insanın her gece yatağına aç girdiği bildirilmiştir. Yine buna karşın diğer bir tarafta fazla ve aşırı kiloluk, obezite toplumda oldukça yaygınlaşmış durumdadır. Yaklaşık 2 milyon yetişkin ve 40 milyon çocuğun (<5 yaş) aşırı kilolu olduğu, 670 milyondan fazla yetişkin ve 120 milyon çocuğun (5-19 yaş) obez olduğu görülmektedir. Aşırı kilo ve obezite ile ilişkili bulaşıcı olmayan hastalıklara bağlı ölümler küresel çapta 4 milyona ulaşmaktadır. Toplumsal bu dengesizlik, kaynakların eşitsiz dağılımı, israf ve beslenme şekli gibi konular sürdürülebilir beslenmenin önemli temel unsurlarıdır. Sağsız beslenme, dünya genelinde hastalık yükünün 1/10'u gibi yüksek bir oranını oluşturmakta ve küresel çapta tedavisi büyük maliyetler gerektiren hastalıklar ortaya çıkmaktadır (WHO-FAO, 2019; Willett et al., 2019). FAO'ya göre "Sürdürülebilir beslenme: insan ve doğal kaynakları doğru kullanarak biyoçeşitliliğe ve ekosisteme saygılı, koruyucu, kültürel olarak kabul gören, ulaşılabilir, ekonomik açıdan uygun ve beslenme açısından yeterli, güvenilir, sağlıklı beslenme" demektir (WHO-FAO, 2019). Bu tanımlamada kaynakların doğru kullanılması, ihtiyaç ölçüsünde tüketilmesi ve ekonomik açıdan uygunluk ve kaynakların eşit dağılımı israf açısından önleyici olacaktır gerçeği yatmaktadır.

Gıda kaybı ve israfı bakıldığında dünya geneli genel bir sorun olsa da her ülkeye göre bunların boyutları farklılık göstermektedir. Yüksek gelirli gelişmiş ülkelerde israf daha çok tüketim ve dağıtım aşamasında



olurken daha az gelişmiş ülkelerde üretim ve hasat aşamasında olmaktadır. Kişi başına düşen gıda kaybı ve israf yıllık Avrupa ve Kuzey Amerika'da 280-300 kg iken Afrika ve Güney Asya ülkelerinde yaklaşık yarısı ölçüsünde olan 120-170 kg civarındadır (HLPE, 2014). Gıda sistemindeki kayıp ve israfın oluşturduğu bu derece yüksek oranlar kaynakların yetersizliğine, çevre kirliliğine, sera gazı emisyonuna, açlık, savaşlar gibi birçok soruna sebep olmaktadır. Bu bağlamda önemine bakılarak Dünya Gıda Güvenlik Komitesi talebi ile 2014 yılında Gıda Güvenliği ve Beslenme Yüksek Düzeyli Uzmanlar Paneli (HLPE) tarafından "Sürdürülebilir Gıda Sistemleri Bağlamında Gıda Kayıpları ve İsraf" konulu bir çalışma yapılmıştır. Bu çalışma ile gıda kaybı ve israfın;

bir kaza değil aksine bir sorumluluk olarak görülmesine,

gıda sisteminin bir parçası kabul edilmesine,

gıda sistemlerinin yanlış işleyişinin bir sonucu olduğunun bilinmesine

gıda kayıpları ve israfının gıda güvenliği ve beslenme ile olan ilişkisi gibi konulara değinilmiştir (HLPE, 2014).

TARIMA İLİŞKİN SORUNLAR

İnsanların yaşamlarını sürdürebilmeleri için ihtiyacı olan, yeterli, güvenilir ve besleyici gıdaya ekonomik ve fiziksel açıdan ulaşabilmeleri olarak tanımlanan gıda güvencesinin ilk başlangıç yeri tarımdır. Bu sebeple gıda güvencesini oluşturmak isteyen ülkeler tarım politikalarını düzenlemekten başlamalıdır (Koç & Uzmay, 2015). Gıdaların üretim ve tüketim sistemleri, arazi kullanımı, toksik etki, biyolojik çeşitlilik, asitleşme, iklim değişikliği gibi çevresel sorunlar oluşturmaktadır. Daha önceleri yıllarca uygulanan politikalarda açlık sorununa çözüm olarak gıda üretimini artırma ve enerji içeriğini yükseltmek hedeflenirken gıda kalitesi ve çevresel etki göz ardı edilmiştir. Günümüzde yeni sürdürülebilir anlayış ile bu politikalar değiştirilmek istenmektedir (Marco et al., 2020). Sürdürülebilir tarım anlayışı; suyun ve arazinin verimli kullanıldığı, sera gazı emisyonunu fazla oluşturmayan taşımacılık yapıldığı, biyolojik entegre tarım sistemlerinin olduğu, gıda etiketleri ve sertifikalarının tamamlandığı bir sistemdir. Sürdürülebilir tarım doğal kaynakları gereksiz kullanmayı önlemek ve mevsiminde yerel ürünlerle beslenmeyi teşvik etmektedir (Vermeulen et al., 2012).

Yediğimiz yiyecekler soframıza gelene kadar birçok aşamadan geçmektedir. Tarım sonrası kısımda gıdayı işleme, paketlenme, nakliye, gıda hazırlama ve atık kısımları ile sera gazı emisyonunun %5-10'unu oluşturmaktadır (Vermeulen et al., 2012). Besinlerin iklimsel değişikliklere etkisi üretim ve tüketim kısmında sera gazı emisyonlarına olan etkisi ile ölçülmektedir. Karbondioksit (CO₂), metan gazı (CH₄) ve nitrik oksit (N₂O) başlıca sera gazı emisyonu sebebi olan gazlardır. Bunlardan CH₄ ve N₂O genelde tarımsal faaliyetler sırasında artan gazlardır. Gıdaları işleme, taşıma, depolama ve hazırlama aşamalarında ise CO₂ gazı emisyonu artmaktadır. Tarımsal üretim gıdaya bağlı emisyonun toplamda %80-86'sını oluşturmaktadır (Vermeulen et al., 2012). Küresel ısınmaya en çok neden olan karbondioksit gazıdır (Joyce et al., 2014). Ülkemiz 3 tarafı denizlerle çevrili bir yarım ada ülkesi olduğu için küresel ısınma ile birlikte ani sel baskınları, su seviyesi yükselmesi gibi olaylar için risk altındadır. Yağışların, hava koşullarının ve insanların beslenme şekillerinin değişmesine uyum sağlamak için geleneksel tarım anlayışı da değişmektedir (PAKSOY, 2019). Organik tarım; genetiği değiştirilmemiş organizmaları içeren, kimyasal ilaçlardan arındırılmış, tarımsal verimliliği arttıran bir sistemdir. Organik tarımda geleneksel tarıma göre topraktaki organizmaların sayısı ve çeşitliliği korunduğu için sağlık açısından daha faydalı ve sürdürülebilir olduğu düşünülse de bazı çalışmalar geleneksel tarım ile organik tarım arasında sera gazı emisyonu ve asitleşme gibi sonuçlar açısından önemli farklar bulunmadığını göstermektedir. Ayrıca iki tarım yönteminde de benzer karbon ayak izi ortalaması çıkmaktadır. Organik tarımda geleneksel yöntemlere göre %15 gibi daha az enerji harcanması ile birlikte %25-110 gibi daha fazla arazi kullanımına sebep olduğu düşünülmektedir (Clark & Tilman, 2017; Treu et al., 2017; Vermeulen et al., 2012). Bu yüzden organik tarım günümüz koşullarında yüksek gıda tüketimi göz önüne alındığında özellikle tarım arazilerinin geniş kullanımı gerekeceği için geleneksel tarıma göre avantajlı bir yöntem olarak görülmemektedir. Gıda tüketimi ihtiyaç ölçüsünde sınırlandırıldığı, daha



sağlıklı, yeterli ve dengeli beslenme şekline geçildiğinde organik tarım daha az çevresel zararı sebebi ile tercih sebebi olabilecektir.

GEZEĞEN SAĞLIĞI VE BESLENME ŞEKLİ

Beslenmek yaşamın sürdürülmesi ve sağlığımızın korunması için temel bir gereksinim olsa da beslenme şeklimiz, tükettiğimiz gıdaların üretim şekli ile kendi sağlığımız ve üzerinde yaşadığımız gezegenimizin sağlığına zarar vermekteyiz (FAO, IFAD, UNICEF, 2018). İşlenmiş gıdaların tüketiminin artması ile doğal işlenmemiş gıdaların; meyve, sebze, kurubaklagiller, tahılların tüketimi azalmaktadır. İnsanlarda beslenme şeklindeki bu değişim bağırsak disbiyozisine, düşük seviyeli inflamasyona ve bulaşıcı olmayan hastalıklara yatkınlığa sebep olmaktadır (Willett et al., 2019). Dünya genelinde 2,5 milyardan fazla insan yetersiz beslenmekte ve 2 milyar yetişkin aşırı kilolu veya obez durumdadır. Hem besleyici gıdaların yetersiz tüketimi hem de zararlı gıdaların aşırı tüketiminden kaynaklı beslenme şekli hastalık ve ölümlerin önde gelen bir sebebidir (WHO, 2017). Her ne kadar 2000 yılından 2019 yılına gelene kadar bodurluk prevalansında 3'te 1 düşüş olsa da çocuklarda yetersiz beslenme küresel bir sorun olarak devam etmektedir. 2019'da 5 yaş altı çocukların yüzde 21,3'ü(144 milyon) bodur, yüzde 5,6'sı (38,3 milyon) aşırı kilolu en az 340 milyon çocuğun yetersiz beslenme sorunuyla karşı karşıya olduğu bildirilmiştir. Diyetlerin kalitesi insan sağlığını birçok şekilde etkilemektedir (Marco et al., 2020). Gıdaların güvensizliği yetersiz beslenme riskini arttırmaktadır.

Çevre sağlığı ve insan sağlığına olumsuz etkileri ile iklim krizlerini önleyebilmek adına değişik beslenme modelleri birçok kuruluş tarafından denetlenmektedir. 2019 yılında EAT Lancet komisyonu sürdürülebilir beslenme politikasına uygun "Gezegen Sağlığı Diyetini önermiştir (Willett et al., 2019). Bu diyetle hayvansal gıdalar orta düzeyde olurken işlenmiş gıdalar, şeker ve doymamış yağın azaltılması istenmektedir. Ayrıca bitkisel bazlı besinlerin (tam tahıl, meyve, sebze, kurubaklagiller ve sert kabuklu yemişler) daha çok tüketilmesi önerilmektedir. Gezegen Sağlığı diyetinde aşırı kilo, obezite ve bulaşıcı olmayan hastalık riskini azaltmak için bir yetişkinin ortalama 2500 kcal alması önerilmektedir. Bu enerji ihtiyacının yaş, cinsiyet ve aktivite düzeyine göre değişebileceği belirtilmektedir (EAT Forum., n.d.). Gezegen Sağlığı diyeti küçük porsiyonlarda et, süt grubu ile birlikte daha büyük porsiyonlarda sebze, meyve, kuruyemiş ve kurubaklagil tüketimi içermektedir (EAT Forum., n.d.). Diyet içeriği olarak;

Protein ihtiyacı ilk olarak bitkilerden daha sonra haftada birkaç kez balıktan karşılanması, orta seviyede kümes hayvanı tüketilmeli, kırmızı et özellikle de işlenmiş et sınırlandırılmalı.

Sebze ve meyve açısından patates hariç günde en az 5 porsiyon (ortalama meyve:100-300 gr, sebze: 200-600 gr).

Kuruyemiş günlük en az 50 gr, kurubaklagil 75gr tüketilmeli.

Et ürünü olarak haftada en fazla 98 gr kırmızı et, 203 gr kümes hayvanı eti ve 196 gr balık eti tüketilebilir.

Yağ içeriği olarak doymamış yağlar tercih edilmeli. Günlük 11,8 gr'dan fazla doymuş yağ tüketilmemeli.

Karbonhidrat içeriği olarak tam tahıllar fazla tüketilmeli. Günlük diyetin şeker içeriği %5'i geçmemeli.

Süt tüketimi orta düzeyde tutulmalı. Günlük 250 gr süt ürünü tüketilebilir (EAT Lancet Commission, 2020).

Kişilerin beslenme şekilleri, diyet içerikleri oluşturduğu sera gazı etkisi bakımından tüketilen besine göre değişmektedir. Besinlere göre oluşturdukları çevresel zarar (sera gazı emisyonu) değerleri Tablo 2'de ayrıntılı olarak verilmiştir (Macdiarmid et al., 2012).



Tablo 2. Bazı Besinlerin Sera Gazına Etkisi

Düşük GHGE(<1,00 kg CO ₂ e/kg yenilebilir ağırlık)	Orta GHGE (1,00-4,00 kg CO ₂ e/kg yenilebilir ağırlık)	Yüksek GHGE (>4,00 kg CO ₂ e/kg yenilebilir ağırlık)
Patates	Tavuk	Sığır eti Kuzu Domuz Hindi
Makarna, erişte Ekmek	Süt, tereyağı, yoğurt Yumurta	Peynir
Yulaf	Pirinç	
Sebzeler (soğan, bezelye, havuç, tatlı mısır, brassica)	Kahvaltılık gevrek	
Meyveler (örneğin elma, armut, narenciye, erik, üzüm)	Ekmek üstüne sürülen soslar Fındık, tohumlar	
Fasulye, mercimek Şekerleme, şeker	Bisküvi, kek ve tatlılar	
Lezzetli atıştırmalıklar	Meyveler (örneğin, çilek, muz, kavun) Salata sebzeleri	
	Sebzeler (örneğin, mantar, yeşil fasulye, karnabahar, brokoli, kabak)	

GHGE: Sera gazı emisyonu CO₂e: Karbondioksit eşdeğeri

Tablo 2 incelendiğinde aynı besin grubunda bulunan gıdaların da farklılık gösterdiği görülmüştür. Örneğin sığır eti tavuk etine göre daha yüksek sera gazı etkisine sahiptir. Çünkü büyükbaş hayvan yetiştiriciliğinde yem ihtiyacı, arazi kullanımı, taşımacılıkta harcanan fosil yakıt vb. çevresel etki daha yüksektir. Tahıllar grubunda da pirinç daha yüksek bulunmuştur. Bunun sebebi pirinç üretiminde fazla su kullanımının fazla olmasıdır. Sebze ve meyvelere bakıldığında çoğunluğu düşük sera gazı etkisine sahip iken bazı hassas yetiştirilen (çilek, muz, salatalık gibi) sebze ve meyvelerin daha yüksek olduğu görülmektedir. Çünkü hassas ürünlerin tüketime hızlı ulaştırılmaları ve saklanma koşullarında daha yüksek enerji harcanmaktadır (Demir & Akay, 2020). Temel besin gruplarının mortalite ile ilişkisini inceleyen çalışmalarda en az oran sert kabuklu yemişler, tam tahıl ve sebze ürünlerinde bulunurken en yüksek ölümler et ürünleri, şekerle tatlandırılmış gıdalar, işlenmiş et ürünleri ile ilişkili bulunmuştur (Bechthold et al., 2019; Schwingshackl et al., 2017).

Dünya geneli tüm sektörler bakımında gıda sektörü şuan su kullanımında oran olarak en büyük paya sahip sektördür. Su kullanma oranında gıda sektörü Avrupa'da %21, Afrika'da ise %82 oranındadır. Daha kırsal yerleşimlerde arazilerin geniş kullanılması ve geleneksel yöntemler ile fazla su kullanılmaktadır (Willett et al., 2019). Besin ya da besin olmayan bir ürünün üretilmesinden tüketilmesine kadar harcanan, buharlaşan, kirlenen suyun hacmi (m³/ton) su ayak izi olarak ifade edilmektedir. Bir gıda için su ayak izi denildiğinde kullanılan temiz su miktarı kastedilmektedir (Gerbens-Leenes et al., 2013). Çevresel bir zarar olan su ayak izi oranlarına bakıldığında bitkisel veya hayvansal beslenmeye göre oranlar değişmektedir. Su ayak izi için küresel değerlere bakıldığında sebzeler: 322 m³/ton, meyveler 962 m³/ton, tahıllar:1644 m³/ton, kuru baklagiller: 4055 m³/ton hesaplanmıştır. Hayvansal ürünler için bakıldığında süt: 1020 m³/ton, yumurta: 3265 m³/ton, peynir: 5060 m³/ton bulunurken et çeşitlerinden; tavuk eti: 4325 m³/ton, koyun eti: 10412 m³/ton, dana eti: 15418 m³/ton olarak hesaplanmıştır (Gerbens-Leenes et al., 2013). Besinlerin su ayak izine bakıldığında bitkisel bazlı besinlerin daha düşük etkisi olduğu görülmektedir. Besi hayvanlarını beslemek için üretilen mahsul ve harcanan enerjinin çevresel zararı bitkisel bazlı gıdalara göre daha yüksektir.

SONUÇ

Birçok ülke sürdürülebilir beslenmenin uygulanması ve çevresel zararların azaltılması için gerekliliği noktasında hem fikir olsa da sürdürülebilir beslenmenin ilkeleri konusunda tam olarak fikir birliği oluşturamamıştır. Bu yüzden de FAO ve WHO'nun desteğiyle 2019 yılında düzenlenen toplantı sonucu



Sürdürülebilir Sağlıklı Diyetlerin çevre dostu, ekonomik, sosyo kültürel açıdan uyumlu ve uluslararası beslenme tavsiyelerine ters düşmeyen bir şekilde olması kararlaştırılmıştır (WHO-FAO, 2019). Oluşturulmaya çalışılan evrensel diyet ne kadar yol gösterici olsa da küresel açıdan uygulanması pek mümkün olamamıştır. Çünkü toplumların sosyo-kültürel yapıları, ekonomik hedefleri, erişebilirlikleri farklılık göstermektedir. Günümüzün gelişmiş ülkeleri olarak kabul edilen Avrupa Birliği ülkeleri bile Sürdürülebilir Kalkınma Hedeflerini uygulamada çok az ilerleme sağladıkları ve sürdürülebilir beslenmeye tam bir ortak uyum sağlayamadıkları görülmüştür (Brimont et al., 2016). Ayrıca her sürdürülebilir diyet sağlıklıdır ya da her sağlıklı diyet mutlaka sürdürülebilirdir demek pek mümkün değildir. Toplumlar için beslenme rehberleri oluşturulurken bilimsel ve politik bir süreç içinde geliştirilmektedir. Sosyo-kültürel durum, beslenme alışkanlıkları, besine ulaşım, ekonomi, bulaşıcı olmayan hastalıkların prevalansı vb. parametrelerin hepsine bakılmalıdır (Herforth et al., 2019),(Hirvonen et al., 2020). Bu yüzden küresel yerine aslında sürdürülebilir beslenmede; toplumların sosyo kültürel yapıları, ekonomik koşulları, maddi olanakları göz önüne alınarak ülkelere özgü daha özel şekilde programlar oluşturulması gereklidir. Tüm ülkelere aynı sürdürülebilir beslenmenin tanımlaması ve ulaşılması gereken hedefler verilmesi yerine her ülkeden istenenlerin daha yerel olması gereklidir. Sonuç olarak küresel çapta düşünüldüğünde sürdürülebilir beslenmenin bize göre temel ayaklarını oluşturan özellikle ekonomi, uygun tarım koşulları, israf, erişebilirlik ve yerel tüketim ayaklarını oluşturmak ve her ülkenin kendi özelinde hazırlanacak programlar sağlıklı bir ilerleyiş için oldukça önemlidir. Bu programların gerçekleştirilmesinde her ülkenin kendi özelinde beslenme, tarım, ekonomi ve sosyoloji gibi alanlarında uzman profesyonellerinden yardım alınmalıdır.

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ÇİFT KOLLU BİR SCARA ROBOTUN BOZKURT ALGORİTMASI KULLANILARAK OPTİMUM YÖRÜNGE SENTEZİ

OPTIMAL PATH SYNTHESIS OF A DUAL-ARM SCARA ROBOT USING THE GREY WOLF OPTIMIZER

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ÖZET

Bu çalışmada, meta-sezgisel optimizasyon algoritmalarından Bozkurt Algoritması kullanılarak çift kollu bir scara robotun optimum yörünge sentezi gerçekleştirilmiştir. Minimize edilecek amaç fonksiyonu, istenen bir yörünge ile robotun uç işlevcisinin takip edeceği yörünge arasındaki dik mesafe olarak alınmıştır. Çift kollu scara robotun optimal tasarımı, tekillik durumu oluşmadan ve robotun çalışma uzayı içerisinde istenen yörüngeyi minimum hata ile takip edecek şekilde yapılmıştır. Çift kollu scara robotun, çalışma uzayı içerisinde olmak şartıyla zamanlama olmadan, istenen yörüngeyi takip edeceği düşünülmüştür. Bozkurt Algoritması kullanılarak istenen kısıtlara uygun çift kollu scara robotun kol boyutları hesaplanmıştır. Örnek bir uygulama üzerinde kullanılan algoritmanın etkinliği ve hassasiyeti gösterilmiştir. Sayısal uygulama sonuçları grafiksel olarak verilmiştir.

Anahtar Kelimeler: Çift kollu scara robot, yörünge sentezi, optimizasyon, Bozkurt Algoritması.

ABSTRACT

In this study, the optimal path synthesis of a dual-arm scara robot was carried out using the Grey Wolf Optimizer, one of the meta-heuristic optimization algorithms. The objective function to be minimized is taken as the perpendicular distance between a desired trajectory and the trajectory that the end-effector of the robot will follow. The optimal design of the dual-arm scara robot was made to follow the desired trajectory within the robot's working space without a singularity situation and with minimum error. It is thought that the dual-arm scara robot will follow the desired trajectory without timing, provided that it is within the working space. Using the Grey Wolf Optimizer, the arm dimensions of the dual-arm scara robot were calculated in accordance with the desired constraints. The effectiveness and sensitivity of the algorithm used are demonstrated on an example application. Numerical application results are given graphically.

Keywords: Dual-arm scara robot, path synthesis, optimization, Grey Wolf Optimizer.

GİRİŞ

Seri ve paralel olmak üzere iki tür temel manipülatör vardır. Seri manipülatörler, endüstriyel robotik uygulamalarda gerçekleştirilecek çeşitli görevler için yaygın olarak kullanılmaktadır. Ancak paralel



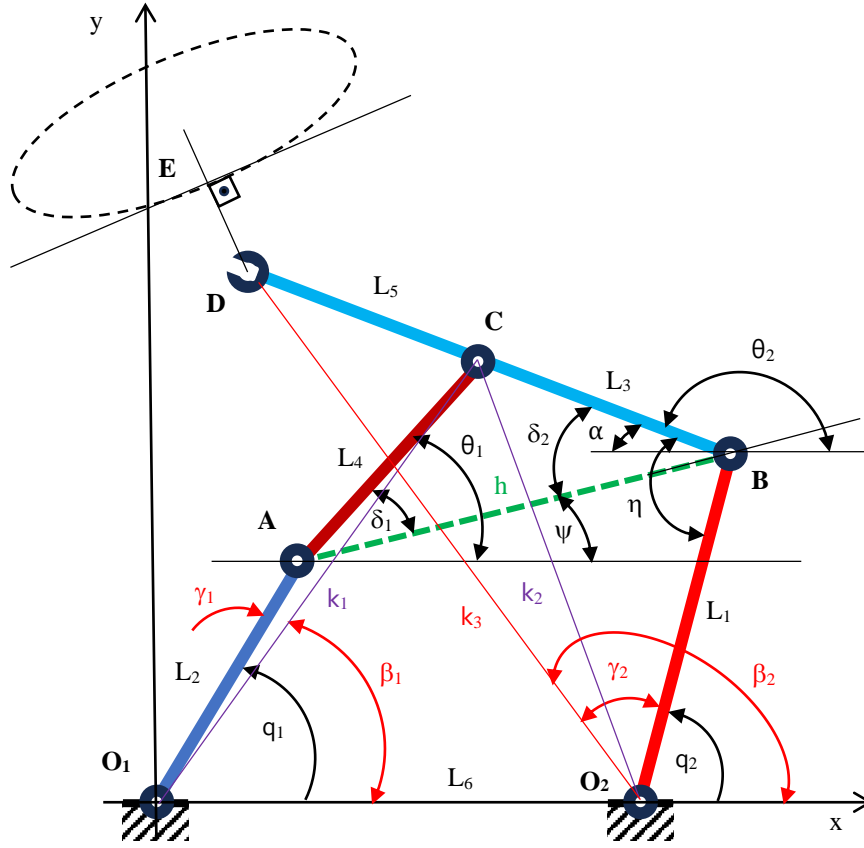
manipülâtör kendine has özellikleri nedeniyle önem kazanmaktadır. Paralel manipülâtörlerin seri manipülâtöre göre avantajları, son yıllarda araştırmacıların büyük ilgisini çeken, yüksek taşıma kapasitesi, konum doğruluğu ve yüksek yapısal sağlamlıktır. Prallel manipülâtörlerin yüksek doğruluk, yüksek rijitlik, yüksek taşıma kapasitesi, düşük hareket ataleti vb. gibi avantajları vardır. Bununla birlikte, paralel manipülâtörün ana dezavantajları, nispeten küçük çalışma alanları ve çalışma alanındaki birçok tekil konfigürasyondur. Ayrıca paralel manipülâtörlerin performansı geometrik parametrelere güçlü bir şekilde bağlıdır. Bu nedenlerden dolayı paralel manipülâtörlerin optimum kinematik tasarımı çok karmaşıktır ve tasarım yönteminin yeterliliği ve etkinliği daha kritik hale gelmektedir [1-5].

Bu çalışmanın konusu olan çift kollu scara robot, beş çubuklu düzlemsel bir paralel manipülâtördür. Beş çubuklu düzlemsel paralel manipülâtör, 2 serbestlik derecesine sahip tipik bir paralel mekanizmadır. İki aktif eklem ve üç pasif eklemden oluşur. 5R simetrik mekanizma olarak da adlandırılan simetrik yapıya sahip beş çubuklu düzlemsel paralel manipülâtör, bu alandaki çoğu araştırmacının ilgisini çekmiştir. Bu tür paralel manipülâtörün optimal tasarımı birçok araştırmacının ilgisini çekmiştir. Paralel robot yapılarında beş çubuklu düzlemsel manipülâtör basit bir yapıya sahiptir ve kinematik analizi göreceli olarak açıktır. Ancak yüksek hız, yüksek doğruluk, düşük eylemsizlik ve yüksek sertlik özelliklerine sahiptir. Bazı özel endüstriyel proseslerde, bazı cihazlar (örneğin mikroelektromekanik sistemler) hiç montaj gerektirmez veya çok az montaj gerektirirken, diğer minyatürleştirilmiş ürünler işlenmesi ve birleştirilmesi gereken çeşitli parçalardan oluşur. Genel olarak mikro montaj için kullanılan konvansiyonel seri robot boyutlarına göre geniş bir çalışma alanına sahiptir ancak tekrarlanabilirliği oldukça düşüktür. Beş çubuklu düzlemsel manipülâtörün kullanımı, basit kontrol, yüksek sertlik ve yüksek hassasiyet gibi özellikleri nedeniyle umut verici görünmektedir. Bu nedenlerden dolayı beş çubuklu düzlemsel manipülâtörün araştırılması ve geliştirilmesi birçok araştırmacının ilgisini çekmiştir. Teknolojinin gelişmesiyle birlikte endüstriyel otomasyonda montaj ve ayıklama işlerinde yaygın olarak kullanılma potansiyeline sahiptir [6-14].

ÇİFT KOLLU SCARA ROBOTUN KİNEMATİK MODELİ

Bu çalışmada ele alınan çift kollu scara robotunun yapısı Şekil 1'de gösterilmektedir. Robot manipülâtörün 2 serbestlik derecesi vardır. D noktasında robot uç işlevcisinin tuttuğu bir parçanın konumlandırılması için x ve y eksenleri boyunca öteleme hareketi ve bunların oryantasyonu için z ekseninde dönme hareketi gerçekleştirilebilir. xy düzlemindeki öteleme hareketi beş çubuklu paralel mekanizma yapısı ile elde edilir. Robot manipülâtörün 2 serbestlik derecesi olması dolayısıyla mecburi hareketlilik O_1 ve O_2 eklemlerine bağlanan motorlar aracılığıyla sağlanır.

Bu bölümde çift kollu scara robotun ileri ve ters kinematik modeli elde edilmiştir. İleri kinematik problemde eklem değişkenlerinin bilindiği varsayılar ve problem uç işlevcinin konumunu ve yönelimi bulunur. Paralel robotların ileri kinematığı genellikle ters kinematikten daha karmaşıktır. Çift kollu scara robot için yapısının basitliği nedeniyle ileri kinematik çözümler analitik formda kolaylıkla ifade edilebilmektedir.



Şekil 1. Çift kollu scara robot

Şekil 1 'de gösterildiği gibi, O_i eklemlerin sabit temel noktalarını, L_i uzuvların uzunluklarını ve q_i ise eklemlerin dönme açılarını belirtir. Uç işlevcinin pozunu (konumu ve yönelimi) $D = [x_D, y_D, \alpha]$ ile gösterilirken, eklemlerin değişkenleri $[q_1, q_2]$ 'dir. İleri kinematik problemde, q_i ortak değişkeni verilmekte ve uç işlevci $D = [x_D, y_D, \alpha]$ konumu ve yönelimi bulunacaktır. Düz kinematik için Şekil 1 kullanılarak aşağıdaki formüller türetilmiştir:

$$x_D = x_A + L_4 \cos(\theta_1) + L_5 \cos(\theta_2)$$

$$y_D = y_A + L_4 \sin(\theta_1) + L_5 \sin(\theta_2)$$

$$\theta_1 = \delta_1 + \psi$$

$$\psi = \text{atan2}(y_B - y_A, x_B - x_A)$$

A ve B eklemlerinin konumu, q_i eklemlerin değişkenlerinin bir fonksiyonu olarak ifade edilebilir:

$$x_A = L_2 \cos(q_1)$$

$$y_A = L_2 \sin(q_1)$$



$$x_B = L_1 \cos(q_2) + L_6$$

$$y_B = L_1 \sin(q_2)$$

Yukarıdaki denklemlerdeki δ_i değişkenleri aşağıdaki şekildedir:

$$\delta_1 = \pm \arccos\left(\frac{(L_3^2 - L_4^2 - h^2)}{2L_4h}\right)$$

$$\delta_2 = \arccos\left(\frac{(L_4^2 - L_3^2 - h^2)}{2L_3h}\right)$$

$$h = \sqrt{(y_B - y_A)^2 + (x_B - x_A)^2}$$

şeklinde. Denklemlerdeki \pm işareti robotun montaj moduna bağlıdır, bu durumda iki çözüm üretilebilir. Son olarak uç işlevcinin mutlak rotasyonu α aşağıdaki şekilde belirlenebilir:

$$\alpha = \pi - \theta_2$$

$$\theta_2 = \pi - (\delta_2 - \psi)$$

şeklinde. Ters kinematik analiz için uç işlevcinin konumu ve yöneliminin ($D = [x_D, y_D, \alpha]$) bilindiği varsayılarak problem robotun eklem değişkenlerini ($[q_1, q_2]$) bulmak olarak tanımlanır. Robot manipülatörün nispeten basit geometrisinden ters kinematik problem kolayca çözülebilir. Ters kinematik için Şekil 1 kullanılarak aşağıdaki formüller türetilmiştir:

$$q_2 = \beta_2 - \gamma_2$$

$$q_1 = \beta_1 + \gamma_1$$

İki ara değişken $\beta_1, \beta_2, \gamma_1$ ve γ_2 aşağıdaki şekilde tanımlanır:

$$\beta_2 = \pi - \arctan2(y_D, L_6 - x_D)$$

$$\beta_1 = \arctan2(y_C, x_C)$$

$$x_C = x_D + L_5 \cos(\alpha)$$



$$y_C = y_D - L_5 \sin(\alpha)$$

$$\gamma_2 = \pm \arccos \left(\frac{(L_1^2 + k_3^2 - (L_3 + L_5)^2)}{2L_1 k_3} \right)$$

$$\gamma_1 = \pm \arccos \left((L_2^2 + k_1^2 - L_4^2) / 2L_2 k_1 \right)$$

$$k_1 = \sqrt{x_C^2 + y_C^2}$$

$$k_3 = \sqrt{(L_6 - x_D)^2 + y_D^2}$$

şeklindedir. γ_1 ve γ_2 için seçilen işarete göre çift kollu scara robotun dört farklı ters kinematik çözümünü elde edebiliriz. Ayrıca uç işlevcinin oryantasyonu α için ortak koordinatlar aşağıdaki şekilde yazılabilir:

$$\eta = \pm \arccos \left(((L_3 + L_5)^2 + L_1^2 - k_3^2) / 2L_1(L_3 + L_5) \right)$$

$$\alpha = \eta - q_2$$

xy koordinat sistemi üzerindeki uç işlevcinin D noktasının koordinatları (x_D , y_D) ve uç işlevcinin takip etmesi istenen yörünge üzerinde bulunan E noktasının koordinatları (x_E , y_E) olarak tanımlanmıştır. D ve E noktaları arasındaki en kısa mesafe z ise aşağıdaki şekilde tanımlanabilir:

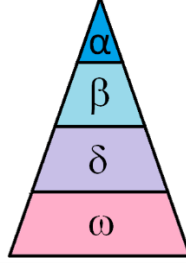
$$z = \sqrt{(x_E - x_D)^2 + (y_E - y_D)^2}$$

BOZKURT ALGORİTMASI

Bozkurt Algoritması, bozkurtların liderlik hiyerarşisini ve avlanma mekanizmasını simüle eden bir arama algoritmasıdır, Mirjalili ve ark. tarafından önerilmiştir [15]. Bu optimizasyon algoritması, bozkurtların avlanma sırasındaki davranışlarını taklit etmeye ve çözümleri gruptaki hiyerarşiye göre sıralamaya dayanmaktadır. Bozkurt algoritmasının detaylı olarak incelendiği birçok çalışma mevcuttur [16-17]. Teknik, vahşi doğada bozkurt toplumundaki avlanma davranışını ve sosyal hiyerarşiyi simüle eder. Bozkurt hiyerarşisinde bozkurtlar birbirleri arasındaki baskınlık durumlarına göre 4 farklı simülasyon grubunda incelenir. Şekil 2'de görüldüğü gibi simülasyonlar hiyerarşik olarak sırasıyla Alfa (α), Beta (β), Delta (δ) ve Omega (ω) şeklindedir. Alfa (α) kurt, bozkurtlar grubunda avlanma ve diğer faaliyetler (uyku yeri ve zamanı vb.) ile ilgili kararlardan sorumlu olan liderdir, dolayısıyla hiyerarşide en üst sırada yer alan bozkurttur. Karar verme yetkisine sahip Alfa (α) kurdun yardımcısı olan Beta (β) kurt, hiyerarşide ikinci sırada yer alır. Alfa (α) ve Beta (β) kurtların ardından Delta (δ), en düşük sıralamadaki bozkurttur ancak Omega'ya (ω) hakimdir. Alfa (α), Beta (β) veya Delta (δ) kurtları dışındaki diğer kurtlara bozkurt hiyerarşisinde Omega (ω) adı verilir.



Bozkurt algoritması kullanılarak yapılan optimizasyon işleminde, arama rastgele oluşturulan kurt popülasyonu (çözümler) ile başlar. Avlanma sırasında (optimizasyon), bu kurtlar yinelemeli bir prosedür yoluyla avın konumunu (optimum) tahmin eder. Alfa (α) en uygun çözüm, Beta (β) ikinci en iyi çözüm ve Delta (δ) üçüncü en iyi çözümdür. Diğer çözümler uzmanının çözümleri en az önemli olan Omega (ω) olarak değerlendirilen çözümlerdir [15].



Şekil 2. Bozkurt hiyerarşisi [15]

Bozkurt algoritmasında avlanma davranışı temel olarak üç adıma bölünmüştür. Avlanma süreci avın takip edilmesi, kovalanması ve yaklaşılmasıyla başlar. Av hareket etmeyi bırakıncaya kadar takip edilmesi, kuşatılması ve taciz edilmesi devam eder. Sonunda kurtlar avına saldırır. Bu adımlar Şekil 3 'te görülmektedir. Bozkurtların sosyal hiyerarşiye göre avlanma adımlarındaki (takip etme, kuşatma ve saldırma) davranışları Mirjalili ve ark. tarafından matematiksel olarak modellenmiş ve ayrıntılı olarak açıklanmıştır [15]. Matematiksel model kısaca aşağıda verilmiştir:



Şekil 3. Bozkurtların avlanma davranışı: (A) avın takip edilmesi, kovalanması ve yaklaşılması (B-D) takip etmek, taciz etmek ve kuşatmak (E) sabit durum ve saldırı [18]

Bozkurtların kuşatma davranışı matematiksel olarak şu şekilde modellenmiştir:

$$\vec{D} = |\vec{C}\vec{X}_p(ite) - \vec{X}(ite)|$$



$$\vec{X}(iter + 1) = \vec{X}_p(t) - \vec{A}\vec{D}$$

\vec{X}_p ve \vec{X} sırasıyla avın ve bozkurdun konum vektörünü temsil eder. *iter* o anki iterasyondur. \vec{A} ve \vec{C} katsayı vektörleridir ve şu şekilde hesaplanır:

$$\vec{A} = 2\vec{a}\vec{r}_1 - \vec{a}$$

$$\vec{C} = 2\vec{r}_2$$

\vec{r}_1 ve \vec{r}_2 , [0, 1] aralığında yer alan rastgele vektörlerdir. \vec{a} 'nın bileşenleri iterasyonlar yoluyla doğrusal olarak 2'den 0'a azaltılır. Bozkurtların avlanması matematiksel olarak şu şekilde modellenmiştir:

$$\vec{D}_\alpha = |\vec{C}_1\vec{X}_\alpha - \vec{X}| \quad \vec{D}_\beta = |\vec{C}_2\vec{X}_\beta - \vec{X}| \quad \vec{D}_\delta = |\vec{C}_3\vec{X}_\delta - \vec{X}|$$

$$\vec{X}_1 = \vec{X}_\alpha - \vec{A}_1(\vec{D}_\alpha) \quad \vec{X}_2 = \vec{X}_\beta - \vec{A}_2(\vec{D}_\beta) \quad \vec{X}_3 = \vec{X}_\delta - \vec{A}_3(\vec{D}_\delta)$$

$$\vec{X}(iter + 1) = (\vec{X}_1 + \vec{X}_2 + \vec{X}_3)/3$$

Başlangıçta optimumun arama uzayındaki konum hakkında hiçbir fikir yoktur. Elde edilen ilk 3 en iyi çözümün (α β δ) avın konumu hakkında daha iyi bilgiye sahip olduğu varsayılmaktadır. İterasyonlar boyunca α β ve δ avın olası konumunu tahmin eder ve mesafesini günceller. Daha sonra diğer grup üyelerinin pozisyonları en iyi çözümlere göre güncellemeye zorlanır. Potansiyel çözümler avdan ayrılma (eğer $|\vec{A}| > 1$) ise veya ava doğru yaklaşma (eğer $|\vec{A}| < 1$) ise eğilimindedir. Son olarak, bozkurt algoritması bir son kriter veya iterasyon sayısı ile tamamlanır. Bozkurt algoritmasının akış şeması Şekil 4'te verilmiştir.



```
Bozkurtların konumlarını başlat
Bozkurtların uygunluk değerlerini hesapla
En iyi bozkurdu alfa kurt olarak kaydet
En iyi ikinci bozkurdu beta kurt olarak kaydet
En iyi üçüncü bozkurdu delta kurtu olarak kaydet
While (iterasyon < maksimum iterasyon)
   $\vec{a}$  değerini azalt
  For her bir Bozkurt
    Alfa, beta, delta için katsayı vektörlerini oluştur
    Uzaklık vektörlerini hesapla
    Deneme vektörlerini hesapla
    Bozkurdun konumunu güncelle
  End
  Güncellenen Bozkurtların uygunluk değerlerini hesapla
  For her bir Bozkurt için
    If (Bozkurt < alfa kurt )
      Alfa kurdu güncelle
      Else if (Bozkurt < beta kurt)
        Beta kurdu güncelle
      Else if (Bozkurt < delta kurt)
        Delta kurdu güncelle
    End if
  End For
  Alfa kurdu güncelleyin
  İterasyonu artır
End While
Alfa kurduna dönüş
```

Şekil 4. Bozkurt Algoritması akış şeması [15]

SAYISAL UYGULAMA

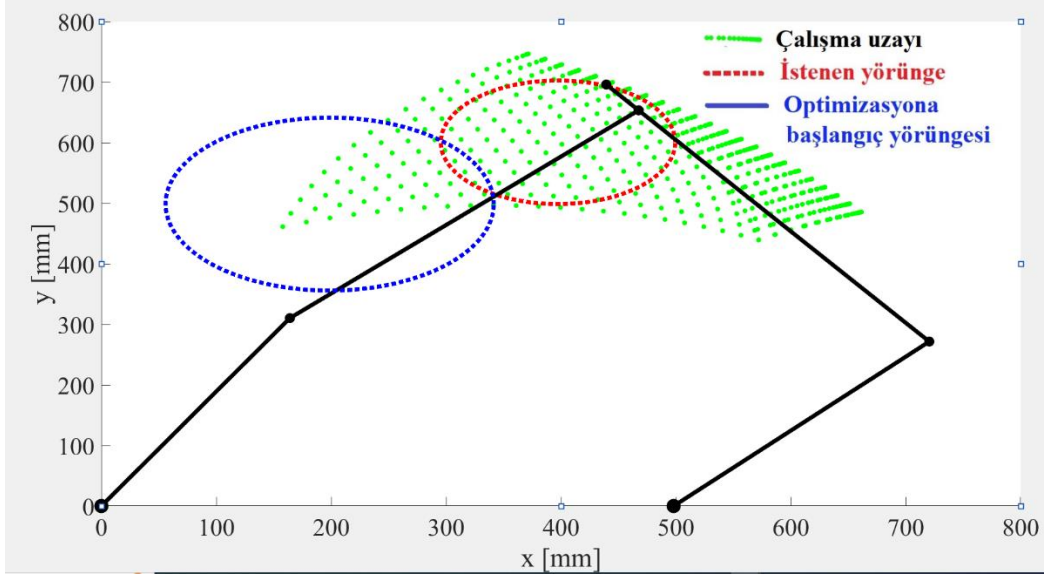
Ele alınan düzlemsel çift kollu scara robot, sanayi uygulamalarında birçok yerde kullanılmaktadır. Çift kollu scara robotun uç işlevcisinin verilen bir yörüngeyi minimum hata ile takip etmesi istenmektedir. Yörünge takibi sırasında q_1 ve q_2 açısının belirli sınırlar içerisindeki hareketine karşın z mesafesi minimum olacak şekilde robot manipülatörün boyutları optimize edilmiştir. Bu çalışmadaki boyut optimizasyonu problemi Bozkurt Algoritması kullanılarak çözülmüştür. Şekil 5 'te çift kollu scara robotun uç işlevcisinin robotun çalışma uzayı içerisinde ve tekillik oluşmayacak şekilde takip etmesi istenen yörüngeye karşın optimizasyon yapılması sırasında başlangıç olarak ele alınan çift kollu scara robotun uç işlevcisinin takip ettiği yörünge ve robot manipülatörün çalışma uzayı görülmektedir. Optimizasyon sonrası elde edilen sonuçlara göre birimleri mm olmak üzere çift kollu scara robotun boyutları $L_1=351.14$, $L_2=351.14$, $L_3=458.17$, $L_4=458.17$, $L_5=51.23$ ve $L_6=498.43$ olarak bulunmuştur.

SONUÇ

Bu çalışmada, meta-sezgisel optimizasyon algoritması olan Bozkurt Algoritması kullanılarak çift kollu bir scara robotun optimum yörünge sentezi gerçekleştirilmiştir. Amaç fonksiyonu, çift kollu scara robotun uç işlevcisinin takip etmesi istenen yörüngeyi oluşturan noktalar ile çift kollu scara robotun uç işlevcisinin geçeceği noktalar arasındaki mesafelerin karelerinin toplamı olarak alınmıştır. Çift kollu scara robotun optimal tasarımı, tekillik durumu oluşmayacak ve robot manipülatörün çalışma uzayı içerisinde kalmak üzere takip edilmesi istenen yörüngeyi minimum hata ile takip edilebilmesi şeklinde gerçekleştirilmiştir. Bu çalışma, zamanlama olmadan çift kollu scara robotun uç işlevcisinin istenen yörüngeyi takip edeceği düşünülmüş ve yörünge noktalar şeklinde tanımlanmıştır. Bozkurt Algoritması kullanılarak istenen kısıtlara uygun olarak çift kollu scara robotun boyutları hesaplanmıştır. Optimizasyon sonucu; istenen yörünge ile gerçekleşen yörünge arasında determinasyon katsayısı (R^2) 0.999 olmuştur. Tekillik durumu oluşmayacak ve robot manipülatörün çalışma uzayı içerisinde kalmak üzere takip edilmesi istenen yörünge minimum hata ile takip edilecek şekilde Bozkurt Algoritması



kullanılarak çift kollu scara robotun optimum yörünge sentezi başarı ile gerçekleştirilmiş ve gelecekte çift kollu scara robotun yörünge sentezi için Bozkurt Algoritması'nın etkili bir optimizasyon aracı olarak kullanılabileceğini gösterilmiştir.



Şekil 5. Çift kollu scara robot uç işlevcisi yörünge takibi

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IRONY AND ‘AMOR FATI’ IN O. HENRY’S “THE CACTUS” AND JOHN CHEEVER’S “THE HARTLEYS”

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ABSTRACT

This study deals with the two American short stories written by O. Henry and John Cheever; “The Cactus” (1917) and “The Hartleys” (1949). The stories are evaluated in the context of the concepts irony and the Latin term ‘amor fati’, which was coined by Friedrich Nietzsche but dates back to the Stoics. The ironical subtlety is common for the two works. In “The Cactus” the irony rests on a simple misunderstanding of a word which leads to the separation of the couple, who intend to marry. The latter story passes at a winter ski resort hotel in winter and handles a dysfunctional couple with a seven-year-old daughter. In it, the unhappy couple tries to regain the happiness by re-visiting the places where they were happy but far from this, they see their daughter’s death. In both stories’ ironic and sorrowful endings, the characters are not aware of their negligence and imprudence which lead to their inevitable downfalls. They prefer to exercise ‘amor fati’; they feel that they can do nothing to change the situations. They consent to the inevitable outcomes and stay passive. Accepting fate as it is, they do not question what was and was not within their control.

Keywords: Irony, amor fati, O. Henry, “The Cactus”, John Cheever, “The Hartleys”.

The methodical approach that is employed by literary writers to convey meaning is defined as literary technique. There are a variety of literary techniques and one of them is irony. “In most modern critical uses of the term ‘irony,’ there remains the root sense of dissembling, or of hiding what is actually the case; not, however, in order to deceive, but to achieve special rhetorical or artistic effects” (Abrams and Harpham, 2012:184). Often, the intention or expectation, and the result conflict in endings in literary works. In the language of literary works, irony is used to convey the opposite of the surface meaning. On the other hand, “[c]osmic irony (or ‘the irony of fate’) is attributed to literary works in which a deity, or else fate, is represented as though deliberately manipulating events so as to lead the protagonist to false hopes, only to frustrate and mock them” (Abrams and Harpham, 2012:186). In American writers William Sydney Porter (1862-1910), known by his pen name O. Henry’s “The Cactus” (1917) and John Cheever’s (1912-1982) “The Hartleys” (1949), it is possible to see the kind of ‘cosmic irony’ in which the characters find themselves in helpless situations, caused either by their mistakes, illusions or merely and greatly by chance, coincidence and fate.

“Accordingly, fate is not something within our control because it encompasses aspects of life for which we only have ‘partial’ control over,…” (Fate, Medium.com:2023) It is inevitable and people have hardly any authority and potency to prevent, delay or cancel it. “Though the word ‘fatalism’ is commonly used to refer to an attitude of resignation in the face of some future event or events which are thought to be inevitable, philosophers usually use the word to refer to the view that we are powerless to do anything other than what we actually do” (‘Fatalism’, Stanford Encyclopedia:2023) Fatalistic people do not believe that they have any power to affect or change the events. Moreover, they attribute the negative outcomes not to their lack of intention and action, but to the divinity.

Amor fati is a Latin phrase meaning ‘love of fate’. It describes an attitude in which one meets everything including negative things in life with serenity, obedience and prudence. It goes back to Epictetus, (c. 50- c. 135 AD) a Greek Stoic philosopher. The term is often applied by F. Nietzsche (1844–1900). In our



stories this concept can be seen when the characters do nothing to change the flow of actions and reality, perhaps because it is too late.

In the light of these concepts, it is suitable to analyze the works and find the common points.

“The Cactus” (1917) tells the story of a love which is not finished in marriage. It begins from the end of the action.

From this last hopeless point of view he still strove, as if it had become a habit of his mind, to reach some conjecture as to why and how he had lost her. Shaken rudely by the uncompromising fact, he had suddenly found himself confronted by a thing he had never before faced—his own innermost, unmitigated, arid unbedecked self. He saw all the garbs of pretence and egoism that he had worn now turn to rags of folly. He shuddered at the thought that to others, before now, the garments of his soul must have appeared sorry and threadbare. Vanity and conceit? These were the joints in his armor. And how free from either she had always been—But why— (Henry,2023)

Trysdale, the protagonist wonders about why his girl-friend has left him. He had proposed her when everything is all right. He was sure she loved him immensely. As an answer she had sent him a cactus in a flowerpot with an obscure note on it. He had interpreted it as a rejection of the proposal, because a cactus is not a lovely flower. It is covered with thorns. He had interpreted the note as the name of the cactus. All his interpretations were in fact false.

“She had invested him with an almost supernatural number of high attributes and excellencies and talents, and he had absorbed the oblation as a desert drinks the rain that can coax from it no promise of blossom or fruit” (Henry,2023). His lover, a nameless girl admires him to the degree of adoration. Trysdale, on the other hand has so much conceit, egotism and vanity; these character defects make him blind to her sincere love to him. These defects also contribute to his blindness not to see that she cannot leave him easily. Again his defects lead him to lie that he knows Spanish very well. He is in fact an imposter, only showing himself as a well-informed and cultivated man. However, his enjoyment to be admired brings him the fatal blow; “How she fluttered like a snared bird when he laid his mightiness at her feet! He could have sworn, and he could swear now, that unmistakable consent was in her eyes, but, coyly, she would give him no direct answer. ‘I will send you my answer to-morrow,’ she said; and he, the indulgent, confident victor, smilingly granted the delay” (Henry,2023). He waits for the answer being sure that it will be positive. He is sure either out of his conceit or of her adoration of him. On the other hand, he is disappointed in what he gets two days later. “There was no note, no message, merely a tag upon the plant bearing a barbarous foreign or botanical name. He waited until night, but her answer did not come” (Henry,2023). In fact, she had sent her answer as positive to him with the cactus: there was a note on it in English, ‘Come and take me’, but in Spanish, ‘Ventomarme’. He does not understand this important detail and does not wonder about it. Thus, he misses the opportunity of marrying the woman, whose love for him is perfect. She also misses the opportunity to marry the man whom she loves, but not loved by him as much as she loves him. Both of them misunderstand each other; he waits for her answer without knowing that the answer has come as positive, the latter waits for him to take action. In this ironical situation, when they encounter two days later, each of them expects the first step but neither of them speaks and the one-sided love finishes.

While talking with Trysdale about the marriage of his lover later to another man, her brother reveals the chief point, the meaning of the word ‘Ventomarme’ but it is too late. In the last scene, Trysdale is aghast, but we as readers do not know whether he has taken a lesson about his illusion and his ironical situation about himself or not. He surrenders to ‘amor fati’, accepting his fate and doing nothing.

“The Hartleys” (1949) is a more sorrowful story than “The Cactus”. At first, a family of three seems like an ordinary one who comes to Pemaquoddy Inn to spend their time together. The couple was there eight years ago and they search to find the happiness of their marriage again with a nostalgic quest, because they are not happy any more. They visit the same places to find the jolly atmosphere again. This is their illusion; they do not try to find the defects in their marriage. It will not help them to catch the same happiness again through re-visiting the old places. The word ‘Hartley’ is associated with sincerity,



happiness and love, but ironically the name refers to the reverse. Mr. and Mrs. Hartley has a daughter, Anne, a seven years old girl. She is not happy either, because she feels the cold relationship between her parents. She is anxious that she will be deprived of her father's love if the couple divorces.

They do not spend time together as a family; Mr. Hartley "would take his daughter to the skating rink and give her a skating lesson. On the occasions, they stayed out late. Mrs. Hartley watched them sometimes from the parlour window" (Cheever, 2024). He is not interested in his wife, moreover he often rebukes her. He does not speak to her with affection. So, it seems that he does not exert any effort to set right the relationship. Mrs. Hartley is depicted as a sad and careless woman. Anne prefers her father to show how to ski, not her mother: "I don't want you to show me, I want Daddy to show me" (Cheever, 2024). This is because she is deeply worried about losing her father and a fatherless future.

Mrs. Hartley is more prudent than her husband. She says, "Why do have to make these trips back to the places where we thought we were happy?" (Cheever, 2024). Mr. Hartley does not give importance to her ideas and stubbornly imposes his own ideas. The holiday resort is not attractive for Mrs. Hartley; it becomes a suffering place, ironically. He is not happy there, either. The efforts of Anne and Mr. Hartley in the ski rink are ironical in that Anne makes the same mistakes and resists learning and the parent's relationship is the same. They do not change anything. While he teaches Anne how to ski again and again, Mrs. Hartley drinks alone upsetly. Skiing as an action is also ironic; it refers to the family's transient and short happiness.

The story ends with the tragic death of Anne caught in the rope of the ski tow breaking her neck. "Her arm had got caught in the frayed rope; she had been thrown to the ground and was being dragged brutally up the hill toward the iron wheel" (Cheever, 2024). Her death takes place abruptly before the eyes of everybody. Waldeland comments: "Mr. and Mrs. Hartley are engaged in frantically revisiting places where they had been happy in the past to try to recapture those feelings... The futility of this search turns to tragedy; their daughter is killed in an accident on a ski tow, a hostage to their ill-fated attempt to reestablish a meaningful relationship by reliving the past" (Waldeland, 1979:34). They leave the hotel unhappily bringing their dead child home. The regaining of the happy times in their marriage has proved impossible. Meanor states that "The Hartleys" is "one of Cheever's most brutally sad stories and the most bitterly ironic story in the collection" (1995:49-50). In this dysfunctional family, Anne's death is tragic. It did not lead them to speak, or communicate.

At the ends of both works, the characters do not experience 'recognition' (anagnorisis) in the Aristotelian sense. The disturbing and ironical endings do not teach them any lessons and they are not willing to see and take those lessons. They take refuge behind 'amor fati', sensing and doing nothing. They resign themselves to the unpredictability of fate.

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MICROBIOTA OF PLANTS USED IN GREENING IN BAKU AND GANJA BAKÜ VE GENÇE ŞEHRİNDE YEŞİLLENDİRMEDE KULLANILAN BİTKİLERİN MİKROBİYOTALARI

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ABSTRACT

The main purpose of the article is the microbiota of plants used in greening in Baku and Ganja cities in the Republic of Azerbaijan. In modern times, the development of civilization has reached a global level, which has brought about the change of the society's production-economy level and the attitude of man to the environment. Extremely unfavorable environmental changes due to natural and anthropogenic influences for human life and biosphere functioning are today's realities. The fact that greening is an important component of the environments where people live, work, rest, and where they are at certain times, and that they are also one of the habitats of microorganisms characteristic of the mentioned symptoms, makes contact with those microorganisms inevitable. Therefore, it is important that the plants used in greening are clean from a microbiological, including mycological point of view.

According to the detailed information based on literature data, the total number of tree and shrub species used in the greening of Ganja city is equal to 150. The use of these trees in urban greening is not the same, and for this reason, it was considered appropriate to characterize the frequency of their use in urban greening.

Result. To sum up, it should be noted that recently, when characterized by the manifestations of ecotrophic specialization of mushrooms, their toxigenicity, allergenicity and opportunism are considered to be among the issues in the center of special attention in microbiological and mycological studies. From this point of view, it was considered appropriate to characterize the fungi that were recorded in the tree and shrub plants used in the greening of the city of Ganja in the course of the research.

Application importance: It can be used in lectures and seminars in higher education institutions. The material is useful for those interested in the fields of mycology and biology, students who study in higher and secondary education institutions can benefit from this material, either.

Key words: Azerbaijan, Baku, Ganja, microbiota, micology, fungi, plants, greening

ÖZET

Makalenin temel amacı Azerbaycan'ın Bakü ve Gence şehrinde yeşillendirmede kullanılan bitkilerin mikrobiyotasıdır. Modern zamanlarda uygarlığın gelişimi küresel boyuta ulaşmış, bu durum toplumun üretim-ekonomi düzeyinin ve insanın çevreye karşı tutumunun değişmesini de beraberinde getirmiştir. İnsan hayatı ve biyosferin işleyişi üzerinde doğal ve antropojenik etkilerden kaynaklanan büyük ölçekli ve son derece olumsuz çevresel değişiklikler günümüzün gerçekleridir. Yeşillenmenin insanların yaşadığı, çalıştığı, dinlendiği ve belirli zamanlarda bulunduğu ortamların önemli bir bileşeni olması ve aynı zamanda söz konusu belirtileri gösteren mikroorganizmaların yaşam alanlarından biri olması, bu



mikroorganizmalarla teması kaçınılmaz kılmaktadır. Bu nedenle yeşillendirmede kullanılan bitkilerin mikrobiyolojik ve mikolojik açıdan temiz olması önemlidir.

Literatür verilerine dayanan detaylı bilgilere göre Gence şehrinin yeşillendirilmesinde kullanılan ağaç ve çalı türlerinin toplam sayısı 150'ye denk gelmektedir. Bu ağaçların kentsel yeşillendirmede kullanımları aynı değildir ve bu nedenle kentsel yeşillendirmede kullanım sıklıklarının karakterize edilmesi uygun görülmüştür.

Son zamanlarda mantarların ekotrofik uzmanlaşmasının belirtileriyle karakterize edildiğinde, bunların toksijenitesi, alerjenitesi ve fırsatçılığının mikrobiyolojik ve mikolojik çalışmalarda özel ilgi odağındaki konular arasında sayıldığı sonucuna varıyoruz. Bu açıdan bakıldığında araştırma sırasında Gence şehrinin yeşillendirilmesinde kullanılan ağaç ve çalı bitkilerinde tespit edilen mantarların karakterizasyonunun yapılması uygun görülmüştür.

Uygulamanın önemi: Yükseköğretim kurumlarındaki ders ve seminerlerde kullanılabilir. Materyal mikoloji ve biyoloji alanlarıyla ilgilenenler için faydalıdır, yüksek ve orta okul öğrencileri için önemlidir.

Anahtar kelimeler: Azerbaycan, Bakü, Gence, mikrobiyota, mikoloji, mantarlar, bitkiler, yeşillendirme

Introduction. Nowadays, the development of civilization has reached a global level, which has brought about the change of the society's production-economy level and the attitude of man to the environment. Extremely unfavorable environmental changes due to natural and anthropogenic influences for human life and biosphere functioning are the realities of today. In such a situation, the risk of irreversible ecological problems also increases, which in turn reveals an important task of maintaining and protecting humanity. Thus, the fact that the main sources of pollution and degradation of urbanized areas with toxic and carcinogenic substances, highly toxic components and radioactive products are related to the high level of technical-technological, transport and energy equipment of modern settlements of people is already one of the realities of the current era. All this leads to the realization of trends that lead to the increase of environmental insecurity, diseases and deaths. Taking advantage of all these is one of the main tasks that concern humanity today, more precisely, it is the first one. Considering this point of view, one of the important components of the ecological systems of big cities is the greening of that environment, because greening is one of the conditions that determine the initial normal conditions for maximally revealing the physical and psychological health of people, as well as creative activity. It is no coincidence that greening is considered one of the main elements of the ecological structure of urbanized areas. So, it is green plants that absorb carbon dioxide from the air and enrich it with oxygen, on the other hand, green plants help regulate the temperature of the city air, create air currents, increase air humidity, etc. plays an important role in the processes, more precisely, green plants are irreplaceable in solving environmental problems caused by human activity today. For this reason, the greening of cities in any country, especially those that are large in terms of territory and population, is one of the most urgent issues. To solve this, hundreds of trees, shrubs and herbs are currently used for this purpose. However, the factors affecting the biological productivity of these plants prevent their activities from being properly performed, among them, they are related to the pathologies recorded in those plants.

Among the four pathogens, fungi play an important role [1]. In order to solve these issues, to prepare preventive measures for the prevention of the diseases caused, it is important to first determine the species composition of its causative agent as well as its owner. Ganja, which is the largest city of Azerbaijan after Baku, also has characteristics typical of modern cities, and for this reason, its greening is one of the issues of special importance, but research works dedicated to the microbiological assessment of the condition of plants, primarily trees and shrubs, used in urban greening are found. does not come. However, the harmful effects of the interaction of fungi with plants do not end only with the change and deterioration of their productivity or decorativeness.

So, many types of microorganisms, primarily fungi, have properties such as toxigenicity, allergenicity and opportunism, which are a source of serious danger to human health. The fact that greening is an



important component of the environments where people live, work, rest, and where they are at certain times, and that they are also one of the habitats of microorganisms characteristic of the mentioned symptoms, makes contact with those microorganisms inevitable. Therefore, it is important that the plants used in greening are clean from a microbiological, including mycological point of view.

According to the detailed information based on literature data, the total number of tree and shrub species used in the greening of Ganja city is equal to 150. The use of these trees in urban greening is not the same, and for this reason, it was considered appropriate to characterize the frequency of their use in urban greening. It became clear that they can be broadly divided into 3 conditional groups: dominant, frequently used and rarely encountered. As can be seen, 10% of the used tree and shrub species are dominant, 40.7% are frequently used, and 49.3% are rarely used [3, s.8].

Both toxigenic (*Aspergillus fumigatus*, *A. ochraceus*, *Cladosporium herbarium*, *Fusarium moniliforme*, *F. oxysporium*, *Penicillium cuslopium* etc.), allergens (*Botrytis cinerea*, *Monila stophila*, *Penicillium granulatum*, *Rhizobus stolonifer*, *T. viride* və s.), and opportunistic (*Aspergillus niger*, *A. terreus*, *A. versicolor*, *Candida alpicans*, *Pencillium expansum*, *P. purpurogenum*, *Mucor hiemails* və s.) are found among the recorded fungi. Their quantitative indicators vary between 32.5-52.8% [2]. In other words, fungi with the mentioned characteristics are actively involved in the formation of the mycobiota of the studied trees and shrubs, which is one of the facts that must be taken into account in terms of microbiological and mycological safety. As it is known, since the greening works are carried out in an open system, the cultivation of the plants used for this purpose, as well as the formation of the biological productivity of those plants, takes place under the influence of environmental factors. These factors are also divided into two groups, biotic and abiotic. Since the main issue in our case is devoted to the clarification of issues related to the mycobiota of plants, it would be appropriate to explain the results obtained regarding the ecobiology of pathogenic species, taking into account some issues related to biotic factors. Some microorganisms, including fungi, have the ability to synthesize a number of biologically active substances that have different effects on plant growth and productivity. So, this effect can manifest itself either by stimulation, weakening, or complete destruction of the plant. The organisms that cause the latter, including fungi, are generally called phytopathogens.

As a rule, during the systematization of fungi corresponding to this characteristic, their morphological and physiological characteristics and specialization to the plants they use as a feeding place are taken as a basis. Accordingly, 14 some researchers, in similar studies, study the pathogenic species of micromycetes by dividing them into powdery mildew, rust-causing and ascomycete anamorphic fungi. Taking into account that this division is somewhat contradictory, it was considered appropriate to characterize the pathogenic activity of the pathogen in our studies according to the specialization in different substrates.

From the obtained results, it became clear that the fungi recorded in the research can be divided into 5 groups, among which most of the recorded fungi with pathogenic activity have a wide range of effects, that is, they cause one or another pathology in most of the plants of trees and bushes involved in the greening of Ganja city. participates in its reproduction, that is, they are characterized as eurytrophs. This fact itself can be evaluated as a case characterized in a negative way. Because fungi characterized as eurytrophs have higher adaptation characteristics compared to stenotrophs and conventional stenotrophs, so any environment is more suitable for meeting their nutritional requirements.

Result. To sum up, it should be noted that recently, when characterized by the manifestations of ecotrophic specialization of mushrooms, their toxigenicity, allergenicity and opportunism are considered to be among the issues in the center of special attention in microbiological and mycological studies. From this point of view, it was considered appropriate to characterize the fungi that were recorded in the tree and shrub plants used in the greening of the city of Ganja in the course of the research.

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SAĞLIK HABERLERİNE İLİŞKİN ÇALIŞMALARIN BİBLİYOMETRİK ANALİZİ BIBLIOMETRIC ANALYSIS OF STUDIES ON HEALTH NEWS

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ÖZET

Giriş: Haber günlük yaşamı etkileyen her alanda gerçekleşen değişim, gelişme, yenilik gibi durumlarla ilgilidir. Sağlık haberleri ise alana özel bir habercilik türüdür. Sağlık alanında pekçok haber yapılsa da sağlık habercisi ile ilgili yayın sayısı sınırlıdır.

Amaç: Çalışmada Web of Science veri tabanında indekslenen, sağlık ve haber alanında yapılan çalışmaların bibliyometrik analizi yöntemi kullanarak mevcut durumunun haritasını çıkarmak, sistemli bir özetinin araştırmacıların dikkatine sunulması, konu ile ilgili çalışma eğilimlerinin tespiti amaçlanmıştır.

Yöntem: Veri toplama yöntemlerinden biri olan belge inceleme yöntemi kullanılarak yapılan bu araştırma retrospektif bir çalışmadır. Araştırmada herhangi bir zaman aralığı sınırlaması yapılmayarak tüm sonuçlara ulaşılması hedeflendi. Verilerin ayrıştırılamaz ve karmaşık yapıda olmasını engellemek için yalnızca “health news” anahtar kelimesi ile arama yapıldı. Aralık 2023 tarihinde, Web of Science’da “tüm alanlar” seçilerek yapılan aramada 29 makaleye ulaşıldı. Dahil etme kriterlerine uyan 21 yayın incelendi.

Bulgular: “Health news” ile ilgili 21 eserin yayın yıllarına göre dağılımına bakıldığında, en fazla 2018 (5 yayın) yapıldığı; en fazla atıf alan yazarın Tanner AH olduğu; yayınların ülkelere göre dağılımı konusunda liderliğin ABD menşeli yayıncılarda olduğu; bu konuda en fazla yayın üreten ve atıf alan üniversitenin University South Carolina olduğu tespit edildi. Health News ile ilgili 1993-2022 yılları arasında araştırma makale olarak yayınların yapıldığı, yayınların çoğunlukla İngilizce olarak yayınlandığı, en fazla ABD menşeli yayıncılar tarafından yayın yapıldığı, en çok atıf alan eserin Tanner AH” na ait olduğu belirlendi.

Sonuç: Health News konusunda çalışma yapacak araştırmacıların en çok atıf alan Tanner AH’nin “Agenda building, source selection, and health news at local television stations - A nationwide survey of local television health reporters” (2004) başlıklı makalesini okumaları önerilmektedir.

Anahtar Kelimeler: Haber, Sağlık, Sağlık Haberleri.

ABSTRACT

Introduction: News is about situations such as change, development and innovation in every field that affects daily life. Health news is a field-specific type of journalism. Although there is a lot of news in the field of health, the number of publications on health news is limited.

Objective: Aimed in the study using the bibliometric analysis method of studies indexed in the Web of Science database and conducted in the field of health / news, map the current situation, presenting a systematic summary to the attention of researchers, determination of study trends on the subject.



Method: This research is a retrospective study that was conducted using the document review method, which is one of the data collection methods. The research aimed to achieve all results without any time period limitation. The search was made only with the keyword “health news” to prevent the data from being unparseable and complex. On December 2023, a search was made in Web of Science by selecting "all fields". 29 articles were reached. 21 publications were reviewed, which met the inclusion criteria for the Study.

Results: Looking at the distribution of 21 works on "Health news" according to their publication years, the following findings were obtained:- published at most in 2018 (5 publications);- the most cited author is Tanner AH;- USA-based publishers are the leader in the distribution of publications by country; - The university that produces and cites the most publications on this subject is the University of South Carolina. It was determined that research articles were published on Health News between 1993 and 2022, the publications were mostly published in English, the most publications were made by US publishers, and the most cited work belonged to Tanner AH.

Comment: It is recommended that researchers who will study Health News read the most cited article by Tanner AH titled "Agenda building, source selection, and health news at local television stations - A nationwide survey of local television health reporters" (2004).

Key Words: News, Health, Health News.

INTRODUCTION

One of the most important areas of interest of the media is the field of health. The field of health and medicine is an area where the information produced is constantly renewed. News undertakes the task of announcing this new information to the society. News; It is defined as all kinds of information conveyed to the public through press, broadcasting and communication organs about the events that took place in the country and the world in the last day or days (Oxford Languages and Google, 2024). Another area of public concern is health. This feature is the common feature that brings news and health together.

In addition to being news about every issue related to events in the field of health and medicine, news also undertakes the task of "informing and announcing" the society. The following are considered as news: - innovations related to the diagnosis, treatment, care and rehabilitation of diseases, situations and problems related to the health system and service; - articles about healthcare institutions and healthcare professionals; - introductions, all kinds of transmissions aimed at expressing the opinions and thoughts of those who provide services in this field and those who receive services (Utma, P. 2019).

One of the most basic human rights is health. Those who make news about health serve to protect this right by ensuring that people are informed. Journalists see healthcare professionals as news sources and convey their information to the public in an understandable language (Şahinoğlu, S., & Baykara, Z. G. (2011).

Mass media have important functions in social issues such as informing, socializing, transferring and protecting cultural values, creating public opinion, entertaining, raising awareness and education (Begtumur & Mazıcı, 2020). Health-related news spreads to most of the society in a short time through the media and mass media (Öcel, Abdulhamit, & Alramazanoğlu, 2023). People tend to believe things they see on television, read in the newspapers, or hear on the radio. This trend affects health behaviors (Kaya, 2019).

Research shows that news has become an important source of health information in health communication with the society (Ateş et al., 2021). Health communication plays an important role in improving the quality of life and health and preventing diseases (Rimal & Lapinski, 2009). In health practices where advice is effective, the individual is affected by the environments with which he interacts (Tosyalı & Sütçü, 2016). The quantity and quality of information in newspapers, magazines, television, social media and the internet shape society's views, behavior and knowledge levels (Karaca, 2021; Öcel, Abdulhamit, & Alramazanoğlu, 2023).



Health-related news is valuable to the media due to the importance of health in human life. For this reason, it tends to increase gradually (Kaya, 2019).

Especially in recent years, health news had been watched with interest as a reflection of the Covid-19 pandemic and its aftermath. Despite society's interest in health news, the number of articles published on this subject is limited.

Aimed in the study using the bibliometric analysis method of studies indexed in the Web of Science database and conducted in the field of health / news, map the current situation, presenting a systematic summary to the attention of researchers, determination of study trends on the subject.

METHODS

This research, which was conducted using the document review data collection method, is a retrospective model study. The aim of the research was to reach all results without any time period limitation. To prevent the data from being incomprehensible and complex, the Web of Science database was searched with only the keyword "news health". Web of Science is a website that provides subscription access to multiple databases that offer comprehensive citation data for many different academic disciplines. Choosing the Web of Science database is an important factor in terms of the reliability of research used in various analyses, including bibliometric analyses. The Web of Science database allows the use of advanced search indicators and various control mechanisms. It is also a database containing qualified and reliable studies in terms of publication ethics. Additionally, it provides ease of access to a large number of data collections from different disciplines.

In December 2023, "all fields" and related WOS categories (communication, computer science theory methods, medicine general international, Public Environmental Occupational Health, computer science interdisciplinary applications, education educational research, Environmental) were published in Web of Science with the keyword "news health". 29 results were found in the search made by selecting (sciences, food science technology, Health care sciences services, medical informatics, nursing, surgery). By excluding other publications from the research and including research articles and articles still in the peer-review process, 22 publications were reached. These 22 publications are also indexed in the selected Science Citation Index Expanded (SCI-E), Social Sciences Citation Index (SSCI) and Emerging Sources Citation Index (ESCI), Art&Humanities Citation Index (AHCI). Among these publications, 1 publication was excluded because it was in Portuguese, and 21 publications were evaluated.

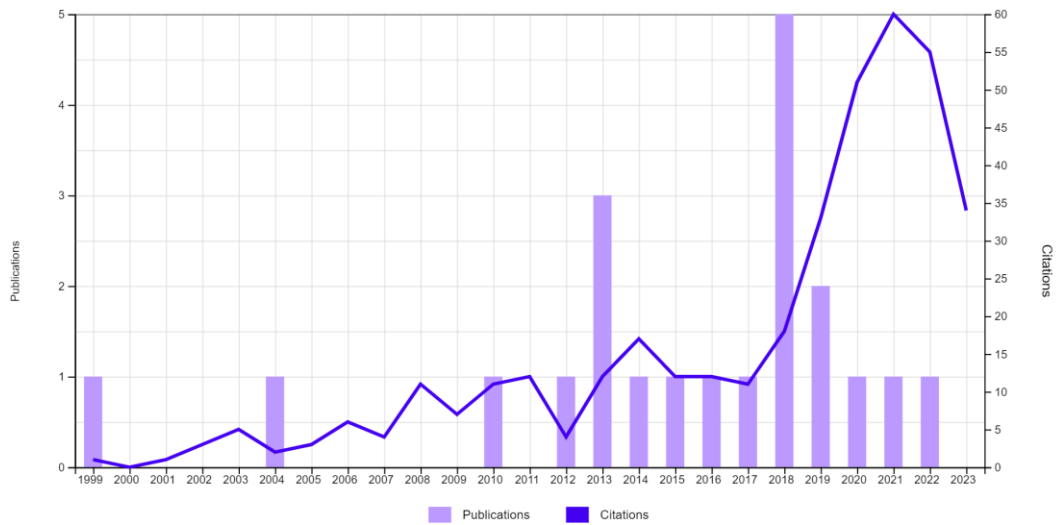
The evaluation of the data was made with frequency distributions and graphic presentations of these distributions. Different bibliometric analysis tools are used in the literature. In this research, VOSviewer program, which has strong features in terms of functionality, was preferred. VOSviewer is an important program that helps researchers identify evolutions, relationships and new concepts in the literature. Additionally, VOSviewer enables in-depth analysis of data sets as it provides visualization, mapping and multi-dimensional analysis.

Ethical Consideration

Research data were obtained from a Web of Science database that is accessible to everyone with free membership. In addition, the VOSviewer program used in data evaluation is an application that allows free access online. Therefore, ethics committee permission was not required.

RESULTS

It was determined that 16 of the 21 publications examined were journal articles and 6 were early access studies from different categories, the oldest being 1999 and the newest being 2022. It was determined that the most publications were published in 2018 and the most references were made to studies conducted on this subject in 2021 (Graphic 1).



Graphic 1: Distribution of Publications by Years and Citation Status

Citation Analysis of Authors: In order to identify citation networks, a network map of author citation analysis was created with the criteria of at least 1 publication and at least 2 citations. In the analysis made on 81 units that were seen to be connected to each other, the total connection strength was determined as 58. The most cited authors are A.H. with 93 citations. He became Tanner (Table 1). This research is his study titled “Agenda building, source selection, and health news at local television stations - A nationwide survey of local television health reporters” (Science Communication 25 (4), pp.350-363).

Author	Documents	Citations
tanner, ah	1	93
burger, j	1	53
lurig, l	1	53
pflugh, kk	1	53
von hagen, la	1	53
von hagen, s	1	53
gorinstein, shela	1	42
kang, baek song	1	42
katrich, elena	1	42
kim, sung kyeom	1	42
ku, yang gyu	1	42
lee, hee ju	1	42
lee, sang gyu	1	42
shawon, rayhan ahmed	1	42
diddi, pratiti	1	41
lundy, lisa k.	1	41

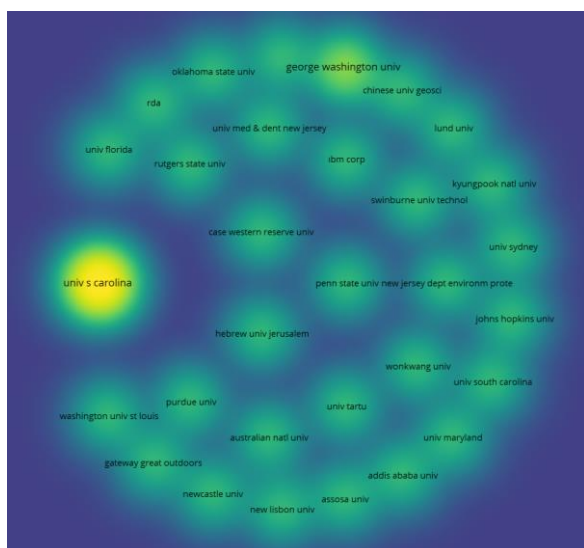
Table 1: Authors' Citation Analysis

When the most frequently used keywords in health news-related publications were examined, it was determined that they were Covid-19, Media and Social Media, with 2 repetitions each.

Citation Analysis of Institutions: When the publications produced by the institutions and the distribution of citations received by these publications were examined, the university with the most citations among the institutions that published the most publications was determined to be University South Carolina (2 publications, 130 citations) (Table 2).



Latin American Scientific Research Programmes



Organization	Documents	Citations
univ s carolina	2	130
new jersey dept environm protect	1	53
rutgers state univ	1	53
univ med & dent new jersey	1	53
hebrew univ jerusalem	1	42
kyungpook natl univ	1	42
rda	1	42
wonkwang univ	1	42
penn state univ	1	41
univ florida	1	41
george washington univ	2	34
gateway great outdoors	1	27
washington univ st louis	1	27

Figure 1: Publication and citation density of universities Table 2: Publication and citation density of universities

Citation Analysis of Countries: In order to create a network map of the citations received by publications according to their country of origin, the criteria for at least 1 work to be published and 1 citation to be received by a country was determined. Analysis was made on 16 observation units with this relationship. The country with the most citations is the USA with 10 publications and 320 citations. Other countries in the top three in terms of total link strength are Australia (2 publications, 9 citations) and China (2 publications, 8 citations).

DISCUSSION AND CONCLUSION

Today, media technologies are effective in directing and changing individuals' perception in the field of health. As a result of the increasing interest in health, the media gives more space to health issues in their content. The media directs consumption for a healthy life in the presentation of health information (Bilişli, 2018). News about being healthy, being fit, being aesthetic, being beautiful and anti-aging applications constitute the health agenda (Bilişli, (2019).

Research conducted in recent years has shown that among the news published in the print media, health news ranks first with a 14% readability rate, after local and political news, and readers are most affected by these news (Utma, 2017). In this popularity, it is important to publish research articles that examine, analyze and evaluate health news. In a study conducted in Canada, 109 randomly selected health news published in newspapers in 1996 were evaluated by doctors who are experts in this field. In 50% of the articles, the recommended methods are not correct, and in 28% of the articles, the information provided is full of errors that can lead to extremely dangerous and even life-threatening consequences. Again, in 22% of the articles, the side effects of the recommended methods were not mentioned (Günaydın, 1999).

It is important to conduct research that includes bibliometric data on health news due to the features of news that set the agenda, attract attention and attract attention. This study has revealed which publication is most cited and which country publishes the most on this subject, in order to guide readers and guide researchers who will conduct research on this subject. In other studies on this subject, it is recommended to plan research to include studies on news analysis.



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GAGAUZ ŞİİR DÜZLEMİNDE TENASÜP SANATININ SEMANTİK BOYUTTA ANALİZİ SEMANTIC DIMENSION ANALYSIS OF THE ART OF TENASUP IN GAGAUZ POETRY PLANE

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ÖZET

Araştırma evreninden yansıyan otantik göndergelerin estetiksel uyumu, tenasüp sanatının anlam yürüncesini görünür kılmaktadır. Retorik katmanda imgesel bir adaptasyon yaratmak adına, aralarında anlamsal ilgi bulunan en az iki sözcenin karşıtlık olmaksızın bir araya getirilme eylemine dikkat çekilmektedir. “Uyum, uygunluk, orantı, yakışma” tarzındaki motiflerle de örüntülenen tenasüp portresi, sanatçının duygu ve düşünce iklimini özgün bir yaklaşımla resmetmektedir. Derin bir muhayyilenin dışa vurumunu sembolize eden bu gramatikal tasarım, okuyucunun dikkat algısını kinestetik bir çağrışımla desenlemektedir. Söylem atmosferindeki anlamsal devinimi belığ yönde işleyen ve düşünsel tepkimeyi estetiksel bir kurguyla senkronize eden tenasüp dizgesi, birbiriyle orantılı birimlerin aynı odakta toplanmasını nitelemektedir. Dolayısıyla, anlam tablosundaki yakınsak sözcelerin lirik vurgusu, eserin varsıl bir renk katmanına ve özgül bir his derinliğine sahip olduğunu bildirmektedir.

Birbiriyle bağlantılı birden çok kelimenin aynı düzlemde konuşlanması esasına dayanan ve zıtlık uyumunu anlamsal yelpazeden geçirmeyen tenasüp örgüsü, söylem dizgesine estetik bir haz yüklemektedir. Kelimeler arasındaki ahenk ve çağrışım, eserin düş orbitalini okuyucunun zihninde somutlayıp reel yapıyı sanatsal metaforlar vasıtasıyla güçlendirmektedir.

Araştırma, metin bağlamında tasvir edilen estetik unsurların saklı uyumunu sembolize ederek yorumsal analiz yöntemini işe koşturmuştur. Gagauz yazın ufkunu orijinal bir üslupla sesleten şiirsel periyot, tenasüp sanatının anlam skalasında tetkik edilmiş, doküman analizi faktörü dikkate sunulmuştur. Çalışma kapsamına dair teorik öğelerin veri katmanı, semantik bir açılımla analiz edilmiştir. Belagat enleminden akseden bu düşünsel reaksiyonun, Gagauz edebi boyutuna otantik bir betim yüklediği tespit edilmiştir.

Anahtar kelimeler: Gagauz şiiri, Tenasüp sanatı, Semantik, Analiz.

ABSTRACT

The aesthetic harmony of the authentic referents reflected from the research universe makes the semantic trajectory of the art of proportion visible. In order to create an imaginative adaptation in the rhetorical layer, attention is drawn to the act of bringing together at least two utterances that are semantically related, without opposition. The portrait of proportionality, which is also patterned with motifs such as "harmony, appropriateness, proportion, suitability", portrays the artist's climate of emotion and thought with an original approach. This grammatical design, which symbolizes the expression of a deep imagination, patterns the reader's perception of attention with a kinesthetic connotation. The system of proportionality, which processes the semantic movement in the discourse atmosphere in an eloquent direction and synchronizes the intellectual reaction with an aesthetic fiction, characterizes the gathering of units proportional to each other in the same focus. Therefore, the lyrical emphasis of the convergent utterances in the meaning table indicates that the work has a rich color layer and a specific depth of feeling.



The pattern of proportionality, which is based on the placement of multiple interconnected words on the same plane and does not pass the harmony of contrasts across the semantic spectrum, adds an aesthetic pleasure to the discourse system. The harmony and association between the words concretizes the dream orbital of the work in the reader's mind and strengthens the real structure through artistic metaphors.

The research employed the method of interpretive analysis by symbolizing the hidden harmony of the aesthetic elements depicted in the context of the text. The poetic period, which expresses the horizon of Gagauz literature in an original style, has been examined in the meaning scale of the art of harmony, and the document analysis factor has been taken into consideration. The data layer of theoretical elements related to the scope of the study was analyzed with a semantic expansion. It has been determined that this intellectual reaction, reflected from the latitude of rhetoric, gives an authentic description to the Gagauz literary dimension.

Keywords: Gagauz poetry, Art of tenasup, Semantics, Analysis.

GİRİŞ

Söylem paradigmasına güzellik, ahenk ve imgelem genişliği kazandıran uyum eksenini, tenasüp sanatının anlam evrenini nitelemektedir. Şiirsel yörüngede periyodik bir dizayn ile senkronize edilen sözcelerin armonik dağılımı, uygunluk arayışı içinde olan temlerin gizil estetiksel vurgusunu yansıtmaktadır. Birbiriyle bağlantılı ya da ilişkili faktörlerin betim yarısındaki esas amacı; sanatçının, duygu ve düşünce kuşağını okuyucunun zihninde canlandırarak şiirsel katmanın anlam ufkunu genişletmektir. Dolayısıyla anlam reaksiyonunda işlem gören senkronik sözcelerin bilinçli olarak aynı düzlemde konuşlanma dizgesi, tenasüp sanatını belirgin kılmaktadır. Bu estetiksel dizgede tezat teşkil eden birimlerin ise anlam sınırından geçemediği görülmektedir.

Tenasüp sanatı, aralarında karşıtlık dışında çeşitli ilgiler bulunan iki ya da daha fazla sözcüğü bir ibarede toplamaktır (Tanç, 2006: 25). Bu sanatın, birbiriyle ilişkili sözcüklerin kavram alanlarını belirginleştirmek, söylenmeyen diğer öğeleri de hatırlatmak, metnin ana fikrini hissettirmek, yazarın veya şairin üslubunu belirlemek gibi işlevleri vardır (Saraç, 2019: 36). Zihni faaliyete ve kelimeler arasındaki anlamsal zenginliğe dayanan tenasüp (Elgün, 2000: 118), çoğu zaman diğer edebi sanatlarla iç içe ve irtibatlı olmaktadır. Bu durum şiirdeki anlamı güçlendirerek pekiştirmektedir. Tenasüp sanatına örnek oluşturan kelimelerin beyit içerisindeki dizilimleri ve anlam ilişkilerinin çeşitliliği, şairin şiirlerini güçlü kılması ve sanatçı kişiliğini ön plana çıkarması yönüyle önem taşımaktadır (Kaya, 2020: 11). Edebiyatta anlam güzelliği ve bütünlüğü oluşturmak için kendi aralarında uyumlu ve ilişkili kavramları bir arada kullanarak yapılan tenasüp sanatında; şairin kelime seçimleri, becerikli oluşu ve çabası dikkati çekmektedir (Betur, 2019: 30). Aslında birbirleriyle alakalı olan söz konusu kavramların hepsi bir bütünün parçalarıdır (Selçuk, 2022: 145).

BULGULAR

Gagauz şiir düzleminde tenasüp sanatının semantik periyottaki semantik yankısı şu şekilde belirmiştir:

1.

Ateşlän barut - durêrız yannaşık.

Cannarmızda sa **koor** hem **kıvılcın!**

Nelär yaptık hem da nelär yapamadık:

Aramızda **tutuşmasın yangın.**

(Zanet, 2021: 192)

Tenasüp örüntüsü, anlamsal açıdan birbirine yakışan ve tezat olmayan birden fazla sözcenin bir arada kullanımını resmetmiştir. Dörtlükte; “*ateş, barut, koor, kıvılcın, tutuş- ve yangın*” sözceleri birbiriyle bağlantılı olduğundan tenasüp sanatını işaretlemiştir.



2.

Hey, halkım, sän diilsin yalancı!

Neredän çıktı yalancılar?!

Kimin onnar **dalı**, kimin **aacı**,

Kimin **tohumnarı**, atnıkları onnar?

(Zanet, 2021: 135)

Anlamsal yörüngede birbiriyle uyumlu kavramların estetiksel yankısını sembolize eden uygunluk portresi, sanatçının his dağarcığından akseden sanatsal bildirişimi betimlemektedir. Dörtlükte; “*dal, aaç, tohum*” kavramları etrafında oluşum arz eden tenasüp olgusu, sanatsal bir bağdaşımın coşkun ritmini yansıtmaktadır. Okuyucunun zihninde çağrışımsal bir perspektif yaratmak amacıyla sesletilen düşlemsel ileti, birbiriyle uyumlu sözcelerin senkronik vurgusunu aktarmaktadır.

3.

En gercik **cennet başçesindä**,

Arıcık gibi -**çiçektä**,

O haşlak pak ellerindän

Bän içärdim koyu **baldan**...

(Bujilova, 2019: 60)

Şiirde; “*cennet başçesi, çiçek, arı, bal*” sözcükleri harmonik bir tasarımın senfonik iz düşümünü sembolize etmiştir. Bu sözceler anlamsal ulamda ekstrem bir uyum yarattığından tenasüp örgesini belirgin kılmıştır.

4.

Bän diz çökerim önündä, halkım,

Ani baaşlêersın yol evladına,

Sendän, dedäm, örnekleri aldım,

Çetin baalyım sarp o adına.

Sana -**damnayım** büük **denizindä**,

Ama deniz damnalardan olur,

Bir **notayım** güçlü **sesindä**,

Ama **türkün** ondan zenginleşir.

(Bujilova, 2019: 80)

Şiirin anlam ufkundan yansıyan belîğ dizilimde, “*deniz ve damna*” sözceleriyle; “*nota, ses ve türkü*” sözcelerinin sanatsal bağlamda tasarlandığı görülmektedir. Bu otantik lirizmden hareketle, anlamca ilgili sözcelerin tenasüp çatısı altında toplandığı ve sanatçının imgelem dünyasını zenginleştirdiği dikkati çekmektedir.

5.

Aaçlarda büüyey **meyva**:

Şıralı **alma, ayva**.

Kırmä sän hiç **dalları** –



Acıdarsın **aaçları**.

(Marinoglu, 1997: 85)

Şiirin anlam tablosunda desenlenen metaforik izlekler, tenasüp dairesinin sanat orbitalinde işlenmiştir. “*aaç, dal*” sözceleri ile “*meyva, alma, ayva*” sözceleri kendi aralarında orantılı bir şekilde dizilim göstermiştir. Söylem rotasına sıra dışı bir yön çizen tenasüp sanatı, anlamsal boyutu estetik bağlamda koordine ederek güçlendirmiştir.

6.

Sülüün kabı var,

Bir ne **-saklanêr**.

Kuşun kanadı var,

Bir ne – o **uçêr**.

(Zanet, 1998: 49)

Şiirde, “*sülüün kabı*” ve “*saklan-*” sözceleri ile “*kuşun kanadı*” ve “*uç-*” sözceleri arasında gizil bir armonik uyum sezilmektedir. Birbiriyle bağlantılı önermelerin düşünsel ritmini vurgulayan şiirsel tasarım, tenasüp sanatının anlam resitalini dramatize etmektedir.

7.

Açıklêêrım sözümü,

Ki bilâsin üzümü,

Ani vardı ilerdân

O uzak gençliimizdân.

Hererdâ **Allah-filcandı**.

Fıçıda şarap- ihlamdı.

Baş urardık **maazaya**

Duamızdı fıçıya.

(Zanet, 1998: 160)

Şiirsel katmanda din ve ibadetle ilgili olan “*Allah ve dua*” kavramlarıyla; “*filcan, fıçı, şarap ve maaza*” sözcüklerinin birbirini anımsatan, anlamsal kategoride birbiriyle ilgili olan unsurlar olduğu görülmektedir. Dolayısıyla, bu çağrışımsal birimler etrafında modellenen bir uyum sanatının varlığı hissedilmektedir. Sanatçının esas gayesi, okuyucunun düşlem atmosferini varsıl bir yörüngeye taşımaktır.

8.

İneyi aldım –

Geçirdim ona **iplik**,

Osaat alındım

Kuklamaa **dikmää** terlik.

(Marinoglu, 2013: 127)



Şiirde; tenasüp odağından geçen anlamsal doğrultu, “*iine, iplik ve dik-*” sözceleri vasıtasıyla inşa edilmiştir. Sanatçı, birbiriyle orantılı kavramları aynı yönde semantize ederek gramatikal katmana estetik bir haz yüklemiştir.

9.

Acımaz bu **yara** acıdan,
Sızlamaz, kapanmaz **acıdan**.
İlacı da genä sendän,
Al lafını bilmezdän.

(Zanet, 2021: 195)

Şiirsel düzlemde “*yara, acı, ilaç*” sözcükleri tenasüp sınırından geçirilerek sanatsal bir devinim yaratılmıştır. Senkronik bir ivmeyle dizayn edilen bu sözcelerin, karşıtlık ilgisinden bağımsız bir reaksiyonla betimlendiği dikkate sunulmuştur. Dolayısıyla anlamsal bir bütünlük arz eden tasviri yönelim, sanatçının duygu yelpazesini kinestetik bir reksiyonla yeniden sembolize etmiştir.

10.

Unut al **dudaamı**, kızgın **elleri**,
Sayısız **yazları**, **ilkyazları**,
Kışları, **güzleri**, akan yaşları...
Hepsini sän unut...

(Zanet, 2021: 227)

Dörtlükte “*dudak ve el*” sözceleri ile “*yaz, ilkyaz, kış ve güz*” sözceleri arasında harmonik bir seremoni ve ahenk söz konusudur. Birbiriyle ilgili öğelerin coşkun iletimini vurgulayan tenasüp önermesi, anlam açısından sanatsal bir bütünlük arz etmektedir.

11.

Yok **çiçek** hem yok **arı**,
Küplerdä toplu **balı**.
Süüt silkti **yapraklarını**,
Salt izi Canavarın...

Kasımın edisindä
Herbir **koyun** - erindä,
Ödeeni alêr **çoban**
Bol elli çorbacıdan

(Bujilova, 2020: 282)

Şiirsel mekaniğin birinci dörtlüğünde, tenasüp bağıntısıyla imgelenen “*çiçek, arı, bal*” ile “*süüt ve yaprak*” ibareleri anlamsal yönden bütüncül bir yaklaşım sergilemektedir. İkinci dörtlükte ise “*koyun ve çoban*” ibareleri estetiksel bir çağrışımla motive edilmektedir. Tenasüp tablosunda resmedilen sanatsal bağdaşım, duygu ve düşünce enlemindeki gizil düş öğelerini açığa çıkarmaktadır.

12.

Lüzgär eser yukardan,



Sallanêr ondan **fidan**,

Büküler **dallar** aşaa,

Uçları diyer **topraa**.

Kalkêr **dallar** yukarı –

Kımıldêr **yaprakları**.

Yannadı **fidan** saaya –

Dokundu komuşuya.

(Zanet, 2018: 240)

Şiirin birinci dördlüğünde; “*lüzgâr, es-, sallan-*” ibarelerinin kendi aralarında tenasüp köprüsü kurduğu; “*fidan*”, “*dal*” ve “*toprak*” ibarelerinin de estetiksel bir uyum yarışında olduğu dikkati çekmektedir. Şiirin ikinci dördlüğünde ise “*dal, yaprak, fidan*” sözcelerinin aynı konumda dizilerek estetik bir görünüm sergilediği belirmektedir.

13.

Kabarêrlar **bulutlar**,

Kabarêrlar pek onnar –

Sansın ne – sa aktarêr,

Yaamuru hazır eder.

Birda **gök gürleer** – öter,

Çimçirik ateş basêr,

Da **yaamur** uçêr erä

Topracı sevindirmää.

(Kösä, 2001: 286)

Şiirin neredeyse her katmanına yayılan tenasüp ezgisi; “*bulut, yaamur, çimçirik (yıldırım), gök gürleer*” sözceleri etrafında betimsel bir kurgu yaratmakta, söze güzellik ve anlamsal derinlik katmaktadır.

14.

Kış geldi, **suuklar** geldi,

Her sabaa **ayaz**,

Kaar yaayêr, yok durması,

Dozdolay **biyaz**.

Sevinerlär uşaklar,

Seviner büüklär,

Ani **kış** geldi bizä,

Ani var çok **kaar**.

(Akt. Bulgar, 1996: 25)

Şiirin neredeyse tamamını kaplayan senkronik örtü, tenasüp ikliminin çağrışımsal örgesinden ilham almaktadır. Şiirde kış mevsimini uygunluk yani tenasüp sanatı bağlamında resmeden sanatçı, söylem



meridyenine orijinal bir renk ve ahenk katmaktadır. Kış temini çağrıştıran “suuk, ayaz, biyaz, kaar” ibareleri, birbiriyle sanatsal bağlamda adapte olan retorik birimleri işaretlemektedir.

15.

Düşlerim sansın çıkêrlar

Aslıya yavaş-yavaş

Türkümâ kulak asêrlar

Üreemdä sa hep o taş:

Kasabada **dallarımın**

Yaprakları, çiçekleri,

Ama yırak tarlada

Kaldı derin **kökleri.**

(Baboglu, 2003: 57)

Şiirde; “*dal, yaprak, çiçek, kök ve tarla*” kavramlarının anlamsal kategoride birbirini bütünleyen öğeler olduğu göze çarpmaktadır. Tenasüp sanatının estetik kutbunda dramatize edilen ilgili kavramlar, ifade düzlemini retorik boyutta yeniden dizayn etmektedir.

16.

Çannar çeker **klisedä,**

İnancıları çaarêr,

Her Pazar günnerindä

Sabaa slujbası olêr.

(Karagançu, 2015: 67)

Şiirde “*çan, klisä, inancılar ile sabaa slujbası*” sözceleri inanç ve ibadet düzlemini işaretlemektedir. Tenasüp dizgesi vasıtasıyla uyarlanan estetiksel söylem, birbiriyle bağlantılı sözcelerin özgün tasarımını yansıtmaktadır.

17.

Kloçka piliç çıkarêr

Yuvasında kilerdä,

Koyun sürüsü otlêêr

Çimen otu çayırdä.

(Karagançu, 2015: 39)

Şiirde; “*kloçka, piliç çıkar-, yuva, kiler*” ile “*koyun sürüsü, çimen otu, çayır, otlä-*” sözceleri arasında periyodik bir uygunluk söz konusudur. Tenasüp bağıntısıyla çözümlenen sanatsal frekans, sanatçının his odağından geçerek anlam kuşağını polisemik bir yapıyla yeniden kurgulamaktadır.

18.

Lä-lä-lä, lä-lä-lä

Başçada açtı **güllär.**

Lä-lä-lä, lä-lä-lä

Sesederlär **bülbüllär.**



(Marinoglu, 2013: 132)

Şiirde coşkunun bir söylemin saklı düşsel uyumunu yansıtan tasviri yönelim, “başça, gül ve bülbül” sözcülerinin gramatikal düzeniyle motive edilmiştir. Tenasüp faktörüyle şekillenen söz konusu belîğ frekans, okuyucunun düş piramidini sanatsal bağlamda özgün bir tarzla inşa etmiştir.

19.

Brak buyursun **ilkyaz** aula –

O geldi hiç urmadaan daula!

Güneşlän bilä konu küülerä,

Almaya, kirezä, güllerä...

(Zanet, 2021: 185)

Şiirde ilkyaz temasını tasvirleyen sanatçı; tenasüp sanatının anlam sığasından esinlenerek, bu mevsimsel olguyu çağrıştıran sözceleri estetiksel bir yaklaşımla harmanlamıştır. “*alma, kirez ve gül*” kavramlarıyla tasarladığı özgün imgelemi tenasüp sanatıyla resmetmiştir.

20.

Güz tütünündän perdä

Gecelär dolaya çekti,

Hava da bom-boz **göklerdä**

Yıldızlar izini sildi.

(Zanet, 2021: 209)

Şiirde; “*gece, gök ve yıldız*” unsurları birbiriyle bağlantılı sözceler olup tenasüp penceresinden yansıtılmaktadır. Sanatçı, orijinal bir betim yaratmak adına, uyum senfonisinden ilham almaktadır.

SONUÇ

Çalışma ikliminden akseden estetiksel bileşimlerin gramatikal iz düşümü, tenasüp sanatının anlam evrenini dramatize etmiştir. Belagat atmosferinde senkronik bir kurgu yaratmak adına, aralarında anlamsal bir uyum bulunan en az iki sözcenin zıtlık örgesi olmaksızın toplanma işlemine vurgu yapılmıştır. Tenasüp olgusunu işaretleyen “yakışma, uygunluk, uyum, orantı” tarzındaki pekiştireçler, sanatçının duygu enlemine özgün bir yaklaşımla betimlemiştir. Sıra dışı bir düşlemin lirik ezgisiyle harmonize edilen bu belîğ tasarım, muhatapın düş skalasını estetiksel bir kreasyonla yeniden inşa etmiştir. İfade boyutundaki anlam eksenini sanatsal yönde etkin kılan ve sezgisel tepkimeyi otantik bir hazla motifleyen tenasüp portresi, birbirine yakışan ibarelerin aynı tabloda resmedilmesini sembolize etmiştir. Dolayısıyla, anlam paletindeki uyumlu birimlerin otantik ezgisi, söylemin zengin bir renk kuşağına ve senkronik bir düş yelpazesine sahip olduğunu göstermiştir.

Söylem ufkunu derin ve güçlü bir katmana taşıyan tenasüp örgesi, karşıtlık unsurunu anlam sınırından geçirmeyerek yaratı eksenini sanatsal bir doğrultuya taşımıştır. Sözceler arasındaki estetiksel dizayn, eserin imgelem çatısını okuyucunun hayal düzleminde aktive ederek vokabüler periyodu varsıl bir boyuta taşımıştır.

Çalışma, metin bağlamını simgeleyen estetik metaforların gizil uyumunu yorumsal tetkik önermesiyle belirgin kılmıştır. Gagauz edebi iklimini özgün bir bakış açısıyla tasvirleyen şiirsel platform, tenasüp şemasının anlam çarkında yorumlanmış, sanatsal çağrışımın orijinal ritmiyle sembolize edilmiştir. Araştırma kapsamına dair lirik temlerin anlam meridyeni ise semantik bir kurguyla analiz edilmiştir. Böylelikle, retorik bulgunun betim aynasından yansıyan düşsel görüntünün, Gagauz yazın dünyasına sanatsal bir yön çizdiği tespit edilmiştir.



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WHY DO WE FEEL RELAXED WHEN WATCHING FISH IN AQUARIUMS OR IN PONDS?

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ABSTRACT

The purpose of this paper is to look at what happens when we watch fish swimming in aquariums, in our personal homes, insitutions such as companies, shops, reataurants, hotels, or museums, as well as in ponds in parks or botanical gardens. We can also look online at swimming fish in reefs, underwater in the sea, or in lakes, ponds and aquariums and likely experience similar effects. The physical effects of relaxation have been documented in already existing research, and these include as explanations heart rate dropping and the effect of endorphines improving our good mood and state of calm. One psychological explanation has been related to the idea that the fish can be perceived as companions. Thus, we no longer feel alone when we have fish in our room in an aquarium. The present paper explores other possible psychological explanations, related to the way we perceive the colours of the fish, as color psychology can also explain our moods. Other explanations may be those related to our associating fish with meditation by a pond, in a Zen Buddhist manner specific to Japanese culture. Further explanations may be those related to the state of calm and relaxation that those having fishing by the pond or lake as a hobby claim to experience. Indeed, the fish can stir water and the sound of water can be noticed in videos that are about relaxation and using the sound of water to help us go to sleep or simply improve our psychological state while finding relief from stress. Supranational organizations such as the European Union raise our awareness to our health and psychological well-being through policies and through publishing popular psychology papers on the topic.

Keywords: Stress, Well-Being, Meditation, Company, Endorphines

INTRODUCTION

In our contemporary world, stress and means of dealing with it is a current concern. Our psychological well-being becomes a priority, due to the fast rhythm of modern life, and especially due to the world and environment around us which becomes more urban, more technologized, and more and more removed from nature. We witness continuously the move from rural to urban areas, as well as the rapid development of urban areas.

Popular psychology articles give various solutions related to relaxation and mindfulness meditation techniques, as well as examples of various practices from other cultures, which could help relieve stress, such as Shinrin-yoku, or forest bathing, from Japanese culture, which involves spending time in the forest, doing breathing exercises, and feeling comfortable in nature while beginning to share a deep connection with it [1].

Plenty of practices from Asian cultures and especially Japanese culture have been taken over by the Western world for the purpose of well-being and relaxation, especially due to the Zen Buddhist mindset, which asks of us to be present [2], psychologically and mentally, in the present moment and to connect with our environment and with the people around us. Definitely, by living in the present moment, this means that we accept what we have and whom we have now with us, and focus on what we can do now, without falling into sadness or even depression regarding what we have lost in the past. We are prompted to accept that we can lose various things and loved persons, and that everything is ephemeral, according to the Buddhist mindset. Yet, we can find it beneficial to connect to nature, through various hobbies



which include it, such as ikebana, or the art of floral arrangements, and creating our bonsai tree [1]. We do not act on elements of nature through these practices, but we work together with them and establish, thus, a deep connection with them [1]. Japanese Zen gardens in urban areas are considered beneficial for meditation and relaxation. Additionally, Japanese culture also promotes the use of natural materials such as wood in their home [1], thus showing how important they consider a connection with nature to be for their well-being.

We could consider the fish in aquariums and ponds that we can watch to be beneficial for our well-being since they are part of nature, and, by having them around, we can keep in touch with nature, much like in the previous examples from Japanese culture. We can recall the Japanese koi fish, that are decorative in various human-made ponds and aquariums, and which improve our psychological state of mind. Additionally, we can connect having a fish aquarium with having pets, which are also considered beneficial for our psychological well-being, due to the fact that they ensure companionship for us.

MATERIALS AND METHODS

The Zen Buddhist meditation and the Japanese art of living [1] which includes all its ideas about accepting that life here is ephemeral, that all we have is the present moment, and that we can establish a close and beneficial connection with nature to help relieve stress can offer us insight into why we enjoy watching fish in aquariums and in ponds.

Fish in aquariums can be consider a small part of nature which we can bring into our own homes, in an urban setting especially. We can find on Youtube music meant to help us relax, and which includes sounds from nature, such as water sounds, or birds' songs, or the wind through the leaves. The fish can sometimes make some light sounds in the water, and the sight of water, as it is, and the smooth movement of fish can be relaxing. We can think about how we feel when we are in nature, and far-away from all the stress we associate with city life.

We can relate the fish aquarium in various public institutions, such as workplace, pharmacies, hotels, and others, as well as in the personal home to a portion of nature which we incorporate in our urban life. We can make an analogy with the Japanese Zen garden, which is a minimalist setting where anyone can meditate, without having to retreat from the civilized world. They can continue living in an urban setting, while allowing themselves a break from it all in a park where they can relax a bit.

Interior space designs nowadays are believed to have beneficial psychological effects once they include at least an element belonging to nature. As an example, a psychoanalyst's or other therapist's office can include living plants, or a coach's office can include a fish aquarium, to improve the state of well-being of the clients.

At the same time, we could relate nature with a feeling of beauty, which, according to Scruton [3], we need in our lives in order to enhance our sense of well-being in this world. Scruton [3] speaks about architectural design, and the way the modern designs are so far removed from a concern with beauty, and are going towards a concern with what is useful and practical. Once buildings look alike, we can also see how they are built easier and faster than old houses with aesthetic decorations. Yet, we could extend the need for the presence of beauty in our lives to other realms, including interior design elements such as fish aquariums.

The fish can be considered from an aesthetically pleasing point of view, due to their shapes and colours. It is well-known that colours have various effects on our psychology [4], and on our well-being. Some colours elevate our moods, offering a boost in optimistic attitude, while other can promote focus, and still others can lead to us feeling aggressive or agitated. We can think about the smooth movement of the fish through the water, where every move is done through a smooth, apparently soft space. This can lead to our sense of relaxation, as we may think of the feeling when we float, relaxed and careless, in a swimming pool during a hot summer day during our holidays.

From interacting in general with pets, studies such as the one by Clements et al [5], claim that there are beneficial effects which can improve mood and reduce anxiety for human beings in relation to interacting with fish. It should be mentioned that no physical interaction is involved in the latter case, which leads to experiencing less risk. Among the effects of interaction between human beings and fish,



according to this study, we can find beneficial ones such as the following ones: reduced blood pressure [6, 7], lower risk of cardiovascular disease [8, 9], reduced levels of loneliness [10], as well as emotional support [11] they feel that they benefit from when they have mental health issues. Feeling that they have a companion when they have a pet leads to people feeling that they have emotional support, and it is then that their physical health also improves [12, 13].

That natural habitats are appreciated by humans has been the topic of the research undertaken by Windhager et al [14]. Within this study, in a window display in a shopping mall from Vienna, in Austria, an aquarium was placed and the effects of those passing by were documented. The fact that many people stopped to watch has been interpreted as influencing their behaviour as buyers. The attraction of passers-by in urban environments for watching fish in aquariums has been understood as increasing well being in an urban, modern environment and with respect to buying behaviour.

According to the study done by Lundberg & Srinivasan [15], interacting with fish in aquariums, for human beings, has a beneficial effect of reducing feelings of anxiety and stress. The state of well-being when looking at an aquarium goes even further, to increasing the threshold of pain, according to the same study.

Real-life and virtual aquariums lead to the same beneficial effect of those watching them [16].

We could argue that watching fish in aquariums, or even under the sea or in lakes, can be the same regardless of them being seen in their real environment or watched on tv or filmed on the Internet, or even through virtual reality. The viewer, after all, relies on the visual experience regardless of the environment, and the experience should be similar, by having a similar effect on the human psyche and state of well-being. Seeing colours, movements, and water, as well as fish, texture should have a similar effect on our mood as we are watching them. In both cases, we only rely on looking at them, as we do not actually interact with them in their own environment. Only in exceptional cases do underwater divers truly interact with fish and sealife in their own environment.

According to research conducted by Mishra et al [17], stress level was found to be reduced among people who owned an ornamental fish aquarium compared to those who did not. Endorphines were higher, and it is well-known that endorphines increase the sense of physical, as well as emotional, well-being in human kind. They are substances that enhance the feeling of pleasure.

We could, thus, claim that fish aquariums in any public as well as personal space can help improve the mood of those watching them.

RESULTS

A sense of well-being for us humans should include a combination of mood, emotions and, in short, of psychological well-being, and physical well-being, including all the processes that go in the brain and in the body at a physical level to create a positive mental state. The fish aquarium or pond manages to do this, through its strong visual component, and then through its triggering of various physical processes which increase the sense of pleasure, of reduction of blood pressure, and, briefly, of reducing stress, with both physical and psychological consequences.

We can relate watching the fish aquarium with watching a small portion of nature to which we can have access in a highly urbanized and highly technologized environment. Then, we can correlate nature with spirituality and well-being, as well as with a feeling of freedom, which we may not feel when in a city, and, especially, when feeling enclosed in a corporate environment, in an office where we psychologically feel that there is no way out. This can be felt even more so as the working programme is long and rather strict, and the presence of free time is very reduced. However, with the recent trend and rules coming from supranational organizations such as the European Union, the presence of nature is ensured in our lives through the promotion of green spaces, parks, exercising in urban areas, and through the concept of smart city which includes green areas and portions of nature for the citizens' well-being.

DISCUSSION

Supranational organizations such as the European Union constantly draw attention to the negative



effects of stress both as far as psychological and physiological well-being are concerned, in their health policies and raising awareness about health issues. From this point of view, having a fish aquarium in the house or at work, or a fish pond nearby, in the garden of our personal homes or at work, can be beneficial for relaxing and getting rid of stress. It is an element of nature which can make us feel experience a relationship of connection with nature, when everything around us is artificial, in an urban area, both at home and at work. The modern buildings are made up of less and less natural items, although recently we deal with the concept of smart city, where plants and green spaces are included. Buildings with plants on them are believed to maintain a pleasant temperature, cool in the summer, for example, and allowing us not to use the air conditioner in very hot weather. We can see the practice of having a fish aquarium as a relaxing practice, ensuring the presence of nature in our lives, together with the presence of pets as companions.

The practice of taking care of a fish aquarium can be seen in the context of having activities which lead to someone's well-being. The effect has been proved scientifically, through the rise of endorphines which lead to a good mood.

Burnout, mindfulness, anti-stress, are all keywords of today's world. We are prompted to start taking measures towards our well-being, since it is only in this way that we can be productive and feel good about ourselves.

CONCLUSIONS

We could call the presence of fish aquariums in public and personal spaces as therapeutic, since it has the effects of increasing the sense of well-being. Just as stress can have consequences both psychologically and physically, so does the feeling of relaxation and well-being. For one thing, our productivity can increase when we feel relaxed, as we feel more rested and less tired, and, thus, ready to do more work. The frame of mind matters a lot, as, once we are optimistic and think positively, we may even find faster and better solutions to various issues. We may feel more energetic and be more efficient in doing our work without distractions and interruptions, and we may be eager to find solutions faster, and believe in ourselves that we can finish various tasks successfully, and not feel discouraged by various difficulties.

Otherwise, we speak of motivations to do various activities. However, our mental and psychological states, which are in strong connection, also matter and have their own consequences on our way of taking various work tasks to the end, just as we carry our everyday life tasks in our personal lives. The fish aquariums, while requiring us to take care of them, if they belong to us personally, offer us a sense of being useful and a sense of caring for a type of hobby.

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ÜNİVERSİTE ÖĞRENCİLERİNDE TOPLUMSAL CİNSİYET ALGI DÜZEYİ DEĞERLENDİRİLMESİ

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ÖZET

Toplumsal cinsiyetin kapsadığı rol kavramı, bireyin içinde bulunduğu toplumun kurallarına göre neyi, nasıl yapması gerektiğini belirleyen davranışlar bütünüdür. Toplumun kültürel değer yargıları bireye bu kurallara uyma noktasında baskıurmaktadır. Bu çalışmada üniversite öğrencilerinin toplumsal cinsiyet algı düzeyinin değerlendirilmesi amaçlanmıştır. Kesitsel ve tanımlayıcı tipte olan araştırmanın evrenini 1 Nisan-31 Mayıs 2022 tarihleri arasında Batman Üniversitesi hemşirelik bölümü, Gaziantep Üniversitesi sınıf öğretmenliği bölümü ile rehberlik ve psikolojik danışmanlık bölümlerinde okuyan 752 öğrenci oluşturmuş, çalışmaya katılmayı kabul eden 553 öğrenci ile araştırma yürütülmüştür. Veriler sosyodemografik bilgi formu ve Toplumsal Cinsiyet Algısı Ölçeği ile yüzyüze toplanmıştır. Veriler SPSS programında değerlendirilmiş, programda bağımsız gruplar için x^2 testi uygulanmıştır. Çalışmaya katılanların %66.9'u kadın olup, %74.5'i çekirdek aileye sahiptir. Hemşirelik öğrencilerinin %7.5'i, sınıf öğretmenliği öğrencilerinin %6.9'u, psikolojik danışmanlık ve rehberlik öğrencilerinin 16.8'i erkeklerin evlilikten önce cinselilişkiye girmesini onayladıklarını belirtmişlerdir ($p<0.05$). Katılımcılara erkeğin ve kadının evdeki rollerine ilişkin düşünceleri sorulduğunda hemşirelik bölümü öğrencilerinin %58.8'i, psikolojik danışmanlık ve rehberlik bölümü öğrencilerinin %48.5'i erkeğin evdeki rolünün eve para getirmek olduğunu belirtirken 18-19 yaş grubundaki öğrencilerin %29.9'u kadının evdeki rolünün yemek pişirmek olduğunu ifade etmiştir ($p<0.005$). Üniversite öğrencilerinin toplumsal cinsiyete bakışı devam ettikleri bölüme ve yaşa göre farklılık göstermektedir. Bu sonuçlar doğrultusunda geleceğin ebeveynleri ve toplumun mimarı olacak üniversite öğrencilerine toplumsal cinsiyet kavramı ve rollerine yönelik eğitimlerin verilmesi önerilebilir.

Anahtar kelimeler: Cinsiyet, Toplumsal Cinsiyet, Cinsiyet Algısı

ABSTRACT

The role concept covered by gender is the set of behaviors that determine what and how an individual should do according to the rules of the society in which he or she lives. The cultural value judgments of the society put pressure on the individual to comply with these rules. This study aimed to evaluate the gender perception level of university students. The population of the cross-sectional and descriptive study consisted of 752 students studying in Batman University nursing department, Gaziantep University classroom teaching department and guidance and psychological counseling departments between April 1 and May 31, 2022, and the research was conducted with 553 students who agreed to participate in the study. Data were collected face to face with the sociodemographic information form and the Gender Perception Scale. The data were evaluated in the SPSS program, and x^2 test was applied for independent groups in the program. 66.9% of the participants in the study are women and 74.5% have a nuclear family. 7.5% of nursing students, 6.9% of classroom teaching students, and 16.8% of psychological counseling and guidance students stated that they approved of men having sexual intercourse before marriage ($p<0.05$). When the participants were asked about their thoughts on the roles of men and women at home, 58.8% of the nursing students and 48.5% of the psychological counseling



and guidance department students stated that the man's role at home was to bring money to the house, while 29.9% of the students in the 18-19 age group stated that the woman's role at home was to cook. ($p < 0.005$). University students' views on gender vary depending on the department they attend and their age. In line with these results, it can be recommended that university students, who will be the parents of the future and the architects of society, be given training on gender concepts and roles.

Key words: Gender, Gender, Gender Perception

GİRİŞ

Cinsiyet rolü, erkeksi (maskülen) ve kadınsı (feminen) değerlendirilmekte bireyin tavırları, davranışları, giyimi, tutumları ve değerleri bireyin sahip olduğu toplumsal cinsiyet rolünün etkisi altında kalmaktadır. Cinsiyet tiplmesi şeklinde değerlendirilen aktiviteleri ve buna benzer durumları eril/dişil isimlendirmek, çoğunlukla doğumun hemen ardından, çocuğun isimlendirilmesi, eşya seçimi, odasının dizaynı vs. ile başladığı bilinmektedir (1). Toplumsal cinsiyet rolleri ve cinsiyet eşitsizliği yüzlerce yıldır süren ve tüm dünya bireylerinin ortak sorunudur. Biyolojik cinsiyetin aksine kültürel kodlamalara bağlı toplumsal cinsiyet yaklaşımı toplum tarafından üretilen, bireylere dayatma ile oynamaları gereken rollere dönüşen yapıdadır. TCR ve ataerkil bakış, ikincil konuma düşürülen kadının kamusal alandaki varlığını sorunlu hale getirmiştir. Bireyler özel ve çalışma yaşamlarında cinsiyetçi iş bölümü içinde rollerin üretimine katkıda bulunur. Özel alanda cinsiyetçi iş bölümü yüklerini yerine getiren kadın kamusal alanda cinsiyetçi iş bölümünde erkeklerin gerisine düşmektedir. Kadının kamusal alanda uğradığı cinsiyetçiliğin ardında, toplumun kültürel kodlarına işlenmiş ataerkil bakış ve toplumsal cinsiyet yargılarının yattığını söylenebilir. Birçok iş kolu erkeklere ait lanse edip kadınları bu alanlar dışında bırakılarak, kadınsı nitelenen alanlar değersizleştirilmektedir. Ülkemizde toplumsal cinsiyet eşitsizliği, sadece kadınları değil toplumun içinde yaşayan bütün bireyleri etkiler. Toplumdaki bireylerin yetişmesinde ilk ortam ailedir. Çocuğa ilk bakım veren kadındır. Kadının TCE'nin bilincinde yetiştirdiği bireyler bu bilince ulaşacaktır. Bu bilinç eğitim ve toplumsal değişimle gelişecektir. Bireylerin eğitim düzeyinin artması toplumsal cinsiyet rollerine farklı, modern bakış açısı kazandırmaktadır. Toplumsal cinsiyetin kapsadığı rol kavramı, bireyin içinde bulunduğu toplumun kurallarına göre neyi, nasıl yapması gerektiğini belirleyen davranışlar bütünüdür. Toplumun kültürel değer yargıları bireye bu kurallara uyma noktasında baskı kurmaktadır (2,3). Toplumsal cinsiyet şartlanmaları ve ataerkil yapının kadına yüklediği görevler geçmişte nasılsa günümüzde de benzer devam etmekte, kadın ev içi ve dışında sömürülmektedir (4). Yeni evli çiftler ilk başlarda toplumsal cinsiyet rol kalıplarına aldırılmadan ev sorumluluklarını birlikte yapmakta, ilk çocuğun dünyaya gelmesiyle cinsiyetçi roller açığa çıkmaktadır. Kadın eş, ev kadını, iş kadını, annelik rolleriyle büyük yükün ağırlığıyla zorlamaktadır. Toplumun bireylerden beklediği kadın ve erkek rollerine bürünmek zorunda kalan eşler ataerkil rollerin çerçevesinde sıkışmaktadır (5). Geleneksel rollerin ev içinde kadınlara yüklediği eşitsiz iş yükünü kaldıramayan kadınlar, kamusal alanda "hizmet içi eğitim", kariyer imkânlarından yeterince faydalanmamaktadır (6). Türkiye de yasal olarak erkeklerle eşit statüde olduğu bilinen kadınlar için bu gerçek değildir. Erkeklerle benzer işlerde ve eşit ücretle çalışan çocuk sahibi kadınların, eşitsiz konumları bu alanda açığa çıkmaktadır. Gebelik izni, süt izni, analık izni gibi yasal düzenlemelerin gözden geçirilmesi gerekmektedir (7). Kadınlar ev dışı işlerde çalışsalar bile ev içi işlerin, koordine edilmesi, düşünülmesi ve uygulanması noktasında tüm sorumluluk üzerlerindedir. Bu cinsiyetçi rol kalıplarından çıkmaları için zamana ve olumlu toplumsal uygulamalara ihtiyaç duyulmaktadır. Bunlardan biri görsel medyadır. Reklamlarda kadının rolleri pekiştirilmekle, kadının cinsiyetçi rollerine vurgu yapılmaktadır. Goffman, kadının reklamlarda cinsel obje, temiz çamaşırlar ve ev temizliği, temizlikçi ve nezih sofralar kurmaya odaklı cinsiyetçi kurallara sıkıştırılmış kadın portresi ile sunulduğunu ifade etmektedir (8). Cinsiyet eşitsizliğinin bir boyutu da eşitsiz toplumsal inanışlardır. Donovan, kadınlara uygulanan toplumsal baskının temelinde dini inanışların olduğunu vurgular (9). Dini kurallarla da ikincil konuma itilen kadın, erkeğin üstün, kadının aşağı konumda algılanmasına maruz kalmış, korunmaya muhtaç ve erkeğin himayesinde, ev içi bakım ve hizmet eden olarak konumlandırılmıştır. Müslümanlıkta durum benzerdir. Ancak kadınlar Donovan'ın aksine toplumda geleneksel eşitsiz algılar sonucu yaşanan problemlerin kaynağını "din" görmemekte, sorunların kaynağı dinle ilgisi olmayan farklı kültürel ve yerel yapıları göstermektedir (10). Kadınların siyasal temsilinin



yeterli olmadığı ülkemizde, siyasal olarak daha fazla temsil edilmesi gerekmekte, kadın siyasal hakları yeterince temsil edilememektedir. Yerel yönetimlere bağlı çalışan kent konseyleri kadınların ev dışı üretime yerel siyaset kanalı ile katılma yollarından biridir. Kent konseylerinde kadın temsiline düşük vurgulayan Tunçer özellikle yönetim alanında kadın sayısının çok az olduğuna dikkat çekmektedir. Kadınların birçok alanda olduğu gibi yerel siyasette de temsiline düşük olduğu ve haklarını, taleplerini dile getirmede eksiklikler yaşanmaktadır. Kadınların ev dışı üretime katılması, çok yönlü yorum/tartışmalara yol açmaktadır. Ev dışı üretimde çalışmanın kadın için maddi-manevi kazanç ve getirileri çok önemli yer tutarken, karşılaştığı problemler ve eşitsiz konumu ciddi sorun yaratmaktadır. Kadın-erkek eşitsizliğinin çalışma yaşamında giderilmesi yönündeki hassasiyet ve emekler, kadınlara yönelik istihdam politikaları, özellikle gelişmiş ülkelerde büyük önem arz etmektedir (11). Bir halk sağlığı hemşiresi olarak bu çalışmayı yapmamızın nedeni 7/24 halka hizmet sunan hemşirelerin topluma iç içe olması, halk sağlığı hemşiresinin topluma rol model olması, halkın sorunlarıyla ilk karşılaşan ve kişileri bu konuda eğiten, yol gösteren olması ile toplumun içinde bulunduğu TCE ile mücadele edebilecek en önemli gruptur. Bu nedenle TCE ile mücadelede halk sağlığı hemşiresine büyük görevler düşmektedir. Bu konuda geleceğimiz olan üniversite öğrencilerinin toplumsal cinsiyet konusundaki düşüncelerinin gelecek için yapılması gereken çalışmalar için yol göstereceğinden örneklem olarak insanlarla yakın ilişkiler içinde olan öğretmen adayları ve hemşire adayları seçilmiştir. Bu çalışmada üniversite öğrencilerinin toplumsal cinsiyet algı düzeyinin değerlendirilmesi amaçlanmıştır.

GEREÇ VE YÖNTEM

Tanımlayıcı-kesitsel olarak uygulanan bu araştırma Batman ili Batman Üniversitesi Sağlık Bilimleri Fakültesi Hemşirelik bölümü ile Gaziantep ili Gaziantep Üniversitesi Eğitim Fakültesi Sınıf Öğretmenliği ve Psikolojik Danışmanlık ve Rehberlik bölümü öğrencilerine uygulanmıştır. Araştırmanın evrenini 2022 yılı Nisan-Mayıs ayları arasında Batman Üniversitesi Hemşirelik Bölümünde öğrenim gören 288 öğrenci ile Gaziantep Üniversitesi Sınıf Öğretmenliği ve Rehberlik ve Psikolojik Danışmanlık Bölümünde 464 öğrenci olmak üzere 752 öğrenci oluşturmuş, katılımı yazılı/sözlü kabul eden 553 öğrenci (%73,5) örneklemi oluşturmuştur. Çalışmanın yapıldığı 1 Nisan- 31 Mayıs 2022 tarihlerinde Batman Üniversitesi Hemşirelik bölümü ile Gaziantep Üniversitesi Eğitim Fakültesi Sınıf Öğretmenliği ve Psikolojik Danışmanlık ve Rehberlik bölümünde eğitime devam eden öğrenciler çalışmaya dâhil edilmiştir. Diğer bölümlerde öğrenim gören öğrenciler çalışmaya dahil edilmemiştir. Veriler istatistiksel analiz için Statistical Package for The Social Science(SPSS) 22.0 paket programına kaydedilerek, dağılımı ve ortalama (\bar{x}), standart sapma (sd) ve yüzde (%) değerleri belirlendikten sonra χ^2 önemlilik testi uygulanmış, $p < 0.05$ istatistiksel açıdan anlamlı kabul edilmiştir.

BULGULAR

Tablo 1. Araştırmaya Katılan Öğrencilerin Sosyo-Demografik Dağılımları

Yaş	Sayı	Yüzde
18-19	187	33.8
20-21	315	57
22-23	36	6.5
24 ve Üzeri	15	2.7
Cinsiyet		
Kadın	370	66.9
Erkek	183	33.1
Bölüm		
Hemşirelik	226	40.9
Sınıf Öğretmenliği	160	28.9
Pdr	167	30.2
Sınıf		
1.Sınıf	142	25.7
2.Sınıf	138	25
3.Sınıf	154	27.8
4.Sınıf	119	21.5



Aile Gelir Durumu		
Gelir Giderden Fazla	71	12.8
Gelir Gidere Eşit	343	62
Gelir Giderden Az	139	25.2
Aile Tipi		
Çekirdek	412	74.5
Geniş	128	23.1
Parçalanmış	13	2.4
Kardeş Sayısı		
1-3 çocuk	181	32.7
4-6 çocuk	268	48.5
7 ve Üzeri çocuk	104	18.8
Doğum yeri		
Akdeniz bölgesi	58	10.5
Ege bölgesi	2	0.4
Marmara bölgesi	3	0.5
İç Anadolu bölgesi	5	0.9
Güneydoğu bölgesi	452	81.7
Doğu Anadolu bölgesi	14	2.5
Karadeniz bölgesi	19	3.4
Toplam	553	100.0

Tablo 1’de 187 kişinin %66,9’u kadın; %40.9’u hemşirelik, %28.9’u sınıf öğretmenliği, %30.2’si PDR bölümünde okumakta, %25,7’si 1.sınıf, %25’i 2.sınıf, %28,8’i 3.sınıf, %21.5’i 4.sınıfta eğitim görmektedir. Katılanların %12,8’i yüksek, %62’si orta, %25,2’si düşük gelire sahiptir. Katılımcıların %10,5’i Akdeniz, %81.7’si Güney Doğu Anadolu bölgesinde, %2.5’i Doğu Anadolu bölgesinde doğmuştur.

Tablo 2. Araştırmaya Katılan Öğrencilerin Anne Baba Özellikleri

Anne baba durumu		
Beraber yaşıyor	504	91,1
Boşanmış	13	2,4
Anne yaşamıyor	9	1,6
Baba yaşamıyor	26	4,7
Anne ve baba yaşamıyor	1	0,2
Baba eğitimi		
Okuryazar değil	12	2,2
Okuryazar	51	9,2
İlkokul	145	26,2
Ortaokul	106	19,2
Lise	143	25,9
Üniversite mezunu	96	17,4
Anne eğitimi		
Okuryazar değil	136	24,6
Okuryazar	68	12,3
İlkokul	178	32,2
Ortaokul	85	15,4
Lise	62	11,2
Üniversite mezunu	24	4,3
Baba yaşı		
38-48	169	30.6
49-59	294	53.2
60 ve üzeri	90	16.2



Anne yaşı		
35-45	191	34.5
46-55	294	53.2
56 ve üzeri	68	12.3
Anne çalışma durumu		
Çalışıyor	55	9.9
Çalışmıyor	498	90.1
Baba mesleği		
Çiftçi	41	7.4
Emekli	96	17.4
Esnaf	68	12.3
İşçi	81	14.6
Memur	105	19
İşsiz	22	4
Serbest meslek	28	5.1
Şoför	28	5.1
Diğer	84	15.1
Anneniz boş zamanlarında ne yapar		
Ev işi	220	39.8
El işi	98	17.7
Dinlenme	32	5.8
İbadet etme	18	3.3
Kitap okuma	36	6.5
Sosyal medyada zaman geçirme	32	5.8
Tv izler	78	14.1
Gezer	39	7
Babanız boş zamanlarında ne yapar		
Ailesiyle zaman geçirme	24	4.3
Arkadaşlarıyla zaman geçirme	10	1.8
Bağ bahçe işleri ile uğraşma	41	7.5
Dinlenme	79	14.3
Ev işleri	71	12.8
Gezme	86	15.6
Kahveye gitme	53	9.6
Sosyal medyada zaman geçirme	18	3.3
Spor yapma	19	3.3
Tv izleme	152	27.5
Toplam	553	100.0

Tablo 2’de araştırmaya katılanların %91,1’inin anne babası beraber yaşıyor; %1.6’sının annesi, %4.7’sinin babası, %24,6’sının annesinin okuryazar olmadığı, %32,2’si ilkokul, %4,3’ü üniversite mezunu, babaların %26.2’sinin ilkokul, %19.2’sinin ortaokul, %25.9’u lise, %17.4’ü üniversite mezunudur. Katılımcıların %30.6’sının babası 38-48 yaş aralığında, %53.2’sinin 49- 59 yaş aralığında, %34.5’inin annesi 35-45 yaş aralığında, %53.2’sinin 46-55 yaş aralığındadır. Çalışmaya katılanların %90.1’nin annesi çalışmıyor, %4’ünün babası işsizdir. %39.8’inin annesi boş zamanlarda evişi yaptığı, %27.5’inin babası boş zamanlarda televizyon izlediği saptanmıştır.

Tablo3. Araştırmaya Katılan Öğrencilerin Toplumsal Cinsiyete Bakışı Dağılımı

	Sayı	%
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Evlilikten Önce Kadının Cinsel İlişkiye Girmesini Onaylıyor Musunuz?		
Evet	64	11,6
Hayır	388	70,2
Kararsızım	101	18,3
Evlilikten Önce Erkeğin Cinsel İlişkiye Girmesini Onaylıyor Musunuz?		
Evet	56	10,1
Hayır	396	71,6
Kararsızım	101	18,3
Sizce Kadın Erkek İzni Olmadan Çocuğunu Aldırabilme/Kürtaj Hakkına Sahip Mi ?		
Kesinlikle Katılıyorum	38	6,9
Katılıyorum	27	4,9
Kararsızım	96	17,4
Katılmıyorum	172	31,1
Kesinlikle Katılmıyorum	220	39,8
Sizce Evde Çocuk Bakmak Kimin İşi		
Erkek	7	1,3
Kadın	54	9,8
Her İkisinin	492	89,0
Evin Bütçesini Kim Karşılmalı		
Erkek	91	16,5
Kadın	2	,4
Kadın Erkek Birlikte Karşılmalı	460	83,2
Sizce Erkeğin Evdeki Rolü Nedir?		
Yemek Pişirmek	9	1,6
Bulaşık Yıkamak	5	,9
Alışveriş Yapmak	7	1,3
Ütü Yapmak	6	1,1
Eve Para Getirmek	276	49,9
Diğer	250	45,2
Sizce Kadının Evdeki Rolü Nedir?		
Yemek Pişirmek	142	25,7
Bulaşık Yıkamak	30	5,4
Alışveriş Yapmak	45	8,1
Ütü Yapmak	1	,2
Eve Para Getirmek	27	4,9
Diğer	308	55,7
Size Göre Evde Lider Reis Kimdir?		
Erkek	97	17,5
Kadın	38	6,9
Her İkisi	381	68,9
Her İkisi Değil	37	6,7
Toplam	553	100,0

Tablo 3'te kadınların %70.2'si erkeklerde %71.6'sı evlilikten önce cinsel ilişkiye girmesini onaylamamakta,%39.8'inin kadının erkek izni olmadan çocuğunu aldırmasına kesinlikle katılmadığını, %89'u evde çocuğa bakmanın anne/baba görevi olduğunu; %16.5'i evin bütçesini erkek karşılar, %49.9'u erkeğin rolünün eve para getirmek; kadının rolüne %25.7'si yemek pişirmek, Evdeki lidere %17.5'i erkek demmiştir.

Tablo 4'te katılanların %32,9'u dış görünüşlerinin kendileri için çok önemli olduğunu, %40.9'u güzellik merkezinde estetik ameliyatı doğru bulduğunu; %88.8'i erkeklerin ağlayabileceği, %3.8'inin herhangi bir



partide siyasette aktif rol aldığını, %98.2'sinin sosyal medya kullandığını, %26'sı eline geçen parayla yatırım yaptığını, %34.5'i çok mutlu olduğunu, %13.6'sının politikacılığı erkeğe daha çok yakıştırdığını, %15,9'u sık sık ihtiyacı olmayan birşey alıp kendini ödüllendirdiği, %32.9'usıksık restoran kafelerde yediğini, %53.2'si haftasonu arkadaşları ile zaman geçirdiğini, %36'sı günün büyük kısmını inernet/tv ile geçirdiğini söylemiştir.

Tablo 4. Araştırmaya Katılan Öğrencilerin Sosyal Hayat Bakışı Dağılımı

	Sayı	%
Dış Görünüşünüz Sizin İçin Önemli Mi?		
Çok Önemli	182	32,9
Biraz Önemli	330	59,7
Önemli Değil	41	7,4
Güzellik Merkezine Gitmek Estetik Ameliyatı Yapmak Size Göre Doğru Mu?		
Doğru	226	40,9
Yanlış	121	21,9
Kararsızım	206	37,3
Erkeklerin Ağlamasını Nasıl Değerlendirirsiniz		
Erkek Adam Ağlamaz	34	6,1
Erkekler De Ağlayabilir	491	88,8
Kararsızım	28	5,1
Siyaset İle İlginiz Nasıldır?		
Herhangi Bir Partide Aktif Rol Alıyorum	21	3,8
İlerde Herhangi Bir Partide Rol Almak İsterim	37	6,7
Siyaset İle İlgilenmiyorum İlerde De İlgilenmek İstemem	495	89,5
Sosyal Medya Kullanıyor Musunuz?		
Evet	543	98,2
Hayır	10	1,8
Paranızla Yatırım Yapıyor Musunuz?		
Yatırım Yapmıyorum	409	74,0
Yatırım Yapıyorum	144	26,0
Kendinizi Ne Kadar Mutlu Hissediyorsunuz?		
Mutlu	191	34,5
Mutsuz	60	10,8
Ne Mutlu Ne Mutsuz	270	48,8
Çok Mutsuz	32	5,8
Politikacı Olmak Hangi Cinsiyete Daha Çok Yakışıyor?		
Erkeğe Yakışıyor	75	13,6
Kadına Yakışıyor	19	3,4
İkisine De Yakışıyor	351	63,5
İkisine De Yakışmıyor	108	19,5
Öğrenci Alışkanlıkları /İhtiyacınız Olmayan Bir Şey Alıp Kendinizi Ödüllendirir Misiniz?		
Sık Sık Yaparım	88	15,9
Bazen Yaparım	347	62,7
Yılda Bir Yaparım	55	9,9
Hiç Yapmam	63	11,4
Restorant/Kafe Gibi Yerlerde Yemek Yer Misiniz?		
Sık Sık	182	32,9
Ayda Bir	301	54,4
Yılda Bir	47	8,5
Hiç Gitmem	23	4,2
Haftasonu Tatillerinde Ne Yaparsınız?		



Sinemaya Giderim	21	3,8
Maça Giderim	16	2,9
Tatile Çıkarım	9	1,6
Arkadaşlarımla Takılırim	294	53,2
Spor Yaparım	28	5,1
Hiçbir Şey Yapmam	132	23,9
Diğer	53	9,6
Yirmi Dört Saatlik Bir Günü Nasıl Geçirirsiniz?		
İş	80	14,5
Ev İşi	41	7,4
Yolculuk	14	2,5
Alışveriş	20	3,6
Eğlence	80	14,5
İnternet/Tv	199	36,0
Diğer	119	21,5
Sigara İçiyor Musunuz?		
Hayatımda Hiç Sigara Kullanmadım	415	75,0
Arada Bir İçerim	69	12,5
Günde 1-2 Tane İçerim	25	4,5
Günde 1 Paket Ve Üstü İçerim	44	8,0
Alkol İçiyor Musunuz?		
Hayatımda Hiç Alkol Kullanmadım	496	89,7
Arada Bir İçerim	54	9,8
Hergün İçerim	3	0,5
Toplam	553	100,0

Tablo 5'te

Tablo 5. Araştırmaya Katılan Öğrencilerin Toplumsal Cinsiyet Algısı Ölçeği Dağılımı

	Tamamen Katılmıyorum		Katılmıyorum		Kararsızım		Katılıyorum		Tamamen Katılıyorum	
	Sayı	%	Sayı	%	Sayı	%	Sayı	%	Sayı	%
Evlilik Kadının Çalışmasına Engel Olmaz	18	3,3	25	4,5	35	6,3	226	40,9	249	45,0
Kadın Sadece Ailesinin Ekonomik Sıkıntısı Varsa Çalışmalıdır	243	43,9	204	36,9	50	9,0	46	8,3	10	1,8
Çalışan Kadın Da Çocuklarına Yeterince Zaman Ayırabilir	16	2,9	63	11,4	122	22,1	206	37,3	146	26,4
Kadınlar Anne Olduktan Sonra Çalışmamalıdır	221	40,0	180	32,5	81	14,6	52	9,4	19	3,4
Kadın Siyasetçiler De Başarılı Olabilir	25	4,5	13	2,4	53	9,6	210	38,0	252	45,6
Kadınlar Evlendikten Sonra Çalışmamalıdır	307	55,5	155	28,0	50	9,0	28	5,1	13	2,4
Çalışma Hayatı Kadının Ev İşlerini Aksatmasına Neden Olmaz	26	4,7	103	18,6	141	25,5	173	31,3	110	19,9
Çalışan Bir Kadın Hayattan Daha Çok Zevk Alır	23	4,2	48	8,7	168	30,4	169	30,6	145	26,2
Kadınlar Erkekler Tarafından Her Zaman Korunmalıdır	128	23,1	153	27,7	120	21,7	89	16,1	63	11,4



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Kocasız İzin Vermiyorsa Kadın Çalışmamalıdır	249	45,0	142	25,7	89	16,1	50	9,0	23	4,2
Kadınlar Yönetici Olabilir	23	4,2	24	4,3	32	5,8	171	30,9	303	54,8
Çalışan Bir Kadın Kazandığı Geliri Eşine Vermelidir	222	40,1	167	30,2	96	17,4	55	9,9	13	2,4
Çalışan Bir Kadın Çocuklarına Daha İyi Bir Anne Olur	37	6,7	77	13,9	238	43,0	127	23,0	74	13,4
Erkekler De Çamaşır Bulaşık Gibi Ev İşlerini Yapmalıdır	26	4,7	30	5,4	40	7,2	170	30,7	287	51,9
Kocasız Kadın Sahipsiz Eve Benzer	326	59,0	134	24,2	44	8,0	30	5,4	19	3,4
Bir Ailenin Gelirini Erkekler Sağlamalıdır	195	35,3	170	30,7	84	15,2	75	13,6	29	5,2
Kadınlar Kendi Başına Ticarethane Gibi Yerler (Kafe,Market,Emlakçı Gibi) Açmamalıdır	308	55,7	151	27,3	45	8,1	29	5,2	20	3,6
Kadınların Birinci Görevi Ev İşlerini Üstlenmektir	249	45,0	168	30,4	64	11,6	52	9,4	20	3,6
Bir Kadın Kocasından Fazla Para Kazanmamalıdır	290	52,4	146	26,4	64	11,6	31	5,6	22	4,0
Erkek Her Zaman Evin Reisi Olmalıdır	269	48,6	139	25,1	82	14,8	44	8,0	19	3,4
Toplumun Liderliği Genellikle Erkeklerin Elinde Olmalıdır	279	50,5	142	25,7	66	11,9	49	8,9	17	3,1
Kız Çocuklarına Da Erkek Çocuklar Kadar Özgürlük Verilmelidir	19	3,4	18	3,3	43	7,8	159	28,8	314	56,8
Kadın Kocasından Yaş Olarak Daha Küçük Olmalıdır	138	25,0	153	27,7	128	23,1	104	18,8	30	5,4
Bir Kadın Kendi Haklarına Sahip Olabilmesi İçin Gerekirse Kocasına Karşı Çıkabilmelidir	37	6,7	30	5,4	64	11,6	211	38,2	211	38,2
Ailedeki Önemli Kararları Erkekler Vermelidir	275	49,7	190	34,4	36	6,5	35	6,3	17	3,1



Tablo 6’da çalışmaya katılanların evlilik kadının çalışmasına engel olmaza %45’i tamamen katıldığını; kadın sadece ailesinin ekonomik sıkıntısı varsa çalışmalı %43.9’u tamamen katılmadığını; kadınlar anne olduktan sonra çalışmamalı%40’ı tamamen katılmadığını; kadın siyasetçiler başarılı olabilir%45.6’sı tamamen katıldığını; kadınlar evlendikten sonra çalışmamalı%55.5’i tamamen katılmadığını; kocası izin vermiyorsa kadın çalışmamalıdır %45’i tamamen katılmadığını; kadınlar yönetici olabilir %54.8’i tamamen katıldığını; çalışan kadın kazandığı geliri eşine vermeli%40.1’i tamamen katılmadığını; erkekler çamaşır bulaşık gibi ev işlerini yapmalı%51.9’u tamamen katıldığını; kocasız kadın sahipsiz eve benzer %59’u tamamen katılmadığı; ailenin gelirini erkekler sağlamalı %30.7’si katıldığını; kadınların birinci görevi ev işlerini üstlenmek%9.4’ü katıldığını; kadın kocasından fazla para kazanmamalı%52.4’ü tamamen katılmadığını; toplum liderliği erkeklerin elinde olmalı%50.5’i tamamen katılmadığını, kız çocuklarında erkekler kadar özgürlük verilmeli %56.8’i tamamen katıldığını; kadın kocasından yaş olarak küçük olmalı%23.1’i kararsız olduğunu; kadın kendi haklarına sahip olabilmek için kocasına karşı çıkabilmeli %38.2’si katıldığını; ailedeki önemli kararları erkekler vermeli%49.7’si tamamen katılmadığını belirtmiştir.

TARTIŞMA

Araştırmaya katılan öğrencilerin %66.9’u kadındır. 2011 ataerkillik, toplumsal cinsiyet ve kadının çalışma yaşamına katılımı adlı çalışmada %100’ü, 2007 Kafkas Üniversitesi son sınıf öğrencilerinin toplumsal cinsiyet rollerine ilişkin bakış açıları adlı çalışmada %52.1’i, 2009 Üniversite öğrencilerinin toplumsal cinsiyet rollerine ilişkin görüşleri adlı çalışmada %55.8’i kadınlar oluşturmuştur (12, 13, 14). Günay ve Bener 2011 Ankara çalışmasında 575 kadın ile yapılan çalışmada ilköğrenim ve daha az düzeyde öğrenim gören kadınların %41.9, çalışmayan kadınların %64.2, 4 ve daha fazla çocuğu olanlar %8.5 bulunmuşken aynı çalışmada kadınlarının eşlerinin %42.8’i yüksek öğrenim, %75.5’inin çalıştığı, gelirlerinin %62.3 ile orta gelir grubunda yoğunlaştığı, %31.3’ünün düşük gelire sahip olduğu sonucuna ulaşılmıştır (15). Çalışmamızda katılımcıların %67.3’ü 4 ve üzeri kardeşe sahip, %24.6’sının annesi okuryazar olmadığı, %4.3 gibi çok az bir kısmının üniversite mezunu; %2.2’sinin babası okuryazar olmadığı, %17.4’ünün babası üniversite mezunu olduğu, %90.1’inin annesinin çalışmadığı, %4’ünün babasının işsiz olduğu sonucuna varılmıştır. Çalışmamızda katılımcıların geliri %62 orta gelir seviyesinde yoğunlaşırken, %25.2’si düşük gelire sahiptir. Çalışmamızda çocuk sayısı, anne eğitim seviyesi ve anne çalışması Günay ve Bener 2011 Ankara çalışmasına göre daha olumsuz sonuçlara, gelir durumunda benzer sonuçlara ulaşılmıştır. Bunun nedeninin çalışmaların farklı bölgede olması ve farklı bölgelerde kadına atfedilen rollerin farklı olması ile ilişkilendirilebiliriz. Ergöl Ş. ve ark. 2012 Ankara’da bir üniversitede 291 kadın araştırma görevlisi ile yaptığı çalışmada kadınların %27.2’si çalışma yaşamında kadın erkek ayrımı yapıldığını, kadın araştırma görevlilerinin %31.7’si kadının kariyerce erkekte yüksek olmasının aile içinde sorun olacağını düşünmektedir. Geleneksel olarak evde kadına yüklenen rollerin (yemek yapma, bulaşık yıkama, çamaşır yıkama, ütü yapma, ev temizleme, giysi onarımı) araştırma kapsamına alınan kadınların çoğunluğu tarafından yerine getirildiği, evin onarımı, alışveriş, fatura ödeme gibi işleri ise daha çok evde bulunan erkeğin (eş ya da baba) yaptığı belirlenmiştir (16). Gök F. A. tarafında 2013 yılında Ankara’da yapılan çalışmada kadınların ev içi işlerle, erkeklerin ev dışındaki işlerle meşgul olduğu saptanmıştır. “(ütü yapma; erkek %2.7, kadın %83.6, her ikisi %13.7; yemek yapma; erkek %1.9, kadın %80.9, her ikisi %17.3; fatura ödeme; erkek %55.7, kadın %7.3, her ikisi %36.9; çamaşır/bulaşık yıkama; erkek %2.4, kadın %82.7, her ikisi %14.8; çocuklara yemek yedirme; kadın %52, erkek %2.4, her ikisi %45.6) olduğu bulunmuştur (17). Bizim çalışmamızda katılımcıların %16.5’i evin bütçesini sadece erkeğin, %83.1’i kadın ve erkeğin beraber karşılaması gerektiği, %89’u evde çocuk bakmanın kadın ve erkeğin her ikisinin, %9.7’si evde çocuğa bakmanın sadece kadının görevi olduğunu belirtmiş; %49.9’u erkeğin evdeki rolünün eve para getirmek olduğunu ifade ederken %25.7’si kadının evdeki rolünün yemek pişirmek olduğu düşüncesindedir. Bizim çalışmamızda her ne kadar eşitlikçi oranlar fazla gözükse de geleneksel cinsiyet bakış açısının bazı roller üzerinde etkisini devam ettirdiğini görmekteyiz. Çalışmamızda toplumsal cinsiyet algısı ölçeğinden alınan puan ortalaması 99.28’dir. Alabaş R. ve ark. 2019 çalışmasında 93.55 puan ortalaması vardır (18). Hem bizim çalışmamızda hem de Alabaş ve ark. çalışmasını değerlendirdiğimizde elde edilen puan ortalamaları katılımcıların toplumsal cinsiyet algılarının olumlu yönde olduğu söylenebilir.



Bunun nedeninin her iki çalışmanın üniversite öğrencileri ile yapılmış olması ve yeni jenerasyonun daha modern bakış açısına sahip olması ile ilişkilendirebiliriz.

SONUÇ ve ÖNERİLER

Çalışmamıza katılanların %66,9'u kadındır. Katılımcıların %48,5'i 4-6, %18,8'i 7 ve üzeri kardeşe sahiptir. Çalışmaya katılan öğrencilerin ailelerini incelediğimizde, %24,6'sının annesinin okuryazar olmadığı, %4,3'ünün üniversite mezunu %2,2'sinin babası okuryazar değil, %17,4'ü üniversite mezundur. Katılımcıların %90,1'inin annesi çalışmıyorken, %4'ünün babası işsizdir. Burada kadın geleneksel düşüncenin etkisi altında kaldığı görülmektedir. Katılımcıların annelerinin %39,8'i boş zamanlarında ev işi ile uğraşmakta, %27,5'inin babası boş zamanlarında televizyon izlemektedir. Bu durum kadının daha fazla yıpranmasına, sosyalleşememesine, hobilerini gerçekleştirememesine neden olmaktadır. Öğrencilerin toplumsal cinsiyete yönelik bakış açıları değerlendirildiğinde %70,2'si kadının, %71,6'sı erkeğin evlilikten önce cinsel ilişkiye girmesini onaylamıyor. Katılımcıların %39,7'si kadının erkeğin izni olmadan kürtaj yapmasına kesinlikle katılmadığı, %89'u çocuğa evde bakmanın hem anne hem de babanın görevi olduğuna inanmaktadır. Katılımcıların %49,9'u erkeğin evdeki rolünün eve para getirmek olduğunu, %25,7'si kadının evdeki rolünün yemek pişirmek olduğunu düşünmektedir. Bu durum bize toplum tarafından ortaya atılan erkeğin görevinin eve para getirmek, kadının ise ev işlerini yapması geleneksel düşüncenin hala hâkimiyetini devam ettirdiğini göstermektedir. Katılımcıların %17,5'i erkeğin, %68,9'u ise kadın ve erkeğin her ikisinin evin lideri olduğunu düşünmektedir. Katılımcıların %32,9'u için dış görünüş çok önemlidir, %21,9'u estetik ameliyatı yaptırmayı yanlış bulmaktadır. Katılımcıların %53,1'i hafta sonu arkadaşlarıyla zaman geçirmekte, %36'sı bir günlük zaman dilimini internette geçirmektedir. Katılımcıların %25'i hayatında en az bir kez sigara, %10,3'ünün en az bir kez alkol kullanmıştır. Annesi üniversite mezunu olanların %16,7'si , annesi okuryazar olmayanların %2,2'si siyasette herhangi bir partide aktif olarak rol almaktadır. Geliri giderinden fazla olanların %36,6'sı kendini mutlu, geliri giderinden az olanların %9,44'ü kendini çok mutsuz görmektedir. Kadın öğrencilerin %76,2'si evdeki liderin erkek ve kadının her ikisi olduğu, erkek öğrencilerin %32,2'si evdeki liderin sadece erkek olduğunu; kadın öğrencilerin %64,6'sı politikacılığı kadın ve erkek her ikisine yakıştığını, erkek öğrencilerin %19,7'si politikacılığın sadece erkeğe yakıştığını düşünmektedir. Sonuç olarak her ne kadar kadın ve erkeğin her konuda eşit olduğu, yasalar önünde aynı haklara sahip görünse de toplumun dayattığı toplumsal cinsiyet kalıp yargıları toplumun bir kesimi tarafından hala aşılammış kadının ev, erkeğin ise evin dışındaki işlerle uğraşması gerektiğine inanılmaktadır.

ÖNERİLER

- Hemşirelik alanında toplumsal cinsiyet eşitliği konularında deneyim ve bilgi paylaşımını artırmak amacıyla, sanal platformlar veya düzenli toplantılar gibi etkileşimli mecralar oluşturulabilir. Bu sayede, hemşireler arasında cinsiyet eşitliğiyle ilgili deneyimlerin paylaşılması ve bilgi düzeyinin artırılması sağlanmalıdır.
- Hemşirelik pratiğinde cinsiyet eşitliği ilkelerini vurgulayan ve uygulama rehberliği sunan kılavuzların hazırlanması, hemşirelerin günlük hizmetlerinde bu perspektifi daha etkin bir şekilde benimsemelerine katkı sağlanmalıdır.
- Hemşirelik eğitiminde toplumsal cinsiyet eşitliği temalarını içeren özel eğitim programları oluşturularak, öğrencilerin cinsiyet duyarlılıklarını artırmaya yönelik bütünleşmiş bir müfredat geliştirilmelidir.
- Hemşirelik öğrencilerinin eğitim sürecinde, toplumsal cinsiyet eşitliği konularını daha derinlemesine işleyen ve örnek vakalarla desteklenen modüllerin eklenmesi, gelecekteki hemşirelerin eşitlikçi bir bakış açısı kazanmalarına yönelik önemli bir katkı sağlanmalıdır.
- Toplumun dayattığı toplumsal cinsiyet kalıplarının uygulandığı yerlerde toplumsal cinsiyet eşitliği konusunda eğitim verilmeli, bireysel farkındalıkları geliştirilmeye çalışılmalı, eğitim öncesi ve sonrasında toplumdaki cinsiyet algı düzeylerinin tekrar ölçülüp işe yarayan uygulamalar hayata geçirilmeli.



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- Çalışmamızda kadınların çoğu boş zamanlarını ev işleri ile geçirmekte bu yüzden kadınların boş zamanlarını değerlendirebilecekleri, hobilerini gerçekleştirebilecekleri sosyal alanlar oluşturulmalı.
- Kadınlara yönelik iş sahaları genişletilip kadınların da gelir elde etmesi sağlanmalı, aynı birimde çalışan kadınların da en az erkekler kadar ücret alması kadın ve erkeğin gelir eşitliği sağlanmalı.
- Kadınlar erkeklere oranla daha az okula gidip eğitimini sürdürmektedir. Bu yüzden kız çocuklarının okula kayıtlarının yapılıp eğitimlerini sonuna kadar devam ettirilmesi sağlanmalı
- Kız çocuklarının okutulmasını teşvik edecek burs, ücretsiz yurt gibi imkânlar sağlanarak yoksul ailelerin kız çocuklarının eğitimlerine devamı sağlanmalı.
- Kız çocuklarını okutmayan ailelerin okutmamasının altındaki nedenler araştırılıp çözüm üretilerek kız çocuklarının eğitime devamı sağlanmalı.
- Kadınlara doğurganlık üzerine eğitim verilerek kadınların sürekli doğum yaparak bedenlerinin yıpranmasının önüne geçilmeli. Bu konuda halk sağlığı çalışanları doğurganlığın fazla olduğu evlere gerekirse ev ev ziyaret edip bu konuda ebeveynleri bilgilendirmeli.
- Kadın ve erkeklere eşit hak ve fırsatlar sunacak ve toplumsal cinsiyet eşitsizliğinin önüne geçecek yasa ve kanunlar oluşturulmalı

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PAST, PRESENT AND FUTURE OF FERTILITY RATE IN TÜRKİYE: SPATIAL ANALYSIS AND FORECASTING WITH ARTIFICIAL NEURAL NETWORK

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ABSTRACT

Fertility rate is the average number of children per population born to a woman over her lifetime, a statistical index that measures the natural increasing or decreasing trend of a population, and fertility rate is a complex issue affecting the demographic, economic and social structure of a country or society. Therefore, managing and stabilizing the fertility rate of societies is important for sustainable development and resource utilization. In this study, using the 13-year (2009-2022) fertility rate data of 81 provinces in Türkiye, the process from the past to the present has been analyzed spatially in GIS environment and an artificial neural network model has been created to predict the situation in the coming years. The data were evaluated regionally together with the spatial maps created in periods. The feed-forward neural network architecture created for forecasting purposes was used to predict fertility rates between 2023 and 2030 for each province. The architecture has a single hidden layer and ten neurons in this layer. In the model trained with Bayesian regularization, data between 2009 and 2022 were used as training data. The correlation coefficient performance measure was used for model training and a value of 0.99 was obtained. When the data group until 2022 is analyzed, it is seen that the fertility rates of the provinces have a decreasing trend and this decreasing trend continues in the forecasts covering the period between 2023 and 2030. The results of the study are expected to be a pioneering study to predict population growth or decline, guide informed policy decisions and ensure the efficient allocation of resources for sustainable social development.

Keywords: Fertility rate, Spatial analysis, GIS, Forecast, Artificial neural network.

1. Introduction

Fertility rate is a demographic measure of the average propensity to have children in a society. This measure usually indicates how many children a woman gives birth to on average in a year. The concept of fertility rate, which can vary depending on economic, social, cultural and individual factors, has a significant impact on the population growth or decline of a society. A high fertility rate usually indicates rapid population growth, while a low fertility rate indicates population decline. This concept usually reflects the influence of demographic, economic, social and cultural factors. The current social status of women of childbearing age, their level of education and their attitude towards having children are the most influential factors affecting the fertility rate. In addition, income level, access to health and family planning services, traditions and customs, ethnic and cultural structure are determinants of fertility rate (Taş and Dikbayır, 1997; Carr, 1997).



Fertility rates vary from country to country, and also vary regionally within countries (Özgür, 2004). In Türkiye, fertility rates vary regionally depending on the social structure. When the fertility rates from the past years to the present are analyzed, it is observed that there has been a downward trend over the years. The increase in the level of development of the country, the growth of the economy, the increase in the level of education, the participation of women in the labor force, and the decrease in agricultural activities due to rural-urban migration have all contributed to the decline in the fertility rate in Türkiye. Although this is the general situation, considering the changes in regional structures, it is understood that the fertility rate also changes spatially. Especially in the cities located in the eastern and southeastern regions of the country, factors such as ethnic diversity, low level of education, women's participation in the agricultural sector rather than employment, the continuation of the big family tradition, and preference for male children increase the fertility rate in the region (Uyanık and Doğan, 1998). From this point of view, it is understood that analyzing the fertility rate in a country will reveal the social structure. In this study, a spatial analysis was conducted in order to understand the social structure and to reveal its change over the years, and thus, the change in the social structure was analyzed regionally. Then, in order to predict the future situation, artificial intelligence-based Artificial Neural Networks algorithm was utilized to make predictions for the future.

2. Method

2.1. Study Area and Data

This study focuses on fertility rates in 81 provinces of Türkiye. Geographically, Türkiye is strategically located in the northern hemisphere, between the 26°-45° eastern meridians and the 36°-42° northern parallels. The country has territory on both the Asian and European continents and is surrounded by seas on three sides. The Mediterranean Sea to the south, the Black Sea to the north and the Aegean Sea to the west.

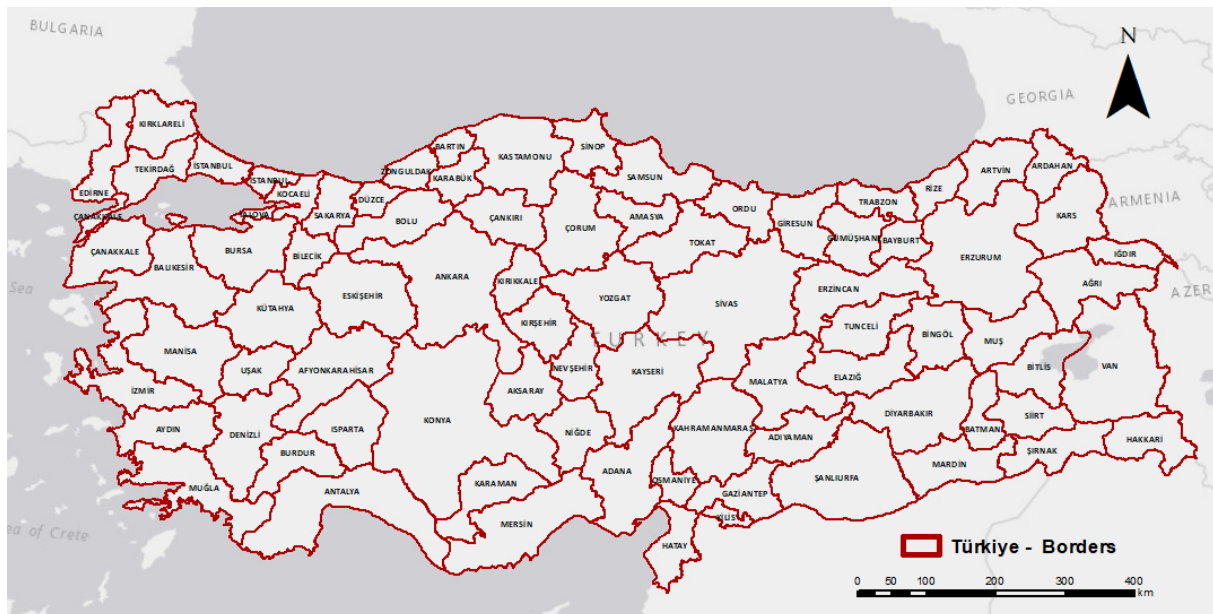


Figure 1. Study Area

The fertility rate in Türkiye is affected by various factors. The main influencer is the economy. Generally, low income is associated with high fertility rates. This is because children are seen as economic support, especially in regions where agricultural activities are carried out. On the other hand, the fertility rate generally decreases as the level of education increases. Educated individuals generally prefer smaller families and adopt a career-oriented lifestyle. Cultural and religious factors are also determinants of fertility rates. Especially in the southeastern region of Türkiye, different ethnic structures and related beliefs may lead to an increase in fertility rates. On the other hand, access to health services, family planning services, women's participation in the labor force and current government policies are influencers and determinants of fertility rates. All these factors have a different impact in



each province of Türkiye. The level of influence of each factor has changed over the years. It will continue to change with the changes in the impact levels of the factors in the coming years.

In order to evaluate the change in fertility rate in Türkiye from past to present and for the future, fertility rate data for the years between 2009 and 2022 were obtained from the database of the Turkish Statistical Institute. The spatial distribution of the data was visualized and evaluated by means of GIS. In order to predict the fertility rate in the coming years, the values between 2023 and 2030 were estimated using artificial neural networks.

2.2. Spatial Analysis with GIS

The location-based evaluation of data sets that emerge depending on locations allows for the acquisition of various information. The most effective tool that can be used for this purpose is spatial analysis. With spatial analysis, it is possible to observe how and in what direction a data set changes depending on the locations. This allows for an effective evaluation of the data. The principle stated by Goodchild and Janelle (2004) that "if the locations change, the results change" reveals the importance of spatial analysis. Geographic Information Systems (GIS) is the tool that allows spatial analysis to be performed and the best results to be obtained. Geographic Information Systems (GIS) is a holistic system that brings together data, software, hardware, methods and personnel (Yomralıoğlu, 2010). GIS is preferred in many areas that work with large data sets because it can effectively manage large volumes of data, allowing analysis and queries to be made on these data. In addition, the ease of use and the ability to integrate with similar systems are other prominent advantages of GIS. A number of software are used in the use of the system. The results of the spatial analyses are transformed into GIS-supported maps and spatial relationships and patterns are visualized. As it is understood from all these, GIS facilitates the management of spatial data, makes the results of the analysis more understandable and facilitates their interpretation (Anselin, 2003; Wong and Lee, 2005).

In the first part of this study, spatial analysis was carried out in the GIS environment by taking the fertility rate data between 2009-2022 in periods. As a result of the analysis, the spatial pattern of fertility rate was revealed. The outputs obtained were evaluated regionally.

2.3. Forecasting with Artificial Neural Network

Artificial Neural Networks are one of the most widely used supervised learning methods for regression and classification problems. It is a machine learning approach inspired by biological nervous systems. ANNs are used for various tasks such as processing large datasets, recognizing complex patterns and making predictions. It consists of three main layers: input, hidden and output. The input layer contains the attributes necessary to achieve the intended outcome. The hidden layer processes information through neurons and the output layer predicts continuous values (Yegnanarayana, 2009). The architecture used in the study is shown in Figure 2. ANN analysis was performed to predict the fertility rate of 81 provinces by years until 2030.

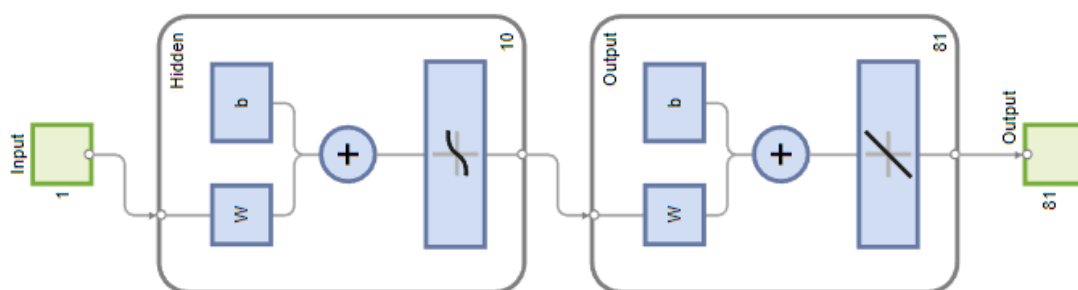


Figure 2. ANN architecture used in the study.



3. Results

In this study, fertility rate data of 81 provinces in Türkiye between 2009 and 2022 are evaluated. The process during these years was analyzed spatially in GIS environment. In order to predict the situation in the coming years, artificial neural networks were utilized and predictions were made.

In order to observe the fertility rate in Türkiye, spatial analysis was performed in GIS environment using ArcGIS 10.8 software. The change from past to present can be seen from the spatial distribution maps given in Fig3. In 2009, the fertility rate is quite high in the cities located in the eastern and southeastern regions. Especially in Şanlıurfa, Şırnak, Siirt and Ağrı, this rate is above 4. The fertility rate decreases as we move towards the west of the country. When the map for 2022 is analyzed, it is observed that there is a general decline in the fertility rate, with a concentration in the eastern and southeastern provinces. Şanlıurfa province also stands out in 2022.

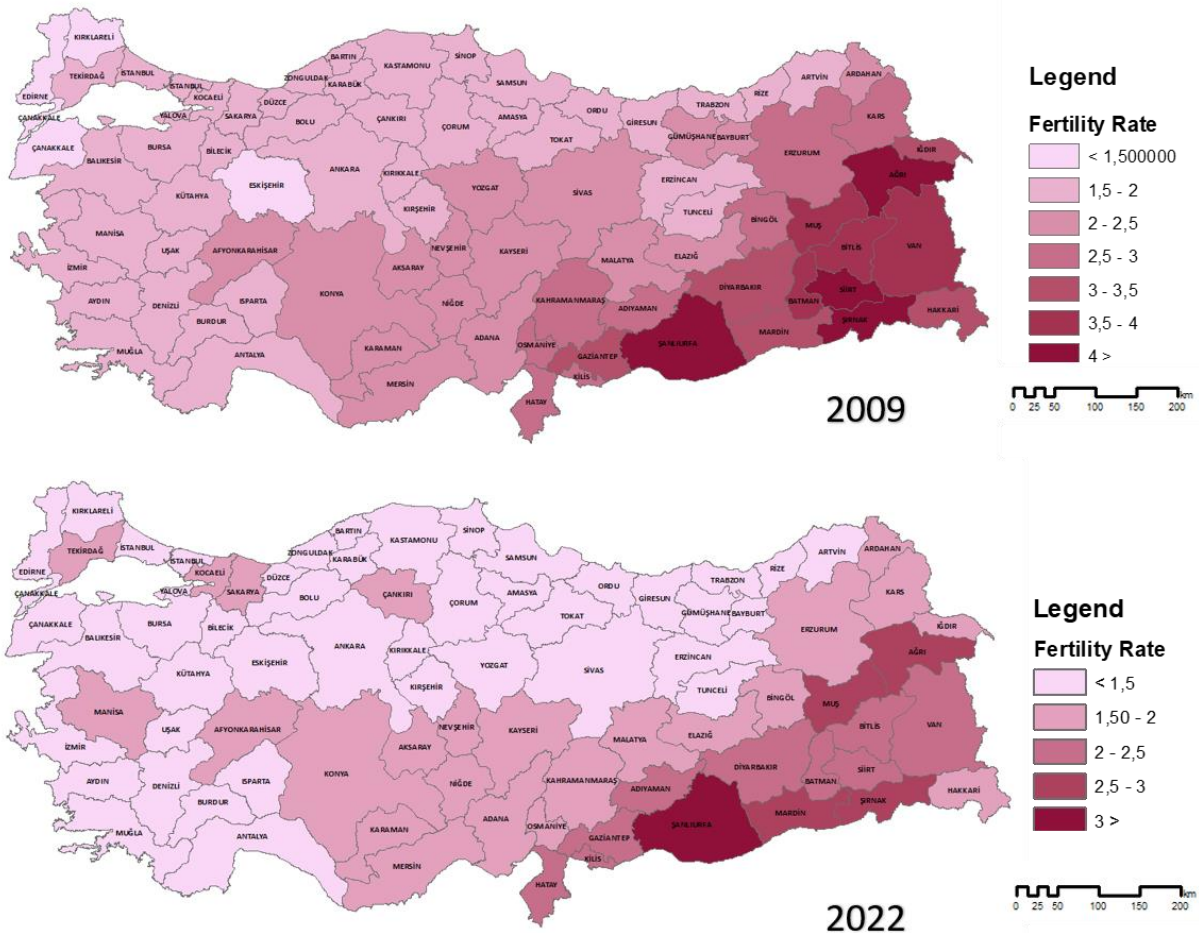


Fig3. Spatial distribution pattern of fertility rate in 2009 and 2022

In the ANN analysis to predict the fertility rate in the coming years, the data between 2009 and 2022 were used in the training process. As a result of the training process, the correlation coefficient value was found to be 0.99 as seen in the regression graph in Fig4.

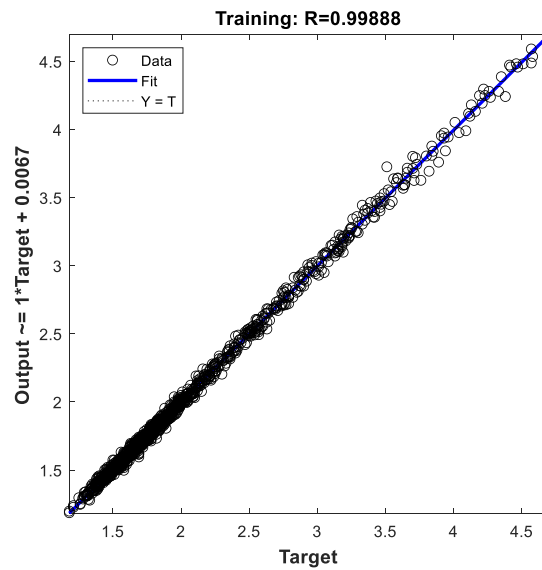


Fig4. Training process regression graph

With the trained artificial neural network, fertility rate values in 2023-2030 were predicted. As a result of the prediction, the fertility rate values of 81 provinces in 2030 can be seen in the map given in Fig5. Looking at this map, it is predicted that there will be a significant decrease in the fertility rate especially in the Black Sea, Marmara, Central Anatolia and Aegean regions of the country, while it will be higher in the Eastern and Southeastern regions compared to the others. In the coming years, Şanlıurfa is expected to draw attention for its fertility rate.



Fig5. Spatial distribution pattern of fertility rate forecasted for 2030

4. Conclusion

Fertility rate is an indicator that measures the birth rate of a society. It is usually expressed as the average number of children born to a woman in a year. The fertility rate, which is a demographic concept, can be used to understand how rapidly the population is increasing or decreasing. Changes in population shape the structure of society. Therefore, evaluating the fertility rate means understanding the society in question. There are various factors that affect the fertility rate in a society economically, socially, culturally and individually. Since these factors have a different structure in each location, their effects vary spatially. In this study, the fertility rate in Türkiye is analyzed and spatial analysis reveals that it



varies on the basis of provinces. With the spatial distribution maps created, it is seen that this concept is also shaped regionally. The high fertility rate, which stands out especially in the Southeastern Anatolia region, reveals the structural differences in the region. Ethnic diversity in the region, lower levels of education compared to other regions, limited access to family planning and health services, low female labor force participation, traditions and cultural structure increase the preference for having a large family. As the effect of these factors decreases as one moves towards the west of the country, the fertility rate also decreases. Future projections using ANN show that the fertility rate will decline across Türkiye, while it will remain regionally high in the provinces in the Southeast region. Changes in the social structure in the coming years may affect these results.

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MIGRATION TRENDS IN TÜRKİYE: SPATIAL ANALYSIS USING GIS AND FUTURE FORECASTS WITH ARTIFICIAL NEURAL NETWORK

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ABSTRACT

Human beings have had to relocate throughout history for geographical, social, economic and environmental reasons. This mobility, called migration, causes various differentiations in the receiving and giving regions. Therefore, observing and evaluating migration will provide an understanding of the changing demographic, social and economic structure. Türkiye has witnessed various migration movements over the years and has constantly changed. This study provides a comprehensive analysis of migration data for Türkiye's 81 provinces for the period 2008-2022. In order to explore the regional dynamics of migration movements, spatial distribution maps were produced in GIS environment, classified and analyzed in 5-year periods and the situation from the past to the present was evaluated. Then, a feed-forward neural network architecture was created to predict the future migration pattern. The architecture has a single hidden layer and ten neurons in this layer. Migration data between 2008 and 2022 were used to train the model and migration movements of each province between 2022 and 2030 were predicted. Bayesian regularization was used for model training. The correlation coefficient was used as a performance measure and a value of 0.99 was obtained. The outputs obtained show that migration movements have been on a continuous increase from the past to the present and will continue to increase in the future. This study focuses on analyzing the current and future state of migration dynamics in Türkiye using spatial techniques and artificial intelligence-based algorithms. The study is expected to contribute to migration management and policy making processes.

Keywords: Migration, Migration rate, Spatial analysis, GIS, Forecast, Artificial neural network.

1. Introduction

There is a strong bond between people and the places where they live. However, migration is one of the important factors that disrupt this bond between people and places. Individuals and communities leave their current place and migrate to a different place for various reasons. Migration not only brings a spatial change, but also causes change and transformation in the meaning and value world of individuals and society (Özer, 2004). This process of change and transformation includes the old place that is abandoned and the new place that is settled and the change that people experience and reflect in this process. Migration is a complex phenomenon with social and economic aspects (Skeldon et al., 1998). It is not only a demographic displacement; it also includes a series of situations such as social, cultural, economic and security (Karakaya, 2020).

One of the most common reasons for migration is economic factors. People usually migrate in order to improve their income levels or to get a job. Depending on the geographical characteristics of the region,



some environmental factors also cause migration movements. Natural disasters that cause negative consequences such as earthquakes and floods, climate change caused by global warming and environmental degradation due to lifestyles are the influencers of migration movements. On the other hand, in some cases, individuals may have to migrate for political reasons such as war, persecution or political pressures (Li and Frieze, 2012). Socially, access to educational opportunities, family reunification and intense population pressure affect migration. In some cases, cultural incompatibilities are also among the reasons for migration.

Each of the factors listed as causes of migration has some impact on the country in question, with migration in and out. Economically, migration can have a positive impact on economic growth by increasing labor supply. From a demographic point of view, migration movements sometimes stabilize the population pyramid and sometimes cause distortions. With increasing population, demand for certain services increases. This requires the revision and improvement of certain infrastructures. Especially from an environmental point of view, the increasing intensity of the use of certain resources can negatively affect sustainability. While cultural diversity emerges with migration, cultural incompatibilities also arise. Finally, migrations between countries can lead to political problems. As a result, migration movements have far-reaching impacts on a country and it is important to implement balanced, fair and sustainable policies to manage these impacts. Therefore, it can be said that migration allows for an understanding of the changing social structure and reveals the texture of the structure of the city or region under consideration.

In this study, Türkiye's migration dynamics between 2008 and 2022 were evaluated. In contrast to a general assessment, spatial analysis was carried out and analyzed on the basis of provinces in order to make more specific examinations. Thus, it has been determined in which provinces migration movements are more prominent. On the other hand, using these data, migration movements between 2023 and 2030 were determined with an artificial intelligence-supported artificial neural network algorithm. These determinations are important for understanding the social structure and improving, preventing and solving some problems caused by migration.

2. Method

2.1. Study Area and Data

This study focuses on Türkiye's migration dynamics and covers 81 provinces of the country (Figure 1). Geographically, Türkiye is strategically located in the northern hemisphere, in the middle belt, between 26°-45° east meridians and 36°-42° north parallels. The country has territories on the continents of Asia and Europe and is surrounded by seas on three sides. To the south is the Mediterranean Sea, while to the north it is home to important waterways such as the Bosphorus Strait, which connects the Black Sea to the Sea of Marmara, and the Dardanelles Strait, which connects the Sea of Marmara to the Aegean Sea to the west.



Fig1. Study Area

The development of economic activities in regions with favorable natural conditions in Türkiye has also affected migration movements and caused the population to concentrate in these regions. This concentration, together with favorable natural conditions, contributed to the rapid growth of economic activities. The concentration of population has led to the emergence of new migration dynamics in these regions, thus creating a cycle in which population density and economic developments reinforce each other.

In the eastern and central parts of the country, agriculture and animal husbandry are prominent due to natural and human conditions, while industry, trade and service sectors become more prominent as you move towards the west. In the southern regions, tourism activities come to the fore. In this context, the level of development of cities has caused migration mobility and affected population densities. The demographic, economic and environmental impacts of migration are analyzed in detail through the analyses conducted in the study. Migration data between 2008 and 2022 were obtained from the database of the Turkish Statistical Institute. The spatial distribution of the data was visualized and evaluated by means of GIS. In order to predict the situation of migration movements in the coming years, the values between 2023-2030 were estimated using artificial neural networks.

2.2. Spatial Analysis with GIS

Spatial analysis methods, which are among data analysis techniques, are effective tools that enable data to be examined and evaluated according to their geographical location. In cases where multiple factors are taken into account to examine a situation, it is observed that the results vary depending on their location. At this point, the use of spatial analysis methods allows for a more effective evaluation of data. The principle emphasized in Goodchild and Janelle's (2004) statement that "if locations change, so do outcomes" reveals the importance of spatial analysis methods. This principle emphasizes the necessity of spatial analysis methods to understand how the relationships between the factors that make up the situation under study evolve both with each other and depending on their location, by showing the spatial distribution of outcomes that vary depending on location. One factor that makes the results of spatial analysis more effective and understandable is the possibility to work integrated with Geographic Information Systems (GIS). GIS-supported maps allow visual examination of geographical relationships and patterns of spatial analysis results. Integration of location-based analysis methods with GIS enables better understanding and management of spatial data and easy interpretation of analysis results (Anselin, 2003; Wong and Lee, 2005).

In the first part of this study, GIS-based spatial analysis was performed to reveal the spatial pattern of migration movements. Migration data for the years 2008-2022 were analyzed in certain periods and

their changes over the years were analyzed spatially. The outputs were evaluated in terms of demographic, environmental and economic aspects.

2.3. Forecasting with Artificial Neural Network

Artificial Neural Networks (ANN) is a machine learning method for information processing, learning and prediction by imitating biological nervous systems through a mathematical model. There are three main foundations in the ANN structure: input, hidden and output layers. In each layer there are structures called neurons. The input layer is responsible for receiving data from the outside world and transmitting it to the neural network. The hidden layer are the components that increase the complexity of the neural network and learn the relationships between inputs. The output layer produces the results of the neural network. Neural networks adapt to real-world data by adjusting weights during the training process and using techniques such as the error back propagation algorithm. In this way, the system learns from observed data and becomes adaptive for future predictions (Yegnanarayana, 2009).

In the training process, various training algorithms are used to make artificial neural networks more effective and reliable. These algorithms prevent overlearning by regulating the weights of the network and increase its generalization ability. Levenberg-Marquardt and Bayesian Regularization are the most widely used training algorithms (Zo and So, 2009).

In this study, the ANN architecture in Figure 2 is used for migration prediction. The input data are years, while the output data are migration to and from the provinces. There is only one hidden layer and the number of neurons in this layer is 10. The years 2008-2022 were used for training purposes and the values between 2023-2030 were also predicted. The training process was performed with the Bayesian Regularization algorithm.

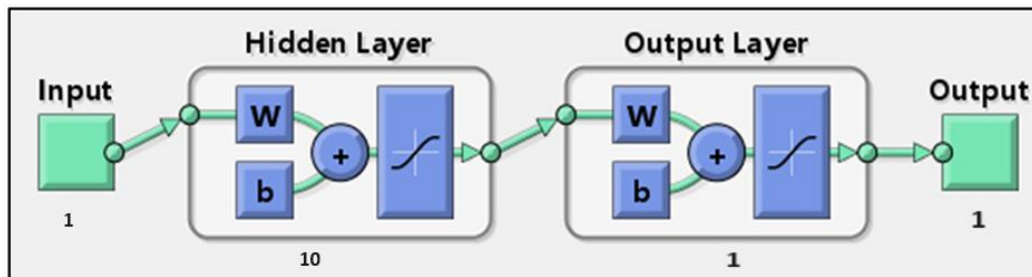


Fig 2. ANN architecture used in the study

3. Results

This study presents a comprehensive analysis of migration data for 81 provinces of Türkiye for the period 2008-2022. In order to explore the regional dynamics of migration movements, spatial distribution maps are produced in GIS environment, classified and analyzed in 5-year periods and the past and present situation is evaluated. Then, a feed-forward neural network architecture is built to predict the future migration pattern.

Spatial analysis was performed using ArcGIS 10.8 software in GIS environment. As a result of the analysis, the maps of migration received and migration given are shown in Fig3 and Fig4. Looking at Fig3, it is observed that the amount of migration received in the cities located in the west and south-west regions has gradually increased over the years. The most prominent cities in terms of the amount of migration received are Istanbul, Ankara, Izmir, Bursa and Antalya.

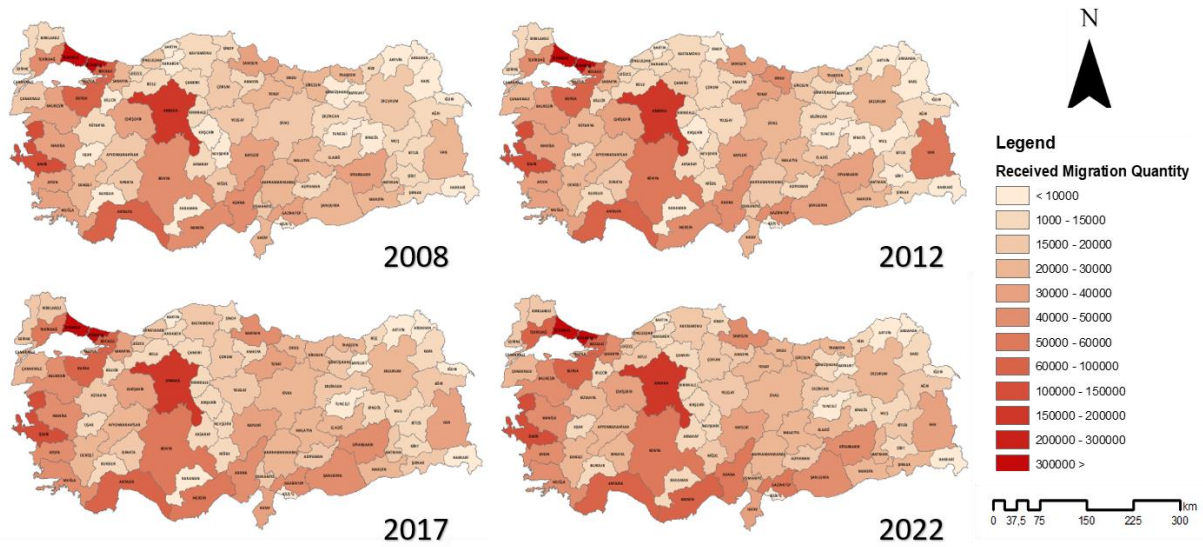


Fig3. Spatial distribution pattern of received migration for the years 2008-2012-2017-2022

The spatial distribution map produced as a result of the analysis for outgoing migration is given in Fig4. Van, Şanlıurfa, Diyarbakır, Adana, Gaziantep, Mersin and Hatay in the East and Southeast; Konya in Central Anatolia; Samsun in the Black Sea Region and Kocaeli in the Marmara Region are the prominent cities in terms of outward migration. In addition, the metropolitan cities of Istanbul, Ankara, Izmir, Bursa and Antalya are also among the prominent cities in terms of outward migration as well as inward migration.

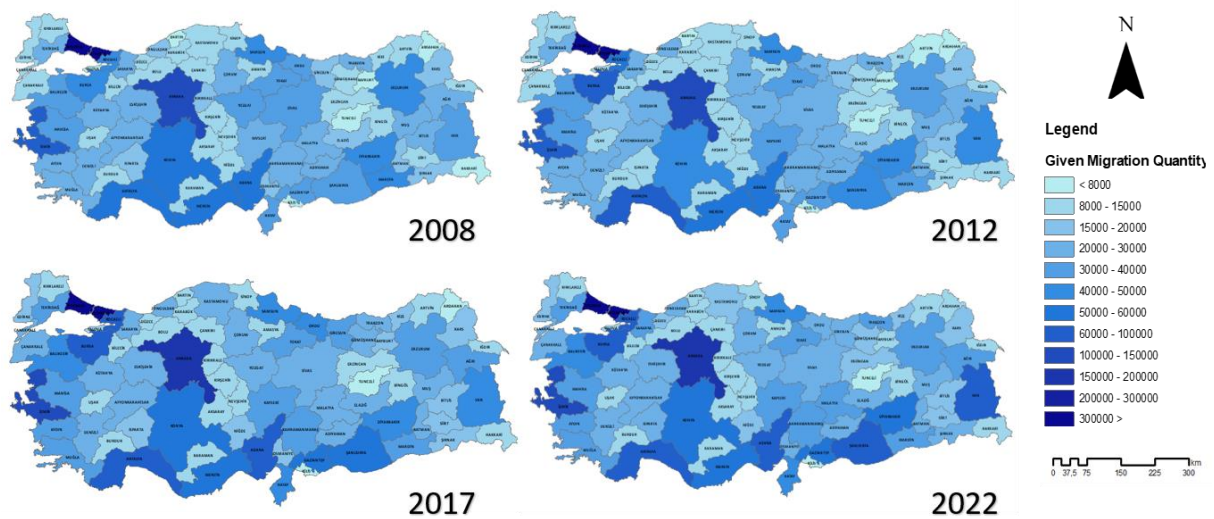


Fig4. Spatial distribution pattern of given migration for the years 2008-2012-2017-2022

In order to predict future migration movements, forecasts were made using Artificial Neural Networks algorithm. In the artificial neural network analysis, data between 2008 and 2022 were used as training data. The regression graph of the training process is shown in Fig5. As a result of the training process, the correlation coefficient value was found to be 0.99.

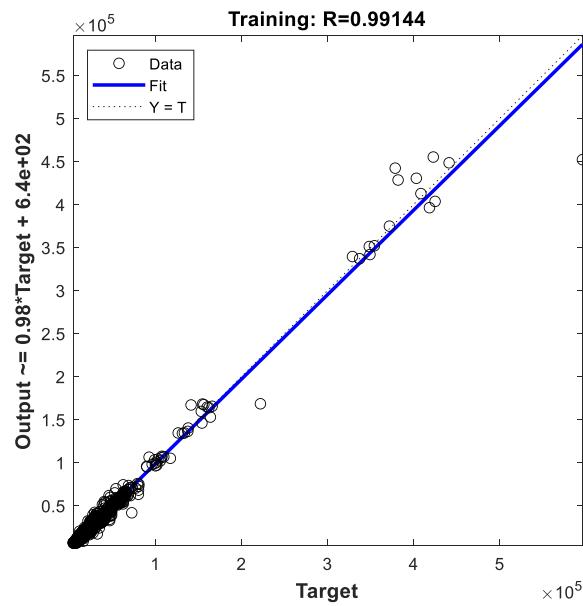


Fig5. Regression graph of the training process

With the trained artificial neural network, the values of received and given migration in the years 2023-2030 were predicted. Fig6 shows the spatial distribution map created from the predictions for 2030. In terms of received migration, it is predicted that Istanbul, Ankara, Izmir, Bursa and Antalya will continue to receive migration in the future, and that there will be an increase in the provinces in the western region. In terms of out-migration, it is projected that out-migration will increase in metropolitan cities and out-migration from cities in the southern region will increase.

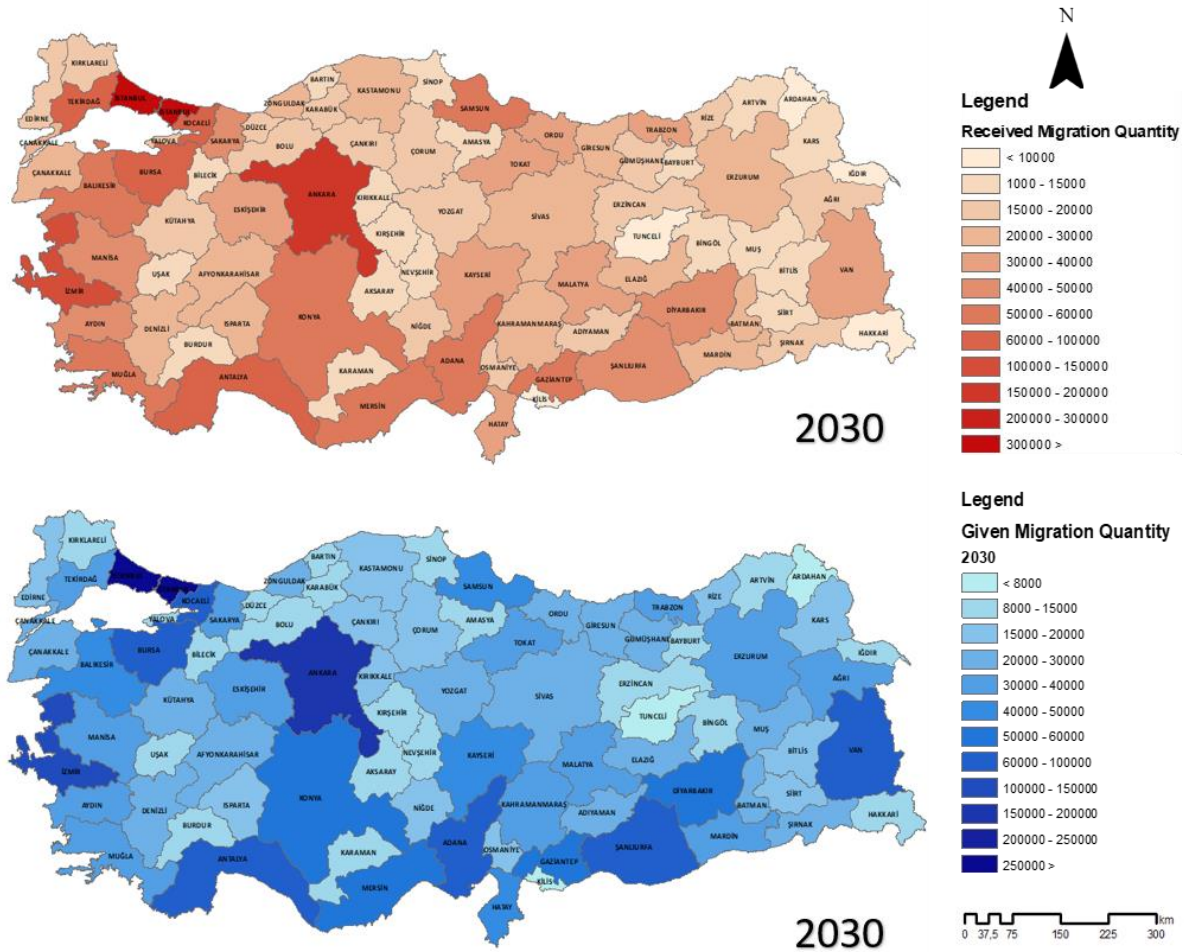


Fig 6. Spatial distribution pattern for received and given migration forecasted for 2030

4. Conclusion

Migration, which is often complex and multifaceted, is one of the important factors through which changes in society can be observed. By analyzing migration movements, the social structure, the reactions of the society to the changes and the adaptation process can be understood. In this context, this study aims to analyze Türkiye's migration dynamics and observes migration movements between 2008 and 2022. It has been observed that both inward and outward migration in metropolitan cities has increased over the years. Generally, it is understood that migration to the cities in the western region of the country has increased, while migration to the cities in the eastern and southeastern regions has increased. As a result of the predictions made with artificial neural networks, it was concluded that migration movements in the coming years will be similar. Metropolitan cities are developed in many aspects. Therefore, they tend to receive migration. On the other hand, pressures and some problems create an environment for emigration from these cities. Cities in the eastern and southeastern regions, on the other hand, mostly migrate to metropolitan cities due to economic, environmental and social factors. Employment opportunities and improved educational opportunities in metropolitan cities cause migration both from all over the country and especially from cities in the eastern and southeastern regions. As a result, the study of migration movements will enable the understanding of the changing social structure, the identification of existing deficiencies and the prediction of possible problems.

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HİPNOEMZİRME HYPNOBREASTFEEDING

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ÖZET

Anne sütü bebekler için en uygun, doğal ve ideal olarak tanımlanan besin olup hem anne hem de bebek mortalite ve morbiditesini azalttığı bilinmektedir. Emzirme yaşam kadar doğal evrensel bir deneyimdir ve bebeğin hem fizyolojik hem de psikolojik gereksinimlerini karşılayan bir eylemdir. Dünya Sağlık Örgütü (DSÖ) ve Birleşmiş Milletler Çocuklara Yardım Fonu (UNICEF)'nin belirttiği gibi anneler emzirmeyi doğumdan sonraki ilk bir saat dolmadan gerçekleştirmeli, ilk 6 ay bebeğini sadece anne sütü ile emzirmeli ve bu emzirmeyi iki yaş ve sonrasına kadar sürdürmelidir. Ancak emzirmeyi iyileştirmek amacıyla yapılan tüm girişimlere rağmen oranlar yeterli düzeyde değildir. Çünkü süreç içerisinde annedeki bazı durumlardan kaynaklanan (kaygı, yorgunluk, stres, ağrı gibi) laktasyonu olumsuz etkileyen süreçler yaşanabilmektedir. Emzirme süreçlerini iyileştirmek amacıyla yapılan emzirme eğitimi ve danışmanlığının, perinatal süreçte annenin emzirme öz-yeterliliğini arttırdığı, ilk emzirmenin erken dönemde başlatılma ve yalnızca anne sütü ile beslenme oranlarını arttırdığı ve emzirme süresini uzattığı bilinmektedir. Günümüzde emzirme eğitim ve danışmanlıklarında, emzirme anatomisi, fizyolojisi ve emzirme sorunlarına yönelik bilgiler verilmektedir. Süreç içerisinde farklı kaynaklardan elde edilen bilgiler karışıklığa sebep olarak annenin süreci uygun yönetmesinin önüne geçebilmektedir. Anne sütü üretiminin istenilen düzeyde olmaması, emziren anneler tarafından ifade edilen en yaygın şikâyettir. Bu süreçte yaşanan sorunlar annede yetersizlik hissine, kaygıya ve strese sebep olmaktadır. Stres, ağrı ya da sütünün yeterli olmadığını düşünmek gibi psikolojik kaygı ya da sempatik uyarım, oksitosin refleksini baskılayıp sütün hücrelerden atılmasına engel olur. Emzirme döneminde annenin süt salınımını arttırmaya yönelik çeşitli yöntemler vardır. Sıcak uygulama, sık emzirme/sağma, oksitosin masajı, masaj ve kompresyon, akupunktur ve akupresure, bilgilendirme ve eğitim bu yöntemlerdendir. Ayrıca hipnoemzirme de bu yöntemler arasında yer almaktadır. Hipnoz, kişinin psikolojik, fiziksel ve ruhsal olarak istediği değişiklikleri elde etmek için belirli düşünce ve önerileri yaşayabildiği, doğal olarak meydana gelen bilinçsiz bir durumdur. Hipnoemzirme ile emzirme süreci rahat bir şekilde gerçekleşir ve anne, bu sürecin doğal ve stressiz bir süreç olduğunu zihnine kaydeder. Hipnoemzirme anne sütü salınımını artırmayı sağlamak amacıyla yapılan zihin-beden programıdır. Hipnoemzirme duygu kontrolü, ağrı yönetimi ve emzirme sürecinde annenin rolünü tanımlayan, bazı olumlamalar içeren bir çeşit terapidir. Bu yöntem ile annenin zihni yeniden inşaa edilir ve kaygıdan uzaklaştırılır. Bu teknikle beraber olumlama ve pozitif uyarılarla annenin sakinleşip rahatlaması ve emzirmeye odaklanmış olması sağlanır. Tüm bunlarla birlikte anne korku ve stresten uzaklaşır, annenin bilinçaltına pozitif düşünceler yerleşir ve emzirme ile ilgili olumsuz kalıplarını değiştirir. Yapılacak ileri çalışmalarda hipnoemzirmenin laktasyon üzerine olumlu etkilerine dair verilerin artması durumunda uygulamada daha sık kullanılacağı düşünülmektedir.

Anahtar kelimeler: Hipnoemzirme, Laktasyon, Oksitosin.



ABSTRACT

Breast milk is defined as the most suitable, natural and ideal food for babies and is known to reduce both mother and baby mortality and morbidity. Breastfeeding is a universal experience as natural as life and is an action that meets both the physiological and psychological needs of the baby. As stated by the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF), mothers should breastfeed before the first hour after birth, breastfeed their babies exclusively with breast milk for the first 6 months, and continue this breastfeeding until the age of two and beyond. However, despite all the attempts to improve breastfeeding, the rates are not sufficient. Because during the process, processes that negatively affect lactation may occur due to some conditions in the mother (such as anxiety, fatigue, stress, pain). It is known that breastfeeding education and counseling provided to improve breastfeeding processes increases the mother's breastfeeding self-efficacy in the perinatal period, increases the rates of early initiation of first breastfeeding and exclusive breastfeeding, and prolongs the duration of breastfeeding. Today, breastfeeding training and consultancy provides information on breastfeeding anatomy, physiology and breastfeeding problems. Information obtained from different sources during the process can cause confusion and prevent the mother from managing the process properly. Lack of breast milk production at the desired level is the most common complaint expressed by breastfeeding mothers. The problems experienced during this process cause the mother to feel inadequacy, anxiety and stress. Psychological anxiety or sympathetic stimulation, such as stress, pain, or thinking that the milk is not enough, suppresses the oxytocin reflex and prevents the excretion of milk from the cells. There are various methods to increase the mother's milk secretion during breastfeeding. Warm application, frequent breastfeeding/expressing, oxytocin massage, massage and compression, acupuncture and acupressure, information and education are among these methods. Hypnofeeding is also among these methods. Hypnosis is a naturally occurring unconscious state in which a person can experience certain thoughts and suggestions to achieve desired changes psychologically, physically and spiritually. With hypnofeeding, the breastfeeding process takes place comfortably and the mother records in her mind that this process is natural and stress-free. Hypnofeeding is a mind-body program designed to increase breast milk secretion. Hypnofeeding is a type of therapy that includes emotional control, pain management and some affirmations that define the mother's role in the breastfeeding process. With this method, the mother's mind is rebuilt and anxiety is removed. With this technique, affirmations and positive warnings help the mother calm down, relax and focus on breastfeeding. With all this, the mother gets away from fear and stress, positive thoughts settle in the mother's subconscious and changes her negative patterns regarding breastfeeding.

It is thought that if data on the positive effects of hypnofeeding on lactation increase in future studies, it will be used more frequently in practice.

Keywords: Hypnobreastfeeding, Lactation, Oxytocin.

GİRİŞ

Kadın, hayatı süresince birçok fizyolojik evreden geçer. Kadın için önemli dönemlerden biri de laktasyon dönemidir. Laktasyon dönemi, doğum eyleminin gerçekleşmesinden sonra başlayan, anne sütünün yapıldığı, fizyolojik değişikliklerin yaşandığı aynı zamanda anne ile bebek arasında duygusal bağın oluştuğu, psikososyal yanı olan bir süreçtir (Cangöl & Hotun Şahin, 2014).

Anne sütü; yenidoğan bebeğin büyüme ve gelişmesi için gerekli olan, tüm besin ve enerji öğelerini sağlayan, kolay sindirilen ve biyoyararlılığı yüksek doğal bir besindir. Yenidoğan için en mükemmel besindir. Anne sütünün bebek için olan faydalarının yanı sıra emzirmenin anne için de birçok faydası vardır. Yani emzirme simbiyotik bir durumdur diyebiliriz (Armini NW., 2016). Dünya Sağlık Örgütü (DSÖ) ve Birleşmiş Milletler Çocuklara Yardım Fonu (UNICEF) tarafından, tüm bebeklerin ilk altı ay süresince yalnızca anne sütü ile beslenmesi daha sonra ek besinlerle beraber olmak üzere iki yaş ve sonrasına kadar devam edilmesi önerilmektedir. Türkiye Nüfus ve Sağlık Araştırması (TNSA) 2018 raporuna göre, Türkiye'de bebeklerin %98'inin belirli sürelerle emzirildiğini fakat ilk 6 ay tek başına



anne sütü verme oranının %41 ile daha düşük olduğunu göstermektedir (TNSA, 2013). Bu da emzirme devamlılığının düşük olduğunu göstermektedir (TNSA, 2013; TNSA, 2018). Anne sütü bağışıklık sistemini güçlendirecek protein antikorları açısından zengindir bu sebeple bebek ölüm riskini azaltması beklenir. Dolayısıyla özellikle gelişmemiş ülkelerde emzirme devamlılığının sağlanması elzemdir (Asiha Y. et al., 2020).

Sağlıklı bir emzirme ve devamlılığının sağlanması için en müdahale edilebilir etken motivasyondur. Emzirme eğitim ve danışmanlığının kadınların emzirmeye yönelik motivasyonu belirlendikten sonra sağlık çalışanınca verilmesi gerekmektedir (Stockdale et al., 2011; Akçay, 2019). Anne emzirmeye yeteri kadar değer vermiyorsa, bebeğine yetebileceğine inanmıyorsa, motive olmuş bir davranış sergileyemeyecek ve emzirmenin devamlılığı sağlanamayacaktır. (Mızrak, 2017; Stockdale, 2013). Doğum sonrası süreçte kadınlar arasında yaygın olan ve bebeği süttten erken kesmenin ana nedenlerinden biri olan diğer bir düşünce de yetersiz süte sahip olma düşüncesidir. (Lin & Zhang, 2011).

Doğum sonrasında erken dönemde emzirmenin başlaması ve sık aralıklarla emzirmenin sürdürülmesinin anneye bir çok faydası vardır (Topal S. Et al., 2017; Irmak N., 2016). Emzirme postpartum dönemde depresyona açık hale gelmiş olan annelerde depresyon görülme sıklığını azaltmakta, anne-bebek bağıını güçlendirmekte ve ek besin-mama kullanımını önleyerek ekonomik katkı sağlamaktadır. Diğer bir faydası da doğum sonrasında kanamayı azaltması ve uterus inovulasyonunun daha hızlı gerçekleşmesini sağlamasıdır. Bunu şu şekilde sağlamaktadır: Emzirmenin başlamasıyla hipofiz bezinin arka kısmından oksitosin salgılanır. Süt salınımının başlamasıyla birlikte uterusun kontraksiyonu da başlar. Bu sebeplerle anne doğumdan sonra emzirmeye ne kadar erken başlarsa uterusun normale dönme süreci de o kadar hızlı olacaktır. Ve emzirmenin sürdürülmesiyle de oksitosinin devamlı olarak salgılanmasına bağlı olarak anne genital organlarının gebelikten önceki durumuna ulaşması daha hızlı olacaktır (Topal S. Et al., 2017; Irmak N., 2016; Samur, 2008).

Emzirmenin anne ve bebek sağlığına olan yararları yadsınamaz bir gerçek olup emzirme döneminde bu yararın en yüksek seviyede olması için süt salınımı desteklenmeli ve artırılmalıdır. Emzirme döneminde süt salınımını arttırmak için birçok yöntem bulunmaktadır. Sık emzirme/sağma, masaj ve kompresyon, sıcak uygulama, akupunktur ve akupresure, bilgilendirme ve eğitim bu yöntemlerdendir (West D. & Marasco M., 2008 ; Varışoğlu V. & Satılmış İG., 2019). Ayrıca hipnoemzirme de bu yöntemler arasında yer almaktadır.

Hipnoemzirme literatürde bazı araştırmalarda bir gevşeme yöntemi olarak bazılarında ise özellikle emzirme problemlerinin çözümünde kullanılabilir bir terapi yöntemi olarak tanımlanmıştır (Anuhgera ve ark., 2017; Dini ve ark., 2017). Hipnoemzirme bir yöntemden ziyade emzirme eğitim ve danışmanlıklarında kullanılabilir bir felsefedir. Hipnoemzirme felsefesine dayalı eğitim ve danışmanlık uygulamaları ile annenin neokorteksini uyarmadan, içgüdüsel sürece destek olarak emzirmenin mümkün olacağı düşünülmektedir. (Aluş Tokat & Gökçe İsbir, 2023). Her ne kadar literatürde hipnoemzirme tekniğine yönelik araştırmalar bulunsa da hipnoemzirme felsefesine dayalı eğitim ve danışmanlık uygulamalarının emzirme süreçlerine etkisinin değerlendirilmesine halen gereksinim vardır. (Sari ve ark., 2017; Dini ve ark., 2017; Witari ve ark., 2022; Laily ve ark., 2021).

1.HİPNOZ

1.1 Hipnoz Tanımı

TDK'ye göre hipnoz kelimesinin anlamı şöyle tanımlanmıştır: Sözle, bakışla telkinle sağlanan bir çeşit uyku durumu, hipnotizma. Uyum deyimiyle özdeşleşen hipnoz, iradesi zayıf olan ve özellikle de telkine meyilli kişilere uygulanan bir suni uyutma tekniğidir. Bu sayede uyutulan bireyler üstünde çeşitli tedavi denemeleri yapılmasına imkan sağlanmıştır (Hançerlioğlu, 1988: 184).

Araştırmacılar hipnozun bir telkin türü olduğunu söylemişlerdir ve sadece bu duruma yatkınlığı olan kişilere uygulanabileceğini belirtmişlerdir. Diğer kişilerde tedaviden elde edilen başarının kalıcı olmayacağı görüşündedirler (Koptagel, 1984: 403).



İnsan bilinci alışılmış düzeyde bulunduğu ya da alışılmamış ve beklenmedik bir seviyeye ulaştığında, bilinçaltı olağan akışına devam eder. Bizler günlük faaliyetlerimize, okuyup yazmamıza devam ettiğimiz süre içerisinde bile, hiçbir şey sezmememize rağmen bilinçaltı işlerliğine devam eder. Ancak özel yöntemler sayesinde bilinçaltımızın bir düşü genişçe ve kesiksiz dokuyuşu ortaya koyulabilir. (Jung, 2001: 67)

1.2. Hipnoterapi

Günümüzde alternatif tedavi ve tamamlayıcı tedavi yöntemlerinden biridir. Günümüzde giderek yaygınlaşmaktadır. Geçmişte ve günümüzde birçok tanımı yapılan hipnoz kesinlikle bir uyku hali değildir. Çünkü olup bitenler hatırlanır ve unutulmaz. Kişi kendini kaybetmez ve kendinden geçmez. Kendisinde söylenen her şeyi sorgulamadan yaptığı bir surum da söz konusu değildir. Hastadan kendi terapi sorumluluğunu terapist ile birlikte alması beklenir. Bireysel fonksiyonlar çalışır bireyin denetiminin açık olduğu, uyku halinde bulunulmayan bilinçli olarak gerçekleşen psikişik bir durumdur. Yüzyıllarca yıllık bir tarihe sahip olduğu bilinen hipnoz modern tedaviye destek amacıyla günümüzde giderek daha yaygın kullanılmaktadır (Taştan K & Set T., 2013, ss.37-45).

Hipnoterapi konvansiyonel tedavi seçeneklerinin çaresiz olduğu durumlarda ve/veya komplikasyonlarının fazla olması durumunda tercih edilmesi tavsiye edilen güvenli, tamamlayıcı ve alternatif tedavi yöntemidir. Hipnoterapi, hipnoz esnasında uygulanan tedavilere verilen genel isimdir. Sözle, yardımcı nesnelere yardımıyla veya bakışlardan yardım alınarak uygulanan, telkinlerle desteklenen özel bir bilinç halidir (Taştan K & Set T., 2013, ss.37-45).

2.Laktasyon

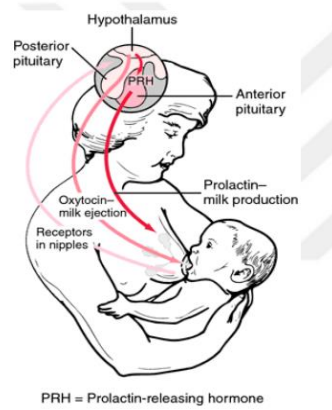
Emzirme, hem bebek hem de anne için biyolojik ve etik açıdan en doğal ve temel haktır. Emzirme bebek için hayatta kalma ve yaşam kalitesi için elzemdir. Emzirme yenidoğanın tüm yaşamını etkileyecek derecede uzun vadeli bir yararlılık sağlar. Anneler için duygusal ve fiziksel sağlıkla ilişkilendirilmektedir. Emziren kadınların, emzirmeyen kadınlara kıyasla, daha az tıbbi bakıma ihtiyaç duyduğu ve emziren kadınların daha az duygusal problemle karşılaştığı da çalışmalarda kaydedilmiştir (Ciampo and Ciampo, 2018). Emzirme tüm faydalarına ek olarak annenin psikolojik iyiliğine katkı sağlamakta ve sürdürmesine yardımcı olmaktadır. Ayrıca doğum sonrası ağırlığına dönme noktasında da en yardımcı olan faktördür. (Grzeskowiak et al., 2019).

2.1 Laktasyon Fizyolojisi

Anne sütü, meme bezinde yer alan üzüm benzeri alveol kümeleri ve epitel kökenli kanallar aracılığıyla salgılanmaktadır (Khan ve Sajjad, 2022). Laktasyon süreci; bebeğin ilk emzirilmesinden önce başlayan meme bezinin gelişimi (mammogenez), süt salgılama yeteneğinin geliştirilmesi (laktogenez) ve sütün üretilmesini (laktasyon) içeren üç evreden oluşmaktadır (Hård vd., 2019; Ni et vd., 2021). Laktogenez, salgı başlatma ve salgı aktivasyonu olarak iki aşamada gerçekleşmektedir. Salgı başlatma evresi, hamileliğin ikinci yarısında plasentadan yüksek seviyelerde progesteron salınması ile başlamakta ve salgı aktivasyonu evresi ise doğum sonrasında plasentanın çıkarılmasıyla birlikte progesteron seviyesinin düşmesi, prolaktin, kortizol ve insülin seviyelerinin yükselmesi sonucu oluşmaktadır. Süt salgısı başladıktan sonra devam ettirilmesine "Laktogenezin 3. evresi" ya da "Laktasyon" denmektedir (Alden, 2016). Laktasyon, meme ucunun uyarılması ile sütün düzenli olarak memeden çıkması ve ön hipofiz bezinden prolaktin salınımını, arka hipofiz bezinden ise oksitosin salınımını tetikleyen hormonal sinyallerin oluşmasıyla gerçekleşmektedir. Prolaktin ve oksitosin, süt üretimi ve salınımından sorumlu hormonlar olup sütün devamlılığını sağlamada önemli role sahiptirler (Uvnäs vd., 2020). Prolaktin, ön hipofizde yer alan laktotrofik hücreler tarafından sentezlenen bir polipeptit hormondur. Bu hormon, büyüme hormonu ve plasental laktojen ile aynı yapıya sahiptir. Prolaktin; meme bezinin kanallarının büyümesini ve epitel hücrelerinin çoğalmasını uyarmakta ve ayrıca süt proteini sentezine de katkıda bulunmaktadır. Hormon üretimi için en önemli faktör, bebeğin emmesi ve memenin boşaltılmasıdır. Meme ucunun uyarılması, prolaktin konsantrasyonunda hızlı artışa neden olmakta ve bu da memede yer alan sinir uçlarını uyarmaktadır (Augustine vd., 2017). Bu hormon, gece vakti daha yüksek seviyelerde salgılanarak ovulasyonu baskılayarak kontrasepsiyon sağlamaktadır (Al Chalabi vd., 2022). Oksitosin



ise; sütün dışarı atılması veya sütün salgısının devamında rol oynayan bir hormondur. Emzirme sırasında, meme başı-areola kompleksinin uyarılması hipotalamusa duyuşal sinyaller göndererek oksitosin salınımını tetiklemektedir. Bu 4 durum, miyoepitelial hücrelerin kasılmasına neden olarak sütün alveolar lümeninden kanallara ve meme ucuna doğru akmasını sağlamaktadır. Oksitosin aynı zamanda stresi azaltan psikolojik etkiye sahiptir ve anne-bebek arasındaki duyuşal bağlanmayı güçlendirmektedir. Alveollerin boşalması, sütün üreten hücrelerin (laktositlerin) duvarındaki prolaktin reseptör bölgelerini aktive etmekte ve daha fazla sütün üretimini tetiklemektedir. Bu mekanizma, sütün sentezinin devamlılığını ve bebeğin gereksinimlerinin karşılanmasını sağlamaktadır. Meme ucunun uyarılması ve sütün çıkışının sıklığı, sütün üretimini miktarını belirleyen önemli faktörlerdir (Walter, 2021). Anne sütünün üretimi ve salgılanması, Moreno Villares ve Germán-Díaz (2019) tarafından tanımlanmıştır (Şekil 1).



Şekil 1: Anne sütünün üretimi ve salgılanması

Laktasyonun başlaması ve devam etmesi hem fiziksel hem de biyokimyasal faktörlerin etkileşimiyle düzenlenmektedir. Bebek memeden sütün emmediğinde, memenin iç basıncı artmakta ve göğüslerdeki peynir altı suyu proteinleri gibi geri bildirim inhibitörleri birikerek sütün üretimini azaltmaktadır. FIL (Laktasyonun Geri Bildirim İnhibitörü) memede oluşan bir protein olup otokrin kontrol yoluyla sütün sentezini inhibe etmekte ve prolaktinin etkisini tersine çevirmektedir (Lee ve Kelleher, 2016). Kandaki prolaktin seviyesi ne kadar yüksek olursa olsun, alveollerdeki reseptörlere bağlanmadığı sürece sütün üretimi yavaşlamakta veya durmaktadır. Meme emzirildiğinde veya sağıldığında, inhibitör madde uzaklaşmakta, reseptörler aktif hale gelmekte ve prolaktin tekrar bağlanabileceği için laktositler sütün üretmeye devam ederek 5 alveoller tekrar sütünle dolmaya başlamaktadır (Shah vd., 2022). Geri bildirim inhibitörünün emzirmedeki rolü, bebeğin ihtiyacına göre sütün miktarının düzenlenmesini sağlamaktır (Lee ve Kelleher, 2016). Yeni doğan bebekler genellikle her 2-3 saatte bir beslenmektedir ve emme süresi genellikle her memede 10-15 dakika kadardır; daha büyük bebekler ise daha az sıklıkla beslenmektedirler (Nwachoko vd., 2022). Annelere, sütün üretimini sürdürmek için her 2-3 saatte bir memeyi boşaltmaları önerilmektedir. Sonuç olarak, sütün üretimi birçok faktöre bağlı karmaşık ve mucizevi bir mekanizmadır (Weaver vd., 2019).

3. EMZİRME

Bebeğe anne sütünün verme süreci yani emzirme süreci üreme kadar önemlidir. Emzirme deneyimi hem anne hem de bebek için en erken dönemde başlaması gereken bir süreçtir (Kurnaz ve Hazar, 2014). Emzirme; annenin, bebeğin sağlığı ve birbirlerine olan duyuşal bağlılığı üzerine sayısız faydası olan bir beslenme şekli olarak kabul edilmektedir. Gelişmekte olan ülkelerde yapılan çalışmalarda ilk altı ay sadece anne sütünün ile beslenmenin artırılmasını sağlayan girişimlerin beş yaş altı ölümleri yüzde on üç oranında azalttığı ve de çocuklarda görülen ölümleri düşürme konusunda en etkin yol olduğu vurgulanmaktadır (Çalık ve ark., 2017). Dünya Sağlık Örgütü (DSÖ) ve Birleşmiş Milletler Çocuklara Yardım Fonu (UNICEF) doğumdan hemen sonra anne sütünün verilmesini ve ilk 6 ay sadece anne sütünün ile



beslenilmesini, 6. ayın sonunda ise ek gıdalara geçilmesini ve 2 yaşına kadar emzirmeye devam edilmesini önermektedir. Yeterli ve zamanında ek besinlere geçilmesi ile her yıl 5 yaş altında 1,5 milyon çocuğun hayatının kurtulabileceğini belirtilmektedir (Cantürk, 2019). Amerikan Pediatri Akademisi, yaklaşık 6 ay boyunca yalnızca anne sütüyle besleme, ardından tamamlayıcı gıdaya geçişle emzirmeye devam edilmesi ve anne ve bebeğin karşılıklı olarak arzu ettiği şekilde 1 yıl veya daha uzun süre emzirmeye devam edilmesi önerisini teyit ediyor (Gartner ve ark., 2005). Türkiye’de annelerin bebeklerini ilk 6 ayda sadece AS ile besleme oranları TNSA 2008 raporunda %41,6, 2013 raporunda ise %30,1’dir. 2018 TNSA raporuna göre ise bu oran %41’dir. "Küresel Emzirme Karnesi"nde ise ilk altı ayda sadece anne sütü ile beslenen bebeklerin oranının %40 olduğunu bildirilmektedir. Küresel emzirme karnesi verilerine göre 194 ülkeden ancak 23’ünde bu oran %60’ın üzerindedir (Koçakoğlu ve Çadirci, 2020). Küresel çalışmalar, yalnızca anne sütü kullanımının üç aydan küçük bebeklerde enfeksiyon oranları %88’e kadar düşürdüğünü göstermektedir. Üstelik emzirme aynı zamanda çocuklarda obezitenin ve kronik hastalıkların azaltılmasına da katkıda bulunur (Asiha Y. et al., 2020).

3.1 Emzirme Sıklığı

Term bebeğe doğumu takip eden ilk yarım saat içerisinde anne sütü verilmesi önemlidir. Doğum sonrası ilk 4-6 haftası boyunca bebeğin 24 saatte 8-12 kez emzirilmesi gerekmektedir (Ruth, Lawrence ve Robert, 2011). Bazı bebekler 4 saat boyunca doyum sağlayacak kadar besin alabilir ve daha seyrek emmeye ihtiyaç duyarken, bazı bebekler 2-3 saatte bir olmak üzere daha sık emmeye gereksinim duymaktadır. DSÖ bebeklerde acıkmışlık belirtileri açığa çıkmadan emzirmenin gerçekleşmesini önermektedir. (Erol, 2020).

3.2. Emzirmeyi Etkileyen Faktörler

Birçok ülkede olduğu gibi Türkiye’de de emzirmeye başlama ve sürdürme konusunda hem anne hem de bebek sorunlarla karşılaşabilmektedir. Bebek için yeterli olacak beslenmenin sağlanabilmesi için Etkili ve yeterli emmenin sağlanabilmesi için emzirmenin nelerden etkilendiğini bilmek gerekmektedir. Emzirmeyi etkileyen faktörler; üç farklı gruba ayrılarak sınıflandırılabilir (Arslan, 2011).

3.2.1. Bebeğe Ait Faktörler

Prematüre doğum, doğum ağırlığı ve sağlık durumu, barsak hareketlerindeki sorunlar, metabolik hastalıkların varlığı, emmeye yardımcı reflekslerin bozukluğu, tavşan dudak-yarık damak gibi malformasyonlar, çoğul gebelik durumu, emzirmeyi olumsuz etkileyen faktörlerdir. (Cantürk, 2019).

3.2.2. Anneye Ait Faktörler

Annenin sosyal ve kültürel gelişmişliği, kentte veya kırdaki yaşama durumu, çalışıp çalışmaması, anne olmaya hazır hissetme durumu, beslenme ile ilgili sahip olduğu bilgi birikimi, zararlı alışkanlıkların varlığı, memeye ilgili sorunlar (çatlaklar, dolgunluk, anormaliler) anneye ait faktörler arasındadır (Arslan, 2011).

3.2.3. Çevresel ve Toplumsal Faktörler

Toplum içerisinde emzirmeye karşı olan tutum, kültürel faktörler, feminizm ve benzeri akımlar, emzirme ile ilgili ulusal sağlık politikaları, sağlık ekibinin yetkinliği ve anneye olan ilgisi, mamalar ve süt muadillerinin kullanımıyla ilgili yasalar ve kitle iletişim araçları olarak değerlendirilebilir (Arslan, 2011).

3.3. Emziklilik Döneminde Annenin Beslenmesi

Emzirmenin annenin biyolojik ve fizyolojik sağlığı ile bebeğin sağlıklı büyüme gelişmesi için pek çok faydası vardır (Doughty KN, & Taylor SN, 2021). Annenin bebeğini emzirdiği dönemde enerji ve besin ögesi gereksinimi gebelik dönemi ve öncesine göre daha yüksektir. Laktasyon döneminde annenin meme bezinden salgılanan süt annenin tükettiği besinlerin bir ürünüdür. Annenin süt salgılamak için ihtiyaç duyduğu enerji ve besin öğeleri, gebelik döneminde oluşturulan kendi depolarından ve dışardan alınan diyetinden sağlanmaktadır (TÜBER, 2015). Emziklilik döneminde annenin beslenmesinde iki hedef bulunmaktadır. Bunlar;



1. Kendi gereksinmesini karşılayarak annenin vücudundaki besin ögesi depolarının yerinde tutulması,
2. Anne tarafından salgılanan sütün içerdiği enerji ve besin öğelerini tam olarak karşılamaktır (Baysal, 2009). Bu durumda annenin vücut depolarından sağlananın haricinde diyetine enerji ve besin ögesi eklemesi yapılmalıdır (Newton ER, 2018).

Anne tarafından bebeği için günde ortalama 700-800 mL süt salgılanmaktadır. Bu sütün salgılanması için ihtiyaç duyulan enerji ve besin öğelerinin yanı sıra annenin günde en az 8-12 su bardağı su tüketmesi gerekmektedir. Ayrıca anne zayıflama diyeti yapmamalı ve bu dönemde diyetle günlük enerji alımı 1800 kkal'nin altına düşmemelidir. Emzirlilik sürecinde günlük enerji alımının yetersizliği süt yapımını azaltmakta ve anne sütünün besin ögesi kompozisyonunu olumsuz etkilemektedir (Samur G, 2018)

Makro Besin Öğeleri	Yetişkin Kadınlar	Yetişkin Gebe Kadınlar	Yetişkin Emziren Kadınlar
Karbonhidrat (Enerji%)	45-60	45-60	45-60
Karbonhidrat (g/gün)	Minimum 130	Minimum 175	Minimum 210
Sükroz (Enerji %)	En fazla %10	En fazla %10	En fazla %10
Protein (Enerji %)	12-20	12-20	12-20
Yağ (Enerji %)	20-35	20-35	20-35
Doymuş yağ	Mümkün olduğunca az	Mümkün olduğunca az	Mümkün olduğunca az
EPA + DHA (mg/gün)	250	250-350	250-350
Posa (g/gün)	25	25	25
A vitamini (mcg/gün)	650	700	1300
C vitamini (mg/gün)	95	105	155
D vitamini (mcg/gün)	15	15	15
E vitamini (mg/gün)	11	11	11
Tiamin (mg/1000kkal)	0.4	0.4	0.4
Riboflavin (mg/gün)	1.6	1.9	1.2
Niasin (mg/1000 kkal)	6.6	6.6	6.6
B6 vitamini(mg/gün)	1.6	1.8	1.7
B12 vitamini (mcg/gün)	4.0	4.5	5.0
Folat (mcg/gün)	330	600	500
Demir (mg/gün)	16	16-27	16-27
Kalsiyum (mg/gün)	950-1000	950-1000	950-1000
İyot (mcg/gün)	150	200	200
Çinko (mg/gün)	7.5-12.7	9.1-14.3	10.4-15.6

Tablo 1: Gebelik ve Emzirme Döneminde Besin Öğeleri İçin Diyetle Önerilen Günlük Yeterli Alım Miktarları (TÜBER, 2022)

	19-50 yaş	Gebe kadınlar	Emziren kadınlar
Süt-yoğurt, peynir	3 porsiyon	4 porsiyon	4-5 porsiyon
Et, tavuk, balık, yumurta, kuru baklagiller, yağlı tohumlar	2.5-3 porsiyon	3 - 4 porsiyon	4-5 porsiyon
Ekmek ve tahıllar	7 porsiyon	7 - 8 porsiyon	8-10 porsiyon
Sebze ve meyveler	En az 5 porsiyon	En az 5 porsiyon	En az 5 porsiyon

Tablo 2: Gebelik ve Emzirme Döneminde Besin Gruplarından Günlük Tüketilmesi Önerilen Porsiyon Miktarları (TÜBER, 2022)

3.4. Emzirme Özyeterliliği

Bandura tarafından 1986 yılında oluşturulan Sosyal Bilişsel Kurama göre kişilerin davranışlarında çevresel ve bilişsel faktörler etkilidir. Bu bilişsel faktörlerden birisi de özyeterlilik algısıdır. Özyeterlilik, bireyin bir hedefe ulaşmaya veya görevi başarmaya yönelik yeteneklerine olan inancıdır (Bandura, 1977). Özyeterlilik kişisel motivasyonu ve başarıya yeteneğini etkilemektedir (Wheeler BJ & Dennis CL, 2013). Emzirme üzerinde etkili olabilecek faktörler arasında özyeterlilik algısı önemli bir yer tutmaktadır (O'Campo et al., 1992). Bandura'nın özyeterlilik kavramını tanımlamasından sonra Dennis, kadınların emzirmeyi başlatması ve devam ettirmesinde özyeterliliğin etkisini incelemek için "Emzirme



Özyeterlilik Kuramı”nı geliştirmiştir (Dennis CL, 1999). Emzirme özyeterlilikte; annenin emzirme hakkında olumlu ve olumsuz görüşleri, bebeğini emzirmeyi isteyip istemeyeceği, bebeğini emzirme becerisi, emzirmede göstereceği çaba ve karşılaştığı güçlüklerle nasıl karşılık vereceği ifade edilmektedir (Kirpınar İ. et al, 2012). Annelerin emzirme özyeterliliklerinin etkilendiği faktörler olarak; annenin ruh hali, sağlık profesyonellerinden, ailesindeki bireylerden veya arkadaş çevresinden destek alması, gözlemsel olarak rol model aldığı bireylerin sergilediği emzirme davranışları, kendisinin daha önceki emzirme deneyimindeki başarısı belirtilebilmektedir. Anneler bebeklerini emzirmeyi tercih edip aynı zamanda sütünün yetersiz olduğu düşüncesine kapılabilirler. Bu gibi durumlarda özyeterlilik kavramı devreye girer ve sağlıklı şekilde emzirmenin sürdürülebilmesi için önem arz etmektedir (Dennis CL, 1999). Annenin emzirme yeteneğinin güçlendirilmesi, emzirme hakkında tavsiyelerde bulunulması ve karşılaşılan sorunlar yerine olumlu açıdan bakmaya yoğunlaşılması emzirme özyeterliliğini artırmak için yapılabilecekler arasında yer almaktadır (Samur G, 2008). Özellikle doğum sonrası ilk 2 saatlik süre içerisinde annenin bebeğiyle ten teması kurarak emzirmeye başlaması, emzirme özyeterliliği artırıcı etki gösterip emzirmenin devamlılığı açısından önemli bir etkidir (Aghdas K. et al, 2014).

3.5. Doğum Sonrası Bağlanma

Doğum sonrası dönem, kısa bir zaman dilimi olup içerisinde olumlu ve olumsuz sonuçların gözlemlendiği, psikolojik ve sosyolojik dengelerin bozulabileceği ve bu gibi değişiklikler sonucunda annenin stres yaşayabildiği olağanüstü bir dönemdir (Pınar G et al, 2009). Bağlanma kuramı, insanın kendisi için önem arz eden diğer insanlarla duygusal bağ kurma yöneliminin sebeplerini açıklar (Kavlak O, 2007). Maternal bağlanma tanımı ise duygusal ve davranışsal bakımdan annenin bebeğine bağlanmasıdır (Korja R et al, 2012). Doğumla birlikte başlayan ve bebek ile anne arasında zamanla gelişim gösteren özel bir sevgi bağı olan maternal bağlanma doğum sonrasında annenin ruhsal durumundan etkilenebilmektedir (Yıldırım A et al, 2011). Doğum sonrası ilk 1-1.5 saatlik zaman dilimi en duyarlı süre olarak tanımlanır ve bu duyarlı dönem süresince anne ve bebeğinin birlikte zaman geçirememeleri bebeğin gelişimini ve annenin doğum sonrası davranışlarını olumsuz etkileyeceği bildirilmektedir (Can G, 1999). Doğum sonrasında oluşabilecek maternal bağlanma sorunu bebeğin beslenme bozukluğu, büyüme ve gelişme geriliği, huzursuzluk, uyku düzensizliği ve ağlama gibi sorunlar yaşamasına sebebiyet verebilmektedir (İşler A & Görak G, 2007).

4. Hipnoemzirme

4.1. Hipnoemzirme Felsefesi

Dr. Grantley Dick Read, hipnozu 1890'lı yıllardan itibaren “korkusuz doğum” adı verilen bir programla uygulanmaya başlamıştır. Dr. Grantley Dick Read’ in korku gerginlik ağrı döngüsüne dayalı olarak Marie F. Mongan tarafından Hipnodoğum (Hypnobirthing) felsefesi geliştirilmiştir. Daha çok psikoloji alanı başta olmak üzere birçok farklı alanda kullanılan hipnoz, emzirme alanında da uygulanmaya başlamış ve sonuç olarak Hipnoemzirme felsefesi doğmuştur (Altıparmak, 2021; Armini, 2016)

Hipnoemzirme, emzirmenin sağlıklı olması için bilinçdışı enerjilerin kullanılmasına yönelik doğal bir çabadır. Olumlama cümleleri veya onay sözcükleri eklenerek süreç güvenli ve sorunsuz bir şekilde yürütülür. Anne gevşemiş bir durumdadır ve sadece hipnoz durumuna konsantre olmuştur, böylece anne, sütünü bebeğinin büyüme ve gelişme ihtiyaçlarına yetecek kadar üretebilir. Feher'e göre, rahatlamanın rehberliği ve ilkeleri planlandığı şekilde yürütülürse anneler, anne sütü üretimini %63 oranında artırabilir (Asiha Y. et al., 2020).

Hipnoemzirme, hipno = hipnoz ve emzirme kelimeden oluşmaktadır. Hipnoz, kişinin psikolojik, fiziksel ve ruhsal olarak istediği değişiklikleri elde etmek için belirli düşünce ve önerileri yaşayabildiği, doğal olarak meydana gelen bilinçsiz bir durumdur. Hipnoemzirme ile emzirme süreci rahat bir şekilde gerçekleşir ve süt veren anne, emzirmenin olağan ve stressiz bir süreç olduğunu bilinçaltına kabullendirir (Sembiring I, 2017).

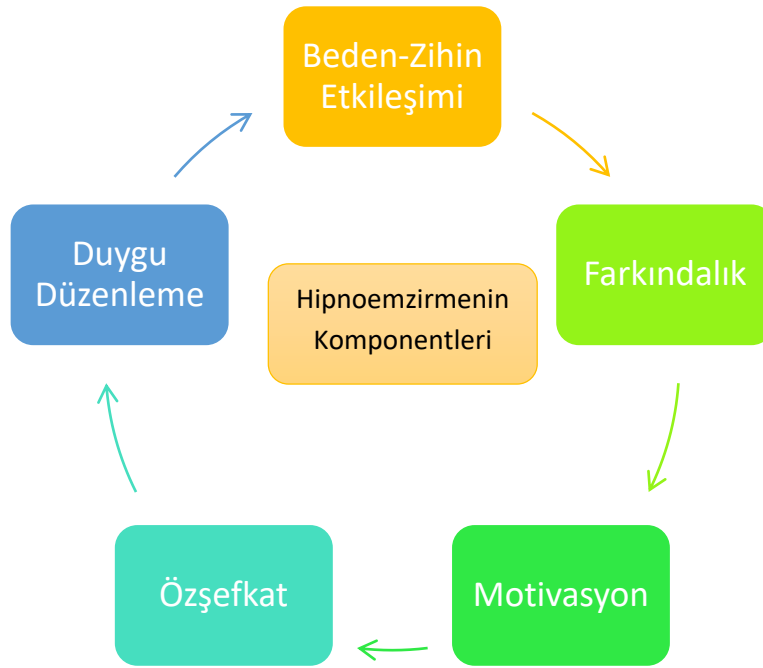


Psikolojik, sosyal ve manevi stres önce hipotalamusu etkileyecek daha sonra da hipofiz bezini etkileyerek ACTH'ı eksprese eder. Bu nihayet ise kortizol oranlarının yükselmesi ile sonuçlanır. Sonuç olarak yüksek kortizol anneyi strese sevk edecek ve anne sütü üretimi engellenecektir (Sari ve ark., 2017). Hipnoemzirme felsefesinin temeli de, beden ve ruh sakin bir durumdayken elde edilen gevşemeyle annenin stres oranlarını düşürmektir. Hipnoemzirme felsefesinde gevşeme tekniği üç aşamalıdır. Bu aşamalar:

1) Kas Gevşemesi: Başın tepesinden ayak tabanlarına kadar yüz, sol ve sağ omuzlar, her iki kol, göğüs bölgesi, karın, kalçalar ve her iki bacağına kadar olan kaslar gevşetilir. Bu aşama kasların gevşediği hayal edilerek yapılabilir.

2) Nefesin Gevşemesi: Rahat bir duruma ulaşmak için burundan derin bir nefes alınır ve burundan/ağızdan yavaşça, diyaframa odaklanılarak nefes verilir. Rahat bir duruma gelene kadar nefes alıp verme birkaç kez yapılır.

3) Zihin Gevşemesi: Beden ile zihnin aynı yerde olmaya odaklanılmasıdır. Gözler kapatılır, sessiz olunur. Zihin boşaltılır ve birkaç dakikalığına yavaş, derin ve düzenli nefes alıp verilir. Kaslar gevşedikten, nefes alıp verme düzene girdikten ve zihin sakinleştikten sonra hipnoemzirme felsefesi uygulanır. Olumlamalar verilir (Aprilina, 2022; Armini, 2016; Sembiring, 2017).



Şekil 2: Hipnoemzirme Felsefesinin Komponentleri

Hipnoemzirme sakin bir oda/atmosfer ile; rahatlama için müzik kullanımı ve ayrıca aroma terapi, kas gevşemesi, nefes ve zihin için bir rehber ile desteklenebilir. İlaç kullanımı olmadan, nispeten basit, anneler tarafından kolayca anlaşılabilir ve uygulanabilir ve öğrenildikten sonra anneler tarafından tek başına yapılabilir ya da olumlamalar eş tarafından verilebilir (Armini, 2016). Literatür doğrultusunda hipnoemzirmenin faydaları baktığımızda, endişeyi ve korkuyu ortadan kaldırmak, böylece anne düşüncelerini olumlu noktalara odaklar; annenin kendine güvenini artırmak, böylece annenin anne rolünü daha iyi hissetmesini ve kendinden emin olmasını sağlar; annenin anksiyete ve stresi azaltmak, böylece süt üretimini artırır (Sumawati ve Yanti, 2015). Kolostrum veya anne sütü salgılaması ile ilgili problemleri olan doğum sonrası annelerde hipnoemzirme yönteminin kullanılması çok uygundur, çünkü bu durumda anne bebeğini emzirmek için daha rahat ve sakin, kendinden emin ve emzirmeye hazır hisseder. Böylece anne sütü üretimi olumlu etkilenir. (Hamidah. ve Fitriana, 2017). Rahimin doğum



öncesi durumuna dönmesi konusunda oksitosin masajı ve hipnoemzirme kombinasyonu doğum sonrası annelere ebelik bakımı sağlarken referans olarak kullanılabilir (Sofiyanti I. et. Al., 2019).

4.2. Hipnoemzirme Felsefesine Yönelik Teknikler

Bu felsefede emzirme sürecindeki annenin bilinçaltını değiştirmeye yönelik bazı tekniklerden yararlanır. (Sembiring I, 2017).

Olumlama

İstenmeyen alışkanlıkları iyileştirmek ve olumsuz inanç ve düşünceleri değiştirmek için hedef davranışa veya duruma zıt ve olumlu bir ifadenin kullanılmasından oluşur. (Özcan Yüce U. Et al, 2017). Olumlamanın işe yarayabilmesi için taşınması gereken bazı nitelikler vardır:

Kişisel, pozitif ve kesin olması, bulunan zamanı ilgilendirmesi, mantığa uygun ve uygulanabilir özellik taşıması (Fata S & Aluş Tokat M, 2017).

Gevşeme

Zihnin ve bedenın gevşemesi için kullanılan bir tekniktir. Bu teknikteki amaç stres ile beraber oluşan fizyolojik tepkileri ve psikolojik etkileri azaltmak ve bireyde rahatlama sağlamaktır. (Ölçer Z & Oskay Ü, 2015). Etkinliğini arttırmak amacıyla aynı sırada farklı yöntemler de kullanılabilir. Hayal kurma, görselleştirme ve nefes egzersizleri, zihin alanı oluşturma ve müzik gibi. (Mete S et al, 2015). Olumlu anlam yüklenilen müziklerin egzersiz esnasında anneye dinletilmesi kortizol seviyelerini düşürerek nöromusküler uyarılmayı azaltacaktır. Ve bunun da annenin gevşeme sürecini hızlandıracağı öngörülmektedir. Gevşeme egzersizleri sırasında okunacak metnin içinde kişiyi motive edecek olumlama cümleleri yer almalıdır. Minimum 20 dk olacak şekilde sürdürülmelidir. (Mete S et al, 2015). Bu esnada dinletilecek olan müzik özel olmalıdır. Frekans olarak alfa frekansında olması önerilmektedir (Fleury EAB, 2015).

Hayal Etme

Anneden kendisini sakin hissettiği yer ve zamanda bulunduğunu hayal etmesi beklenmektedir. Stres sürecinin üstesinden gelebilmek için hayal gücünden yararlanılarak zihinsel görüntüler oluşturulur. Asıl hedeflenen bireyi huzursuz olduğu ortamdan uzaklaştırarak gevşemeyi sağlayabilmektir. (Ölçer Z & Oskay Ü, 2015; Mete S et al, 2015).

Görselleştirme

Amaç parasempatik sinir sisteminin aktivasyonunu sağlamaktır. Bu teknikte kişi zihninde hoşlandığı bir görüntüye tat, koku ve ses ekler. (Fata S & Aluş Tokat M, 2017; Mete S et al, 2015).

4.3. Hipnoemzirmeye Dayalı Emzirme Eğitiminin Planlanması

Eğitim ve danışmanlık faaliyetlerinde hedef kadının kendine olan güvenini kazanması ve kendini keşfetmesidir. Süreç içerisinde odaklanılması gereken kazanılan bilgiden çok olumlu düşüncelerin zihinde yer etmesi, içgüdülere olan güvenin kazanılması, emzirmeye yönelik motivasyonun artırılmasıdır. Fakat günümüz kadınının modernleşen dünyada kendinden uzaklaşmasına bağlı olarak kendini keşfetmesi ve iç güdülerini tanıması uzun bir süreçte bağlıdır. Bu yüzden sıkıcı ve yoğun bir eğitimden ziyade eğitimi içselleştirmeye müsaade edecek aralıklarla ve haftalara yayılmış bir eğitim planlanmalıdır. Hipnoemzirme felsefesine dayalı olarak yapılan eğitimlerin haftalara bölünmesi ve haftada bir gün olarak planlanması önerilmektedir. Tablo 3'te örnek plan yer almaktadır.



HAFTALAR	KONULAR	ETKİLENEN KOMPONENT
1.Hafta	Tanışma, Duygu düşünce ve deneyim paylaşımı	Duygu ve Nefes farkındalığı
2.Hafta	Emzirmeye yönelik bilgi gereksiniminin karşılanması	Zihinsel olarak güvenli alan farkındalığı
3.Hafta	Zihin-Beden harmonisi, Meditasyonlar ve Farkındalık	Bedene dair farkındalık deneyimi, Zihin-Beden etkileşimi,
4.Hafta	Duygu farkındalığı	Duygu Farkındalığı, Şefkat Deneyimi
5.Hafta	Öz- nezaket motivasyonu, Duygulara ulaşım ve duyguların değerlendirilmesi	Öz motivasyon becerisinin kazanımı, duygulara ulaşım ve değerlendirme
6.Hafta	Duygu değişim ve dönüşümü	Duygu düzenleme
7.Hafta	Canlandırma, Sakinlik meditasyonu, Duyguların yeniden anlamlandırılması, Endorfin ve Oksitosin Masajı	Duygu Dönüşümü, Şefkat ve gevşeme deneyimi
8.Hafta	Motivasyonel görüşmenin gerçekleşmesi	Motivasyonun değerlendirilmesi, Beden farkındalığı, motivasyonu sürdürülebilir becerisinin kazanımı

Tablo 3: Örnek Hipnoemzirme Eğitim ve Danışmanlık Planı,

1.Hafta: Tanışma

Bu süreçte önemli olan kadın ile eğitim veren arasında güvene dayalı bir ilişkinin gelişmesidir. İlk oturum karşılıklı olarak tanıma ve beklentileri öğrenme şeklindedir. Kadın bu oturumda emzirme deneyimlerini de eğitim verenle paylaşmalıdır. Kadınlara “Emzirirken nasıl hissediyorsunuz?” “Çevrenizdeki emzirme deneyimlerinde genel olarak neleri gözlemlediniz?” gibi sorular sorularak kadınların deneyimleri hakkında bilgi sahibi olunabilir. Bu oturum genel bir veri toplama sürecidir. Bu süreçte kadının olumsuz ve uygunsuz duygu ve düşünceleri anlaşılabilir ve daha sonraki oturumlar bunu dikkate alarak planlanır. Anlaşıldığını hissetmek, kendisine yardım edilebileceğini hissetmek annenin motivasyonunu arttıracak ve olumlu düşüncelerin yerleşmesini kolaylaştırır. Danışman olarak, “Aslında birçok anne benzer kaygıları taşır. Bu süreçte, duygunuza yoğunlaşın, onu tanımaya anlamaya çalışacağız, onu görmezden gelmek yerine saygıyla yargılamadan kabul edeceğiz ve kendimize anlayışla sarılacağız. Süreç boyunca ‘kaygı’ duygusu yerini ‘tatmin’ duygusuna yavaş yavaş bırakacaktır.” diyebiliriz. Anne bu aşamada eğitimin sadece bilgi aktarımı olmayacağını bilmelidir. (Gokce Isbir & Alus Tokat, in press; Mongan, 2005).

2.Hafta: Emzirmeye yönelik bilgilendirmenin yapılması

Bu felsefe bilgi vermeye karşı olmasa da yine de kadının gereksinimi kadar bilgi sunulmalıdır. Bilginin yetersiz olması durumu kadını strese yönlendirerek emzirmenin hormonal sürecinin baskılanmasına sebep olur. Bu sebeple kadın süreçten tatmin olmalıdır. Her annenin bilgi birikimi farklıdır bu sebeple eğitim veren her konuda bilgi sahibi olmalı ve herkese aynı bilgiyi vermekten kaçınmalıdır. Annelere standart bir içerik verilmemelidir. Gereğinden fazla bilgi verilmesi de kadına stres oluşturabilir.

Tanışma oturumunda, sorular sorulan kadın eksiklerini fark edip sorulara cevap aramaya başlar. Eğitim veren elinden geldiğince neokorteksi uyuracak detaylı bilgilerden uzak durmalı ve eğitimini, görsel takviyelerle desteklemelidir. Örneğin; kadının emzirme pozisyonlarıyla ilgili bilgi eksikliği varsa, sadece bunu anlatmalı ve bebeğiyle beraber emzirme pozisyonuna karar vereceğini vurgulamalıdır. Ama anne bu konuyu gereksinim olarak görüp bahsetmiyorsa eğitim dâhilinde ele alınmasına gerek olmadığı anlaşılmalıdır. Anneye görseller gösterilirken “Böyle yapmalısın” denilirse de görsel bilinçaltında yer edecektir ve anne farkında olmadan emzirme sırasında uygulamaya geçecektir. Bu sebeple, olabilecek en uygun ve etkili görselleri seçmek elzemdir (Milinco M. et al, 2020).



3. Hafta: Zihin-beden Etkileşiminin Fark Edilip, kabul edilmesi

Genel olarak felsefenin temeli duygulardan yararlanılarak zihnin yönetilmesidir. Bunun yapılabilmesi için zihni bilmek gerekir. Eğitim sürecinde her iki tarafın da zihin-beden etkileşimine hakim olması gerekir. Zihin bilinç bilinçaltı ve eleştirel faktör olmak üzere üç elementten oluşur. Bilinç olumlu kelime ve telkin diliyle yönlendirilebilir. Bilinçaltı ise semboller, metaforlar, görselleştirme, gevşeme ve canlandırma ile yönlendirilebilir. Hayal etme sonucunda pariyatel ve frontal loblar, gevşeme sonucunda temporal lob ve görselleştirme ile ise oksipital lob uyarılmaktadır. Bazı görseller (emzirirken mutlu görünen annelerin görselleri), hayaller, gevşemeler (şefkat meditasyonları) annenin bilinçaltını olumlu yönde değiştirecek uygulamalardır. Ek olarak Aromaterapi ve müzik de bu uygulamalardandır. Eleştirel faktör ise bir bariyer görevi görerek olumsuz mesajları engeller ve olumlu mesajların bilinçaltına yerleşmesine olanak sağlar (Mongan, 2005).

Hipnoemzirmede kullanılacak örnek olumlamlar;

- “Bedenimin bebeğimi besleyecek, büyütecek, sakinleştirecek, koruyacak sütü üreteceğine inanıyorum.”
- “Memelerim tüm gebeliğim sürecinde bebeğim için süt üretmeye hazırlandı.”
- “Memelerimde süt üretimi oluyor, süt kanallarım açık ve bebeğim her çektiğinde birçok delikten süt bebeğimin ağzına doluyor.”
- “Bebeğimin emzirirken yutma sesini duymak huzur veriyor.”
- “Bebeğimi besleyen ve sakinleştiren bedenim, sana minnettarım.”
- “Kendime ve bebeğime emzirmenin hazzını yaşamayı diliyorum.”
- “Emzirmenin bedenime sunduğu sakinliğin farkındayım.”

Motivasyon yasasında, motivasyona olan gereksinim vurgulanır. Bunun eylemleri gerçekleştirebilmek ve etkin hale getirmek için gerekli olduğu vurgusu yapılır. Zihnimiz motive olduğunda, beden hedeflenen tepkiyi gösterebilir. Motivasyonun kaynağı ve motivasyona hazırlanma süreci her kadın için biriciktir. Bu nedenle hipnoemzirme eğitimi sürecinde motivasyonel görüşme yöntemlerinin yaygın kullanımı işleri kolaylaştırarak verimliliği arttıracaktır (Mongan, 2005).

4. - 7. Hafta: Duygu farkındalığı ve Davranış değişikliği

Hipnoemzirme gibi davranış değişikliği ve kazanımını amaçlayan eğitim-danışmanlık süreçlerinde hedef davranışa yönelik kadının uyum sağlayabilmesi önemlidir (Van den Brink ve ark., 2021). Eğitim süreci sonuç odaklıdır. Yani emzirme davranışının değişimi asıl hedefdir. Ancak süreç içerisinde en çok karşılaşılan hata annenin duygularının ikinci planda kalmasıdır. Hem anne hem de eğiticinin hatalı olduğu durumlarla karşılaşılabilir. Davranışlar kişilerin duygularının yansımasıdır. Dolayısıyla duygular, davranış değişikliği hedeflenen bir programda hiçbir zaman geride bırakılmayacaktır. Bu nedenle, hipnoemzirme eğitim ve danışmanlık süreçlerinde emzirmeye yönelik duyguların uyumunun belirlenmesine ve gerekli durumlarda duygu düzenlemesine odaklanılır. Anne bazen duygularını karşılayacak kelimeler bulmakta zorlanabilirler. Gerekli donanımı edinmiş bir eğitimci kadına duygularını tanımlaması, karşılığını bulması konusunda rehberlik eder. Sadece karşılığını bulmakla kalmayarak bu duyguyu kadın için anlamlandırır (Greenberg, 2015).

Grup şeklinde planlanan eğitimlerde duygu farkındalığının gelişmesi farklı farklı gelişebilir. Grupta duygularını ifade etmekte zorlanan ve çekinceye kapılan kadınlar olabilir. Danışman bunları takip etmeli ve gerek görürse bireysel görüşme planlamalıdır.

8. Hafta: Durum Değerlendirmesi ve Motivasyonel görüşme

Bireylerin yeni edinmiş oldukları bir alışkanlığı öz-yeterlilik konusunda karmaşık duygular yaşadığında kullanılan bireyi merkeze alan bir yöntemdir. Artık eğitimin sonuna gelinmiştir ve bu haftada bireyin endişelerine ve farklılaşma için içsel motivasyonu ölçülmeye çalışılır (Vasilaki ve ark., 2006). Bu oturumun amacı, annenin süreç içerisinde kazanılması hedeflenen öz-motivasyon becerisinin



değerlendirilip, geliştirilmesini ve devam ettirilebilir olmasıdır. Hipnoemzirme felsefesinin tüm aşamalarında bireyin öz motivasyonu ölçülür ve öz-motivasyon becerisi kazanımı amaçlanır. Ve sürekli olarak yapılan zihin-beden etkileşimi çalışmaları ve duygu değiştirme-düzeltilme çalışmaları kadınların öz-motivasyon becerisini kazanmasına ortam sağlar. Bu son oturumda anneye özel olarak planlanan görüşmelerle kazanılan değerlerin, kat edilen yolun ve motivasyon becerisinin devamlılığına odaklanılır ve gereksinime göre emzirme süreci boyunca tekrarlanır. Kişiler bu konuda danışmanlık yapmak istiyorlarsa motivasyonel görüşme aşaması için gerekli eğitimleri almalıdırlar. (Vasilaki ve ark., 2006).

4.4. Hipnoemzirme Felsefesinin Dezavantajları

Mevcut çalışmalara bakıldığında alınan verim oranı yüksektir. Ancak anne eğer emzirme sürecinde yeterli seviyede beslenmemekteyse veya sürekli devam eden bir stres içerisindeyse, metabolik olarak sağlıklı değilse tek başına hipnoemzirmeyle laktasyonun artırılması beklenemez.

Yukarıda belirtilen durumların varlığında hipnoemzirme eğitim programına devam edilmesi durumunda bir başarı sağlanamayacak, danışman ve anne için zaman ve emek israfı durumu oluşacaktır. Eğitim planlanmadan önce annenin sağlık durumu değerlendirilmeli, yeterli beslenme konusunda bilinçlendirilmeli ve yaşantısı konusunda bilgi sahibi olunmalıdır. Aksi takdirde verimli bir eğitim planlanamayacaktır.

5.SONUÇ VE ÖNERİLER

Hipnoemzirme tekniği günümüzde daha çok ilgi görmeye ve kullanılmaya başlamıştır. Yapılan çalışmalar hipnoemzirmenin diğer laksatif yöntemlerle birlikte daha da etkili olduğunu göstermiştir. Hipnoemzirme annenin sütündeki artışın dışında, kadının zihnindeki negatif düşüncelerden kurtularak rahatlık ve sakinlik de sağlar. Olumlama yerine ulaştığında annenin kendine olan güvenini arttıracaktır. Buna göre;

- Hipnoemzirme anne sütünü arttırmanın yanı sıra stres ve anksiyetenin kontrol altına alınmasında etkilidir.
- Hipnoemzirme, emzirmede olumlama ve motivasyon çalışmaları ile birlikte süt miktar ve kalitesini yükseltmede iyi denilebilecek bir yöntemdir.
- Herhangi bir ilaç veya malzeme kullanımı olmadığından maliyeti düşük ve güvenlidir. Kolay uygulanabilir bir teknik olduğu için birçok kişi tarafından kolayca anlaşılır ve uygulanabilir.
- Hipnoemzirme ve benzeri anne sütü kalitesini yükseltmeye yönelik tekniklerin kliniklerde uygulanması için yetkili kişilere bu eğitimlerin verilmesi desteklenmelidir.
- Standart emzirme eğitimlerinin yeniden yapılandırılmasına, paradigma değişimlerine ve özellikle felsefelerle dayalı eğitim programlarının tasarlanmasına gereksinim duyulmaktadır.
- Konuyla alakalı sertifika programlarının yapılması ve yaygınlaştırılması, uygulayıcı durumundaki kişi sayısının artırılması ve mevcut emzirme eğitim programlarına entegrasyonu sağlanmalıdır.
- Tüm bu sonuçlara ulaşmak için daha fazla deneysel araştırmaya ihtiyaç duyulmaktadır.

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ÇOCUKLARDA PROBİYOTİK KULLANIMI PROBIOTIC USE IN CHILDREN

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ÖZET

Probiyotikler, istenilen miktarda alındığında, konakçının mikrobiyotasındaki dengeyi düzenleyerek bağırsak florasına fayda sağlamak gibi olumlu etkileri olan canlı ve güvenilir mikroorganizmalardır. Probiyotikler, doğal olarak bazı gıdalarda, yoğurt gibi fermente edilmiş ürünlerde bulunabilir. Ayrıca, gıda takviyeleri şeklinde de probiyotikler tüketilebilir. Bu takviyeler, içerdikleri canlı bakteri veya maya türleri ile bağırsak sağlığını desteklemeyi amaçlar. İki farklı yolla alınabilme seçeneği, probiyotikleri beslenme düzenine kolayca entegre etme ve bağırsak sağlığına faydalı etkilerini artırma imkanı sağlar. Günümüzde bilimsel araştırmalar, probiyotiklerin farklı yaş grubundan bireylerde bazı hastalıkların önlenmesinde ve tedavisinde kullanılabileceğine dair veriler sunmaktadır. Çocuklarda probiyotik uygulamasının potansiyel faydası dünya çapında birçok ortamda incelenmiştir. Çeşitli çalışmalarda probiyotik takviyesi kullanımının çocuklarda sindirim sağlığını destekleme, bağışıklık sistemini güçlendirme ve bazı mide-bağırsak sorunlarını hafifletme potansiyelleri açısından olumlu etkileri olduğu bildirilmektedir. Ancak bildirilen bu olumlu etkilerin kullanılan probiyotik takviyesinin türüne, bakteri sayısına ve çocuğun sağlık durumuna bağlı olarak değişiklik gösterebileceği ve uzmana danışılmadan kullanılmaması gerektiği unutulmamalıdır. Öte yandan probiyotiklerin yoğurt ve fermente gıdalar gibi çeşitli besinler aracılığıyla doğal kaynaklardan güvenli bir şekilde alınabileceği de göz ardı edilmemelidir. Çocuğun diyetine probiyotik açısından zengin çeşitli besinlerin dahil edilmesi, bağırsak sağlığını desteklemenin daha doğal bir yolu olabilir. Bu derlemede, kanıta dayalı tıbbi uygulamaların sunduğu veriler doğrultusunda, çocukluk çağında probiyotik kullanımı ile ilgili çalışma sonuçları sunulmuştur. Çocuklarda klinik durumlarda etkisine dair çeşitli çalışmalar halen devam etmektedir. Herhangi bir probiyotik takviyesi kullanılmadan önce sağlık profesyonellerine danışılmasında fayda vardır. Sağlık uzmanları, çocuğun sağlık ihtiyaçlarına ve altta yatan koşullara göre kişiselleştirilmiş önerilerde bulunabilir. En yeni meta-analizler ve incelemeler, daha iyi tasarlanmış, uygun şekilde güçlendirilmiş, suşa özgü ve özel doz yanıt çalışmalarına olan ihtiyacın altını çizmektedir.

Anahtar kelimeler: Probiyotik, Probiyotik takviyesi, Çocuk sağlığı, Mikrobiyota

ABSTRACT

Probiotics are live and safe microorganisms that, when taken in the desired amount, have positive effects such as regulating the balance in the host's microbiota and benefiting the intestinal flora. Probiotics can be found naturally in some foods and fermented products such as yoghurt. Probiotics can also be consumed in the form of food supplements. These supplements aim to support intestinal health with the live bacteria or yeast species they contain. The option to be taken in two different ways provides the opportunity to easily integrate probiotics into the diet and increase their beneficial effects on intestinal health. Today, scientific research provides data that probiotics can be used in the prevention and



treatment of certain diseases in individuals of different age groups. The potential benefit of probiotic administration in children has been studied in many settings worldwide. In various studies, the use of probiotic supplements has been reported to have positive effects in terms of their potential to support digestive health, strengthen the immune system and alleviate some gastrointestinal problems in children. However, it should be kept in mind that these reported positive effects may vary depending on the type of probiotic supplement used, the number of bacteria and the health status of the child and should not be used without consulting a specialist. On the other hand, it should not be overlooked that probiotics can be safely obtained from natural sources through a variety of foods such as yogurt and fermented foods. Including a variety of probiotic-rich foods in a child's diet may be a more natural way to support gut health. In this review, we present the results of studies on the use of probiotics in childhood in line with evidence-based medical practice. Several studies on the effect in clinical situations in children are still ongoing. It is beneficial to consult health professionals before using any probiotic supplement. Healthcare professionals can make personalized recommendations based on the child's health needs and underlying conditions. The most recent meta-analyses and reviews underline the need for better designed, appropriately powered, strain-specific and tailored dose response studies.

Keywords: Probiotic, Probiotic supplement, Child health, Microbiota

GİRİŞ

Yeterli miktarda alındığında, konakçının bağırsaklarında mikrobiyal dengeyi düzenleyerek gastrointestinal floraya fayda sağlamak gibi olumlu etkileri olan canlı mikroorganizmalar "probiyotik" olarak adlandırılır (Figuroa-González vd., 2011; Thomas vd., 2010). Probiyotikler, hastalık ya da tedavi sonucunda bozulan bağırsak bakterilerinin doğal dengesini yeniden sağlamayı amaçlayan canlı bakteri ve maya türleridir. Bu mikroorganizmalar genellikle "iyi" veya "dost" bakteriler olarak adlandırılır; yoğurt gibi doğal gıdalarda bulunabilir veya gıda takviyeleri olarak kullanılabilirler. Probiyotikler, akut bulaşıcı ishal durumlarında zararlı mikroplara karşı etki göstererek ishali kontrol altına alabilir, bağırsağın savunma mekanizmalarını destekleyebilir ve bağırsaktaki iltihabı azaltarak hasarı minimize edebilirler (Collinson vd., 2020).

Besinlerle veya destek amaçlı alınan probiyotikler patojen ve zararlı bakteri sayısını azaltarak ve mikrobiyal metabolizmayı değiştirerek bağışıklık sistemini iyileştirirler (Merve vd., 2014). Probiyotik takviyeleri ağız yoluyla güvenilir ve iyi bir şekilde tolere edilirler ve genellikle kapsül, tablet, şaşe veya toz formunda bulunabilirler (Dinleyici, 2012; Merve vd., 2014). Bir ürünün probiyotik olarak tanımlanabilmesi için bazı özelliklere sahip olması gereklidir. Kabul edilen bir probiyotik mikroorganizma öncelikle insan kaynaklı olmalıdır; patojenik veya toksik olmamalı, mide asiditesi ve safra tuzlarına karşı dirençli olmalıdır. Ayrıca, gastrointestinal kanaldan geçerken canlı kalabilmeli, bağırsak epiteline tutunabilen, doğal flora ile uyum sağlayabilen, gastrointestinal sistemde kolonize olabilen, antimikrobiyal maddeler (örneğin; bakteriyosin) salgılayabilen, konakçı sağlığı üzerinde olumlu etkiler yapabilen, üretim ve depolama sürecinde stabil olmalı ve canlılığını koruyabilmelidir (Gülbandılar vd., 2017; Özdemir ve Büyüktuncer Demirel, 2017). Probiyotikler oldukça uzun bir süredir, genellikle güvenilir olarak kabul edilmektedir ve probiyotik ürünler artık günlük hayatımızın bir parçası haline gelmiştir. Örneğin yoğurt, peynir, çeşitli atıştırmalıkların ve kozmetik ürünlerin içeriğinde probiyotikler bulunmaktadır (Suez vd., 2019).

Çocukluk çağı fiziksel, zihinsel, sosyal ve duygusal gelişimin hızlı olduğu, yaşam tarzı alışkanlıklarının şekillendiği, yetişkin çağ sağlık durumunun temellerinin atıldığı önemli bir dönemdir. Çocukluk çağı sağlık ve gelişim açısından kritik bir dönemdir ve yaşam boyu refahın temelini oluşturur (Norris vd., 2019). Çocuklarda probiyotik uygulamasının potansiyel faydası dünya çapında birçok ortamda incelenmiştir (Depoorter ve Vandenplas, 2021). Probiyotik takviyeleri çocuklarda bazen koruyucu (genel bağırsak sağlığını desteklemek ve bağışıklık sistemini güçlendirmek) bazen de tedavi edici (sindirim sorunları, antibiyotiğe bağlı ishal veya diğer mide-bağırsak sorunlarının düzeltilmesi) amaçlarla kullanılmaktadır (Bozzi vd., 2018; Depoorter ve Vandenplas, 2021). Çeşitli çalışmalarda probiyotik takviyesi kullanımının çocuklarda sindirim sağlığını destekleme, bağışıklık sistemini



güçlendirme ve bazı mide-bağırsak sorunlarını hafifletme potansiyelleri açısından olumlu etkileri olduğu bildirilmektedir. Ancak probiyotikler canlı mikroorganizmalardır ve çocukların bağışıklık ve sindirim sistemleri hala gelişmekte olduğundan bu dönemde kullanımlarına dikkatle yaklaşılmalıdır (Kechagia vd., 2013;Mazziotta vd., 2023). Sağlık üzerine olumlu etkilerine dair artan sayıda çalışma bulunması probiyotikler, yaşamın bir parçası haline gelmelerine ve klinik uygulamalarda yaygın olarak kullanılmalarına rağmen, son zamanlarda, bazı akademisyenler probiyotik güvenliği konusundaki endişelerini dile getirmişlerdir. Nieuwboer ve Claassen, özellikle yüksek riskli popülasyonlarda (örneğin prematüre bebekler, bağışıklık sistemi baskılanmış bireyler ve kritik hastalar gibi durumlar) probiyotiklerin doğru ve güvenli kullanımına ilişkin sağlam kanıtların oluşturulmasına hala ihtiyaç duyulduğunu bildirmişlerdir (Freedman vd.,2020; Cohen, 2018; van den Nieuwboer ve Claassen, 2019).

Probiyotiklere verilen yanıt, çocuklar da dahil olmak üzere bireyler arasında farklılık gösterebilir. Bazı çocuklar düzenli kullanımda fayda görebilirken bazıları önemli etkiler göstermeyebilir. Çocuğun tepkisinin izlenmesi ve kullanım sıklığının gözlemlenen sonuçlara göre ayarlanması önemlidir. Çocuklarda probiyotik takviyelerinin güvenliği ve etkinliğinin halen devam eden araştırma alanları olduğunu ve mevcut ürünlerin kalitesinde farklılıklar olabileceğini unutmamak önemlidir. Bu nedenle probiyotik takviyelerini çocuğun rutinine sokmadan önce sağlık profesyonellerinden görüş alınması önemlidir. Sağlık uzmanları, çocuğun sağlık ihtiyaçlarına ve altta yatan koşullara göre kişiselleştirilmiş önerilerde bulunabilir. En yeni meta-analizler ve incelemeler, daha iyi tasarlanmış, uygun şekilde güçlendirilmiş, suya özgü ve özel doz yanıt çalışmalarına olan ihtiyacın altını çizmektedir (Depoorter ve Vandenplas, 2021).

1. Probiyotiklerin Çocuklarda Klinik Hastalıkların Önlenmesi ve Tedavisinde Rolü

Probiyotik takviyeleri çocuklarda hastalıkların önlenmesi (genel bağırsak sağlığını desteklemek ve bağışıklık sistemini güçlendirmek) ve tedavi edilmesi (sindirim sorunları, antibiyotiğe bağlı ishal veya diğer mide-bağırsak sorunlarının düzeltilmesi) amaçlarıyla kullanılabilir (Bozzi vd., 2018; Depoorter ve Vandenplas, 2021). Çeşitli çalışmalarda probiyotik takviyesi kullanımının çocuklarda sindirim sağlığını destekleme, bağışıklık sistemini güçlendirme ve bazı mide-bağırsak sorunlarını hafifletme potansiyelleri açısından olumlu etkileri olduğu bildirilmektedir (Kechagia vd., 2013; Mazziotta vd., 2023).

1.1. Bağırsak Sağlığı ve Probiyotikler

Probiyotiklerin bağırsak sağlığı açısından işlevini anlamak için mikrobiyota ve onun önemini anlamak gereklidir. Sağlıklı bir insan bağırsağındaki mikroorganizma türü yaklaşık olarak 500'dür. Bu mikrobiyota sindirimi kolaylaştırır, birçok besin sağlar (B vitaminleri, K vitamini, folat, kısa zincirli yağ asitleri) ve immün sistemi şekillendirir (Ciorba, 2012;Kau vd., 2011). Bağırsak bakterilerimiz bir kilogram kadar ağırlığa sahiptir ve bakteriyel hücreler, sayıca insan hücrelerinden daha fazladır (10:1). Ayrıca, bakteriyel genom, sayıca insan genomundan daha fazla olabilir (100:1). Kişinin günlük enerji ihtiyacının %10'unun, bakteriyel fermantasyon yan ürünlerinden elde edilebileceği bilinmektedir (Ciorba, 2012;Macpherson ve Harris, 2004).

Sağlıklı bir bağırsak mikrobiyotası, bağırsak sisteminde önemli bir rol oynar (Ford vd., 2017;Wang vd., 2021). Probiyotik kullanımı bağırsak mikrobiyotasını modifiye etmenin yollarından biridir.

1.2. Bağışıklığın güçlendirilmesi ve Probiyotikler

Rotavirüs, dünya genelinde çocuklarda görülen gastroenterit ve ishalin temel sebeplerinden biridir ve özellikle gelişmekte olan ülkelerde ishalle ilişkili bebek ölümlerinin yaklaşık %20-25'inden sorumlu tutulmaktadır. *Lactobacillus reuteri* ATCC 55730'un rotavirüsle mücadeledeki etkisi, erken bir çalışmada rotavirüs isheline sahip bir grup çocuk üzerinde değerlendirilmiş ve gösterilmiştir. Probiyotik uygulamasının ardından, IgA salınımını artırarak ishal süresini doza bağlı olarak azalttığı tespit edilmiştir. Benzer bir şekilde, *Lactobacillus casei* ve *rhamnosus GG*'nin akut ishal yaşayan bir grup çocukta rotavirüse karşı bağışıklık tepkisini uyarmada etkili olduğu bilimsel olarak kanıtlanmıştır. Günümüzde, probiyotiklerin rotavirüsle mücadelede immün modülasyon sağlamada etkinliği iyi bir şekilde belgelenmiştir. Şu anda ishal, infantil kolik ve diğer gastrointestinal hastalıkların tedavisi için



birçok farklı probiyotik önerilmektedir. Ancak, vurgulanması gereken bir nokta da, bu hastalıkların tedavisinde en etkili bakterilerin laktobasiller olduğudur (Mazziotta vd., 2023).

Mevcut kanıtlara göre, probiyotik bakterilerin sağlık geliştirici ve immünomodülatör özelliklere sahip olduğunu göstermektedir. Dolayısıyla, probiyotik kullanımı, bağışıklık sistemi aktivitelerini artırmak için umut verici bir strateji olarak kabul edilmektedir. Ancak, probiyotiklerin immünomodülatör fonksiyonlarının ve konakçı immün hücreleriyle olan etkileşimlerinin moleküler mekanizmaları hakkında bilgi sınırlıdır (Mazziotta vd., 2023).

1.3. Akut Diyare ve Probiyotikler

İshal hastalıkları dünyada 5 yaş altı çocuklarda ölüm nedenleri arasında halen üçüncü sıradadır (Liu vd., 2015; Black vd., 2003). Probiyotik kullanımının ishal tedavisinde olumlu etkileri olduğunu bildiren çalışmalar bulunmaktadır. Yapılan bir çalışmada ishal durumunda probiyotik kullanımına bağlı herhangi bir yan etki bildirilmemiş olup, akut rehidratasyon tedavisi ile birlikte probiyotik kullanıldığında ishal süresini 25 saat kısalttığı ve dört gün veya daha uzun süren ishal riskini %59 azalttığı belirtilmiştir. Aynı zamanda dışkılama sayısını azalttığı da gözlemlenmiştir (Allen vd., 2010). Cochrane, akut ishal tedavisinde probiyotiklerin erken başlanması (< 48 saat) etkinliğin daha belirgin olabileceğini bildirmiştir (Marchand, 2012). Probiyotikler, özellikle viral gastroenteritlerde, örneğin rotavirüs ishallerinde etkilidir. Laktobasillus, Bifidobacteriler, Saccoromyces boulardii ve Enterokokkus suşları, bu alanda en sık çalışılan probiyotikler arasında yer almaktadır (Duman, 2012).

Akut enfeksiyöz diyare, genellikle viral kaynaklı olup insidansı doğrudan sanitasyon ve hijyenle ilişkilidir (Liu vd, 2018). Probiyotikler, enfeksiyöz diyare tedavisine ek olarak birçok klinik çalışmada test edilmiştir. Sonuçlar, sürenin kısaltılması ve dışkı sıklığının azaltılması konusunda olumlu ve önemli ölçüde tutarlı bulunmuştur. Avrupa Pediatrik Gastroenteroloji, Hepatoloji ve Beslenme Derneği (ESPGHAN), çocuklarda akut gastroenterit tedavisinde rehidratasyona ek olarak probiyotik uygulamasının değerlendirilmesini önermektedir (Sánchez vd., 2017). ESPGHAN Probiyotikler ve Prebiyotikler Çalışma Grubu tarafından oluşturulan belgede, bebek ve çocuklarda akut gastroenterit için kullanım önerileri bulunmaktadır. Belgede, rehidratasyon tedavisine ek olarak L. rhamnosus GG ve S. boulardii probiyotik kullanımının semptom süresini ve şiddetini azaltmada etkili olduğu onaylanmıştır (Guarino vd, 2014).

1.4. Antibiyotiğe Bağlı Diyare ve Probiyotikler

Antibiyotikler, dünya genelinde en yaygın olarak reçete edilen ilaçlar arasında yer almaktadır. Antibiyotik tedavisi, bağırsak mikrobiyota dengesini bozabilir ve özellikle diyare gibi bir dizi yan etkiye neden olabilir. Bu durumun çoğu vakada, Clostridium difficile'nin aşırı çoğalmasına bağlı olarak ortaya çıktığı bildirilmekte bu nedenle antibiyotiğe bağlı diyareler Clostridium difficile ile ilişkili diyare olarak da adlandırılmaktadır (Sánchez vd., 2017; Wilkins ve Sequoia, 2017). Antibiyotik ilişkili diyare, antibiyotik kullanımına başladıktan sonraki iki hafta içinde, günde üç veya daha fazla sulu dışkılama süren ve en az 2 gün devam eden bir durumu ifade eder. Cochrane meta-analizi, probiyotiklerin çocuklarda antibiyotik ilişkili ishali önlemede etkili olduğunu göstermiştir (Guo vd., 2019). Çocuklarda antibiyotikle ilişkili ishali önlenmesinde probiyotik kullanımıyla ilgili randomize kontrollü çalışmaların meta-analiz sonuçları, yararlı etkiler bildirmektedir (Correa vd., 2005; D'souza vd., 2002). Lactobacillus rhamnosus GG B. Lactis, S. Thermophilus, randomize kontrollü çalışmalarda sık kullanılan probiyotik türleridir.

1.5. Konstipasyon ve Probiyotikler

Kabızlık tedavisinde probiyotiklerin etkinliğine dair çelişkili veriler bulunmaktadır ve rutin kullanımını önermek için yeterli kanıt bulunmamaktadır (Kasirga, 2012). 2005 yılında yapılan bir randomize kontrollü çalışmada, fonksiyonel kabızlığı olan çocuklara laktuloza ek olarak Lactobacillus rhamnosus GG verildiğinde, plaseboyla karşılaştırıldığında etkili olmadığı belirlenmiştir (Banaszkiewicz, ve Szajewska, 2005). 2010 yılında gerçekleştirilen bir derlemede, 3'ü erişkinlerde, 2'si çocukluk döneminde olmak üzere toplam 5 randomize kontrollü çalışma gözden geçirilmiştir. Çocuklarda lactobacillus casei rhamnosus (Lcr35) tedaviye yarar sağlarken, Lactobacillus rhamnosus GG'nin yararlı olmadığı tespit



edilmiştir (Chmielewska ve Szajewska, 2010). 2010 Klinik Raporu'nda Amerikan Pediatri Akademisi, çocuklarda kabızlık tedavisinde probiyotik kullanımını önermektedir (Thomas vd.,2010). Laksatif içermeyen probiyotiklerin kullandığı klinik araştırmalar arasında sadece bir çalışma, probiyotiğin plaseboya kıyasla daha fazla terapötik başarı elde ettiğini bulmuştur (Bu vd., 2007). Bu makalede, probiyotik *L. casei rhamnosus Lcr35*'in etkisinin, klinik deneyin üçüncü grubuna uygulanan magnezyum oksidin etkisine benzer olduğu gözlemlenmiştir. Ayrıca, kabızlığın bazı klinik belirtilerinde bazı probiyotiklerin düzensiz faydalı etkilerinin olduğunu görebiliriz; bu, bağırsak hareket sıklığının artmasına dışkı kıvamının iyileşmesine, karın ağrısının azalmasına, bağırsak hareketlerinden kaynaklanan ağrının azalmasına ve gazın azalmasına neden olur. (Coccorullo vd., 2010;Tabbers vd., 2011;Bu vd., 2007, Guerra vd., 2011;Sadeghzadeh vd., 2014). Probiyotiklerin kullandığı bu müdahale çalışmalarında, bağırsak mikrobiyotasının probiyotik uygulamasından önce ve sonra bileşimi değerlendirilmemiştir. Bu nedenle, probiyotiklerin kullanımına atfedilen bağırsak alışkanlığının hareketliliği ve özellikleri üzerinde gözlenen klinik etkiler, bağırsak mikrobiyotasının bileşimindeki spesifik değişikliklerle ilişkilendirilememiştir (Gomes vd., 2019). İleri çalışmalara ihtiyaç duyulmaktadır.

1.6. İnfantil Kolik ve Probiyotikler

Probiyotiklerin infantil kolik üzerine etkilerine dair de çalışmalar yapılmıştır. Randomize çift kör özellikteki bir çalışmada, probiyotik içeren grupta plaseboya kıyasla ortalama ağlama süresinde, ağlama şiddetinde ve atak sıklığında belirgin bir azalma tespit edilmiştir (Savino vd., 2010). Erken dönemde emzirilen bebeklerde kullanılan *L. Reuteri* (*Lactobacillus reuteri*) isimli probiyotiğin, infantil kolik semptomlarını iyileştirdiği ve iyi bir şekilde tolere edildiği ve bu probiyotiğin bağırsak mikrobiyotasını olumlu yönde geliştirdiği saptanmıştır (Savino vd., 2010). Anabrees ve arkadaşlarının gerçekleştirdiği çalışma, anne sütü ile beslenen 209 bebekte probiyotik tedavisi sonrasında, kolik nedeni ağlama ataklarının azaldığını ve formüle ile beslenen bebeklerin de bu tedaviyi güvenle kullanabileceklerini göstermiştir. Elde edilen bulgular, özellikle anne sütü ile beslenen bebeklerde infantil kolikte probiyotik takviyesinin olumlu etkilerini desteklemektedir. *L. Reuteri*, ağlama oranını (dakika/gün) önemli ölçüde azaltmıştır (Anabrees vd., 2013). Mevcut çalışma sonuçları *L. Reuteri* probiyotiğinin infantil kolik semptomlarını anlamlı bir şekilde azalttığını göstermektedir. Bu probiyotik, özellikle anne sütü ile beslenen bebeklerde ağlama süresini, ağlama şiddetini ve atak sıklığını belirgin bir şekilde azaltmıştır. Bu bulgular, probiyotik takviyelerin infantil kolik tedavisinde olumlu etkiler sağlayabileceğini desteklemektedir.

1.7. Prematürite ve Nekrotizan Enterokolit ve Probiyotikler

Bozulmuş intestinal geçirgenlik ve bozulmuş intestinal floranın nekrotizan enterokolit (NEK) patogenezinde etkili olabileceği düşünülmektedir. Probiyotik kullanımı, 1500 gramdan az doğan bebeklerde NEK oluşumunu ve ölüm oranını azaltabilir. Ancak, doğum kilosu 1000 gramın altındaki bebeklerde probiyotik kullanımının yararları ve potansiyel yan etkileri ile ilgili yeterli veri bulunmamaktadır (AlFaleh ve Anabrees, 2014). *Lactobacilli* ve *Bifidobakteri* türlerinden gelen probiyotiklerin erken doğmuş bebekler için güvenli olduğunu ve nekrotizan enterokolit riskini azaltabileceğini ifade edilmektedir. Probiyotik müdahalelerin, özellikle bu iki bakteri türünü içerenlerin, erken doğan bebeklerde NEK'i önlemede etkili olduğunu ve aynı zamanda bu müdahalelerin güvenli olduğu vurgulanmaktadır (Cilieborg vd., 2012).

Randomize kontrollü çalışmaların sistematik incelemesi ile yapılan bir araştırmada, *Lactobacillus acidophilus* LB probiyotiğinin NEK riskini azaltmada olumlu bir etki gösterdiği belirlenmiştir. *Bifidobacterium lactis*, probiyotiğinin etkisinin incelendiği alt grup analizinde, bu probiyotiğin hem anne sütü alan hem de mama alan prematüre bebeklerde nekrotizan enterokolitin belirli bir evresinde ≥ 2 (bu evre 2 veya daha yüksek olarak belirlenmiş) riskini azaltmada etkili olduğu bulunmuştur. Bu durum, belirli bir probiyotiğin kullanımının, prematüre bebeklerde NEK'in belirli evrelerinde daha düşük bir riskle ilişkilendirildiği anlamına gelir. Ancak, bu etki boyutunun (etkinin büyüklüğünün) beslenme tipine göre tutarsızlık gösterdiği belirtilmiştir. Sadece anne sütü alan bebeklerle ilgili verilerde etki daha belirgin olabilirken, mama alan bebeklerde etki farklılık gösterebilir (Beghetti vd., 2021). Yapılan bir



çalışmada, yenidoğanları rastgele deney ve kontrol gruplarına ayırarak her iki grup içindeki bebeklere emzirme uygulanmıştır. Deney grubundaki bebeklerin diyetlerine probiyotikler eklenirken, kontrol grubundaki bebeklere ya plasebo verilmiş ya da hiçbir ek takviye yapılmamıştır. Yapılan çalışma probiyotik eklemenin prematüre bebeklerde NEK'in görülme sıklığını ve şiddetini azaltma potansiyeline sahip olduğunu ortaya koymaktadır (Liu vd., 2022). Athalye-Jape ve arkadaşları tarafından gerçekleştirilen bir meta-analiz, 29 çalışmayı içermekte olup, probiyotik eklemenin prematüre doğanlarda NEK görülme sıklığını %60'tan %31,7'ye düşürdüğünü göstermiştir (Athalye-Jape vd., 2018). Mevcut kanıtlar, preterm yenidoğanlarda probiyotik destek kullanımının belirgin yan etki olmaksızın tüm nedenlere bağlı mortaliteyi ve kesin nekrotizan enterokoliti anlamlı bir şekilde azalttığını göstermektedir (Sever, 2012).

1.8. Alerjik Hastalıklar ve Probiyotikler

Atopik dermatit tedavisinde ve önlenmesinde probiyotiklerin faydalı olabileceğini destekleyen birçok çalışma bulunmaktadır. Prenatal dönemden başlayarak probiyotik takviyesi verilmesinin, postnatal dönemden başlamaktan daha etkili olduğu gözlemlenmiştir (Uysal, 2012; Weston vd., 2005). Öte yandan Dünya Alerji Örgütü, alerjik hastalıklardan korunmada probiyotik kullanımını desteklememektedir. Ancak, gebe ve emziren kadınlarda ile ailede alerjik hastalık öyküsü bulunan bebeklerde probiyotik takviyesini önermektedir (Cuello Garcia vd., 2016).

1.9. İrritabl Bağırsak Sendromu ve Probiyotikler

İrritabl bağırsak sendromu (İBS), kronik karın ağrısı ve düzensiz bağırsak alışkanlıkları ile karakterize edilen bir hastalıktır ve patogenezi bir dizi faktör içermektedir (Distrutti vd., 2016). İBS'nin belirli klinik özellikleri, örneğin şişkinlik, değişmiş intestinal geçiş süreleri gibi, İBS'li hastalarda özgül bağırsak mikrobiyota profilleri ile ilişkilendirilmiştir. Yapılan araştırmalar, özellikle enfeksiyonun bağırsak mikrobiyotası ve bağırsak disbiozisi üzerindeki etkisinin rolüne dikkat çekmektedir (Harris ve Baffy, 2017). Probiyotikler, bağırsak mikrobiyotasını dengeleyebilen Lactobacilli ve Bifidobacteria sayısını artırarak, zararlı bakterilerin büyümesi için uygun olmayan bir ortam oluşturarak bağırsak ekosistemini yeniden şekillendirebilme kapasitesine sahiptir. Bu sayede, İBS'nin bazı patojenik yollarında faydalı etkiler göstererek İBS'li hastalar için terapötik bir yaklaşım sunabilir (Currò vd., 2017; Distrutti vd., 2016).

İBS'nin sıklığı oldukça yüksektir ve dünya genelinde okul çağındaki çocukların %20'sini etkileyebilir (Weidler vd., 2017). Bu hastalık, yaşam kalitesini ve çocukluk dönemindeki öğrenme ilerlemesini önemli ölçüde etkileyebilir (Chiou ve Nurko, 2010). İBS için çeşitli tedavi seçenekleri arasında diyet kontrolü, ilaç tedavisi, psikolojik müdahale ve diğer adjuvan tedaviler bulunmaktadır; ancak bu tedavilerin çoğu yeterli kalitede araştırılmamıştır (Ford vd., 2014; Khanna vd., 2014). Ayrıca, tanı ve prognoz oldukça zor olabilmektedir. Çocuklarda irritabl bağırsak sendromunun (İBS) tedavisine dair sadece bir randomize kontrollü çalışma yayınlanmıştır. Bu çalışmada, Lactobacillus rhamnosus GG 'nin karın şişliği ve rahatsızlığını 6 haftalık bir süre içinde 50 hastada azalttığı gözlemlenmiştir (Bausserman ve Michail, 2005). Erişkinlerde İBS tedavisine dair birçok randomize kontrollü çalışma yapılmış olmasına rağmen, çocuklarda İBS tedavisi için genel kullanım önerilecek kadar güçlü kanıtlar bulunmamaktadır. Probiyotikler, konvansiyonel tedavilere ek olarak destek tedavisi olarak düşünülebilir, ancak bu öneriye dair yeterli kanıtlar henüz mevcut değildir (Aksu, 2012).

1.10. Ekstraintestinal Enfeksiyon ve Probiyotikler

Probiyotiklerin, tekrarlayan idrar yolu enfeksiyonları ve vajinal enfeksiyonlarda olumlu etkileri olduğu bilinmekle birlikte, bu konudaki kesinlik kazanan çalışmalar devam etmektedir. Ancak, ekstraintestinal enfeksiyonların tedavisinde probiyotiklerin yararlı etkilerini destekleyen çocuklarda randomize kontrollü çalışma bulunmamaktadır. Bu nedenle, ekstraintestinal enfeksiyonların önlenmesi ve tedavisinde rutin probiyotik kullanımı önerilmemektedir (Thomas vd., 2010; Kara, 2012).

Egzamalı bebeklerde probiyotik takviyeli formüller alan çalışmalarda, gastrointestinal semptomların ve egzamanın azaltılmasında olumlu etkilerin olduğu belirlenmiştir (Isolauri vd., 2000; Kalliomaki vd., 2001). Bu etki, probiyotiklerin organizmaların bağırsak geçirgenliğini değiştirme yeteneğinin yanı sıra,



vücuttaki en büyük lenfoid organ olan bağırsakla ilişkili lenfoid dokuda doğrudan etkinin olası bir sonucu olabilir (Young vd., 2003).

1.11. Obezite ve Probiyotikler

Bağırsak mikrobiyotası, beslenme alışkanlıklarıyla sıkı bir ilişki içerisinde. Obezite ve bu durumun olası komplikasyonlarının tedavisinde özellikle probiyotik kullanımıyla ilgili mevcut sınırlı sayıda çalışmaya rağmen, probiyotiklerin flora yapısını değiştirerek enerjiyle ilişkili protein ekspresyonlarını olumlu yönde etkileyebildiği ve ağırlık artışını önleyebildiği gözlemlenmektedir (Arslan ve Yağcı, 2012). Obez bireylerde bağırsak mikrobiyota kompozisyonu, zayıf bireylerden önemli ölçüde farklılık gösterebilmektedir. Bağırsak mikrobiyota modifikasyonlarının vücut ağırlığı ve vücut kütle indeksi değişiklikleri ile ilişkilendirilebileceğine dair yapılmış olan çalışmalar bulunmaktadır. Ancak, probiyotiklerin çocukluk çağı obezitesi üzerindeki etkilerini doğrulamak ve meta analiz yapabilmek için daha fazla araştırmaya ihtiyaç vardır (Brusaferro vd., 2018).

1.12. Otizm ve Probiyotikler

Otizmlilerde çocuklarda gastrointestinal semptomlar gözlemlenebilmektedir. Probiyotiklerin, bağırsak mikrobiyotasını olumlu yönde etkileyebileceği ve otizmlilerde potansiyel olarak zararlı metabolitlerin düzeylerini değiştirebileceği teorileri bulunmaktadır. Ancak, probiyotiklerin davranış ve bu belirteçler üzerindeki etkileri henüz kesin olarak doğrulanmamıştır (Navarro, 2016).

1.13. Üst Solunum Yolu Enfeksiyonu ve Probiyotikler

Finlandiya'daki bir kreşte yapılan ve pediatrik kistik fibrozis hastalarını içeren iki benzer ancak ayrı kontrollü çalışma, *Lactobacillus GG* tedavisinin solunum yolu enfeksiyonlarının sayısını azaltma potansiyeline sahip olduğunu gösterdi, bu da uzun süreli antibiyotik tedavisi gerekliliğini azaltabilir (Guarino, 1998; Hatakka vd., 2001). Randomize kontrollü çalışmalarda elde edilen bulgulara göre, çocukları içeren çalışmalar, probiyotiklerin antibiyotik kullanımını azaltma ve okul devamsızlığına neden olan soğuk algınlığı ile ilgili etkilerini hafifletme potansiyeline işaret etmektedir. Ancak, bu sonuçları doğrulamak için daha fazla çalışma gerekmektedir (Hao vd., 2015).

1.14. Diş Çürükleri ve Probiyotikler

Duraisamy ve arkadaşları tarafından çocuklar üzerinde gerçekleştirilen randomize kontrollü bir çalışma, günlük probiyotik tüketiminin tükürükteki *S. mutans* seviyelerinde belirgin bir azalmaya neden olduğunu göstermiştir (Hasslöf vd., 2022). Janiani ve ark. tespitine göre, çocuklarda kısa süreli probiyotik süt tüketimi, tükürükteki *S. mutans* düzeylerini azaltmıştır; ancak uzun vadeli etkiler belirgin değildir (Sarmiento vd., 2019). Staszczuk ve arkadaşlarının yaptığı araştırmada, düzenli kısa süreli probiyotik tüketiminin çocuklarda diş çürüğünün başlangıcını yavaşlatabileceğini gösterilmiştir (Staszczuk vd., 2022). Son olarak, Hasslöf ve arkadaşları (2022), okul öncesi çocuklarda probiyotik damlaların diş çürüğü tekrarını önleme potansiyelini araştırmış; ancak test ve kontrol grupları arasında anlamlı bir fark gözlenmemiştir (Hasslöf vd., 2022). Mevcut kanıtlar, diş çürüğü yönetimi için probiyotik kullanımını önermek için yetersizdir. Ancak, diş eti iltihabı veya periodontit tedavisinin probiyotiklerle desteklenebileceğine dair belirli kanıtlar bulunmaktadır (Gruner vd., 2016). Bu araştırmalar genel olarak, probiyotiklerin ağız sağlığını geliştirmede umut verici bir rol oynadığını vurguluyor olsa da bu etkinlikler farklılık gösterebiliyor ve uzun vadeli etkilerini değerlendirmek için daha fazla araştırmaya ihtiyaç duyulmaktadır.

2. Aşı Etkinliği ve Probiyotikler

Probiyotiklerin aşılama ile ilişkisini araştıran çalışmalar mevcuttur. Farklı yollarla (oral ve parenteral) uygulanan aşılarda, probiyotiklerin serokonversiyon üzerindeki etkileri incelenmiştir. Ancak, çocuklarda aşı etkinliğini artırmak için probiyotik kullanımını önermek için yeterli kanıt bulunmamaktadır (Zimmermann ve Curtis, 2018; Church vd., 2019).



SONUÇ

Bu derlemede, kanıta dayalı tıbbi uygulamaların sunduğu veriler doğrultusunda, çocukluk çağında probiyotik kullanımı ile ilgili çalışma sonuçları sunulmuştur. Probiyotik takviyeleri çocuklarda koruyucu ve tedavi edici amaçlarla kullanılmaktadır. Çocuklarda probiyotik takviyelerinin sindirim sağlığını destekleme, bağışıklık sistemini güçlendirme ve bazı mide-bağırsak sorunlarını hafifletme, bağırsak florasını modifiye etme, diyare ve konstipasyon riskini, şiddetini ve süresini kısaltma, antibiyotiklerin yan etkilerini azaltma, infantil kolik, nekrozan enterokolit, İBS, otizm, obezite ve dış çürüklerinin önlenmesi gibi olumlu etkileri çeşitli çalışmalarda rapor edilmiştir. Ancak bildirilen bu olumlu etkilerin kullanılan probiyotik takviyesinin türüne, bakteri sayısına ve çocuğun sağlık durumuna bağlı olarak değişiklik gösterebileceği ve uzmana danışılmadan kullanılmaması gerektiği unutulmamalıdır. Öte yandan çocukların bağışıklık ve sindirim sistemleri hala gelişmekte olduğu için, canlı mikroorganizmalar içermesi nedeniyle probiyotiklerin bu dönemde kullanılmasına özen gösterilmelidir.

Probiyotiklerin yoğurt ve fermente gıdalar gibi çeşitli besinler aracılığıyla doğal kaynaklardan güvenli bir şekilde alınabileceği de göz ardı edilmemelidir. Çocuğun diyetine probiyotik açısından zengin çeşitli besinlerin dahil edilmesi, bağırsak sağlığını desteklemenin daha doğal bir yolu olabilir. Herhangi bir probiyotik takviyesi kullanılmadan önce sağlık profesyonellerine danışılmasında fayda vardır. Sağlık uzmanları, çocuğun sağlık ihtiyaçlarına ve altta yatan koşullara göre kişiselleştirilmiş önerilerde bulunabilir. En yeni meta-analizler ve incelemeler, daha iyi tasarlanmış, uygun şekilde güçlendirilmiş, suşa özgü ve özel doz yanıt çalışmalarına olan ihtiyacın altını çizmektedir.

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ACTIVE CARBON PRODUCTION METHODS FROM BIOMASS

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ABSTRACT

Activated carbon is one of the materials with a wide working area, and its historical recognition and use dates back to ancient times. Activated carbon is an adsorbent substance with a large surface area and effective pore structure, which cannot be formulated structurally and cannot be characterized by chemical analysis, and has a high carbon content. Since the properties of activated carbons can be controlled depending on the synthesis technique, the number of studies aiming to synthesize activated carbons and modify them according to the desired properties is rapidly increasing. The most striking feature of activated carbon in almost all industrial applications where it is used directly or indirectly is its porous structure and, accordingly, its surface area. Activated carbon is used in many different industrial sectors due to its general properties. Removal of odour and pollution, health sector, use as fertilizer, water and wastewater treatment and energy storage applications are among the areas of use of activated carbons. In addition to the low cost of waste biomass, the high waste rate paves the way for the use of waste biomass in activated carbon production. There are many options for waste biomass, including animal, vegetal and urban waste.

As a result, especially in the field of energy storage, production methods of activated carbons with different surface properties by direct and indirect activation methods in order to use it more efficiently and have high waste biomass potential will be briefly addressed.

Keywords: Activate Carbon, Biomass, Chemical Activation, Energy Storage

1.Introduction

While petroleum-derived pitch and coal are the most common starting materials for commercial activated carbon production, the decreasing availability of fossil fuels, increasing global energy demand, and increasing awareness of the environmental impacts of fossil fuel combustion have led to the development of activated carbons from sustainable and renewable resources such as nut shells, wood, starch, sucrose, cellulose, corn grain, banana peel, coffee powder, sugar cane bagasse (Schröder et al., 2007). Thus, biomass waste has tremendous potential for the recovery of energy and valuable materials (Figure 1). The processing of biomass waste and the ability to use in the production of activated carbon waste left over from agricultural activities offer significant advantages (Williams and Reed, 2006). It has proven to be a promising type of raw material for activated carbon production, especially since it is available at a low price of biomass derived from agricultural by-products (Mohamad et al., 2013).

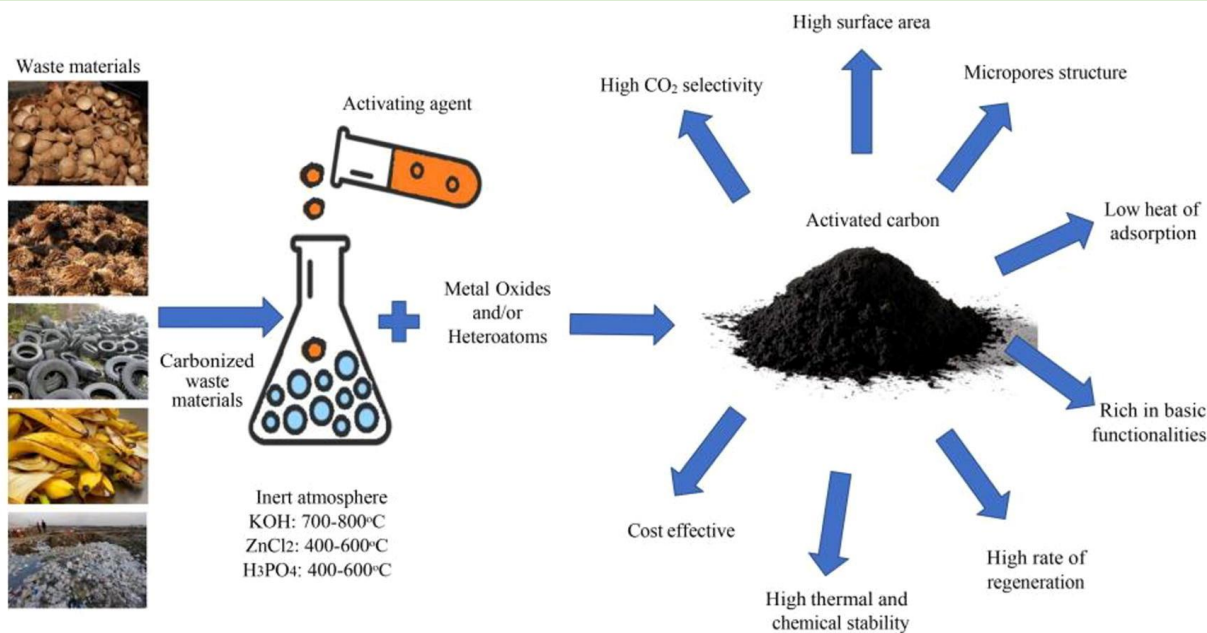


Figure 1. The properties of AC obtained by activation of waste biomass (Azmi et al., 2022).

One of the most important problems of every city is that environmental waste cannot be recycled in the targeted amount. In addition, while waste is unconsciously released into nature, the odor and other negativities it emits into the environment pose serious threats to human health (Figure 2).

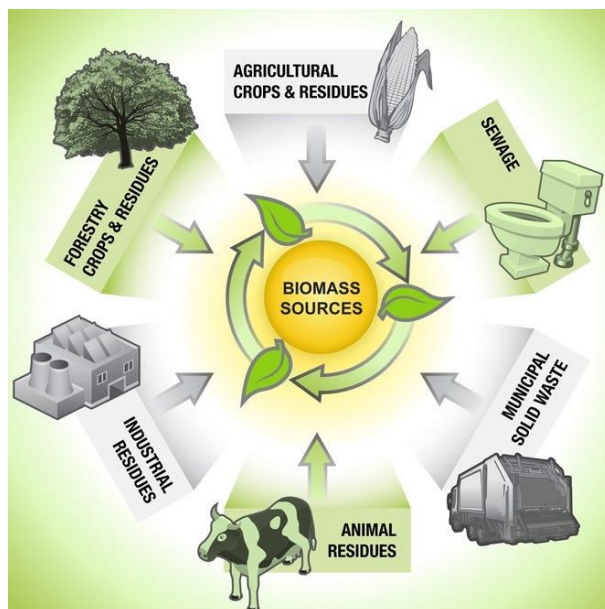


Figure 2. Waste biomass types (Zafar, 2022).

A study on the production of activated carbon from environmental waste was conducted by Nagano and his colleagues in 2000. In addition to garbage and flammable materials, plastic bottles, which take many years to disappear in nature, are also included in the waste. With the analyzes made after the carbonization process, wastes that are harmful to nature were eliminated and activated carbon that could be used efficiently was produced (Nagano et al., 2000). Therefore, especially in the field of energy storage, production methods of activated carbons with different surface properties by direct and indirect



activation methods in order to use it more efficiently and have high waste biomass potential will be briefly addressed.

2. Factors affecting the production of activated carbon from biomass

Although biomass waste has various additive properties to produce activated carbon (AC) with effective characteristics, differences in the chemical composition of lignocellulosic biomass and various production processes are an obstacle for industrial-scale production. Therefore, properties such as the chemical composition of the biomass and the preparation method, pore size, total pore volume, surface area and yield etc. affect the adsorption characteristics of the synthesized activated carbon (Ahmed et al., 2019; Baldania et al., 2021; Danish and Ahmad, 2018).

Apart from the AC preparation methods, char product is a relevant factor determining the economic efficiency of the precursor. The carbonization products of various raw materials are depicted in Table 1. Char products are obtained from the carbonization of various lignocellulosic, polymeric and carbonaceous raw materials (Figure 3). Noteworthy is that pre-oxidation of some polymers can be one of the very effective ways to increase the solid waste product (Grzyb et al., 2004; Carrott et al., 2018).

Table 1. Char products obtained from the carbonization of various raw materials (Grzyb et al., 2004; Carrott et al., 2018).

Raw material	Temperature °C	Char yield wt%
Cellulose	800	19
Lignin	800	43
Palm kernel shell	900	33
Walnut shells	800	26
Coconut shells	800	29
Hazelnut shells	800	25
Cherry stones	800	25
Chitozan	800	30
PFA	800	47
PET	800	19
PAN	550	44
PANox	550	67
Polyvinylpyridine (PVP)	550	9
PVPox	550	60
Phenol formaldehyde resin	800	43
Coal-tar pitch	800	45
Lignite	800	45-55
High-volatile bituminous coal	800	60-70

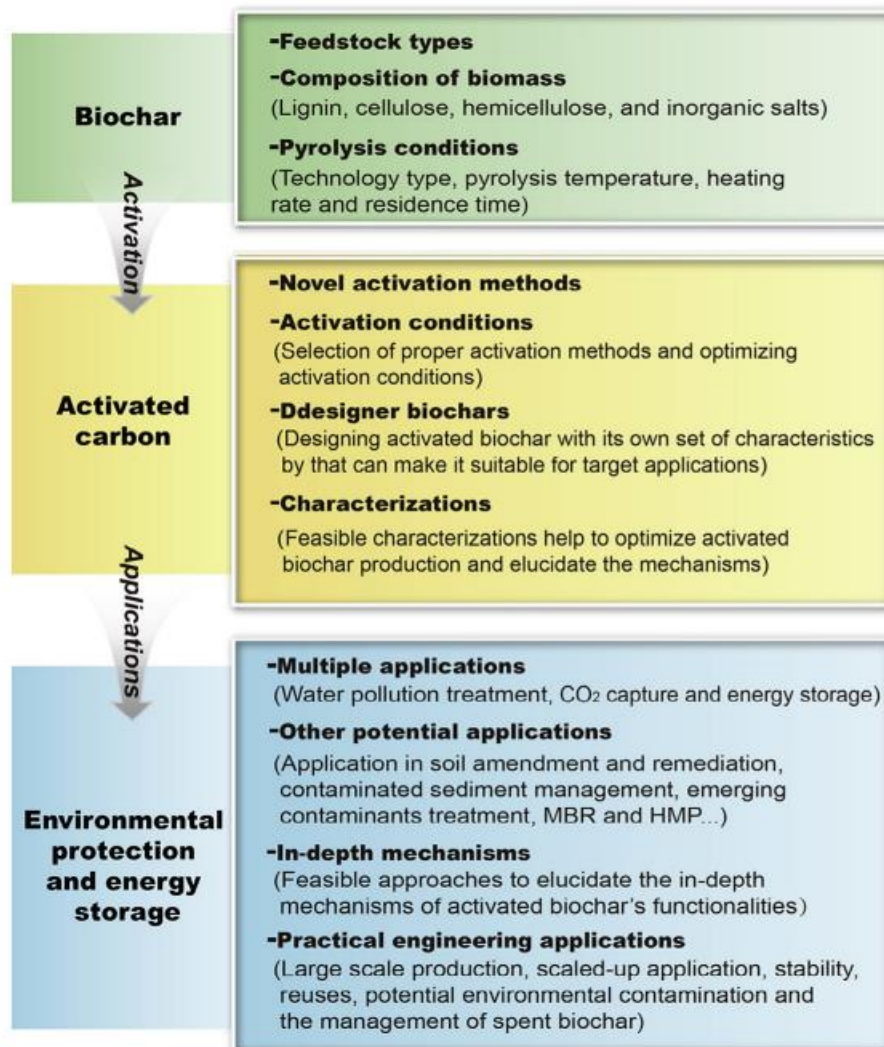


Figure 3. Factors affecting the char product, AC obtained via its activation and applications of AC (Tan et al., 2017).

Another precursor feature that is very important for AC is related to the presence of mineral matter. If AC is produced during physical activation as inorganic matter continuously accumulates during carbonization and subsequent carbon gasification, a low mineral matter content in the precursor is particularly desirable. Therefore, for the production of AC from coal, the ash content in the raw material should not exceed 5-7% by weight, and therefore a special selection and pre-heat treatment of the coal is required. This issue can be easily overcome by using wood and fruit peels due to their naturally low ash content (<1 and <4 wt.%, respectively). To summarize, AC can be prepared from any carbonaceous precursor. However, the most favorable properties for AC precursors are polymeric and macromolecular structure, high carbon content, low inorganic substance content and high carbonization product (Kierzek & Gryglewicz, 2020). Moreover, some of the most important features of AC are the high specific surface area and the high level of porosity (Bergna et al., 2018; Heidarinejad et al., 2020). The increasing potential of AC synthesized from biomass waste for the adsorption of impurities will increase the applicability and useful devices, which will lead to improving environmental protection (Spessato et al., 2019; Ani et al., 2020; Aljeboree and Alshirifi, 2018).

3. Methods of producing activated carbon from biomass

Factors such as particle size, temperature and heating rate are a few factors that affect the production of AC (Ioannidou and Zabaniotou, 2007). The synthesis of AC is basically divided into 2 parts. It is (1) Physical and (2) Chemical activation (Figure 4). Common features of these two methods are that they



are often affected by inoculation time, carbonization temperature and duration, chemical composition of the raw material, type of chemical activator used throughout production, and various other factors (Gayathiri et al., 2022).

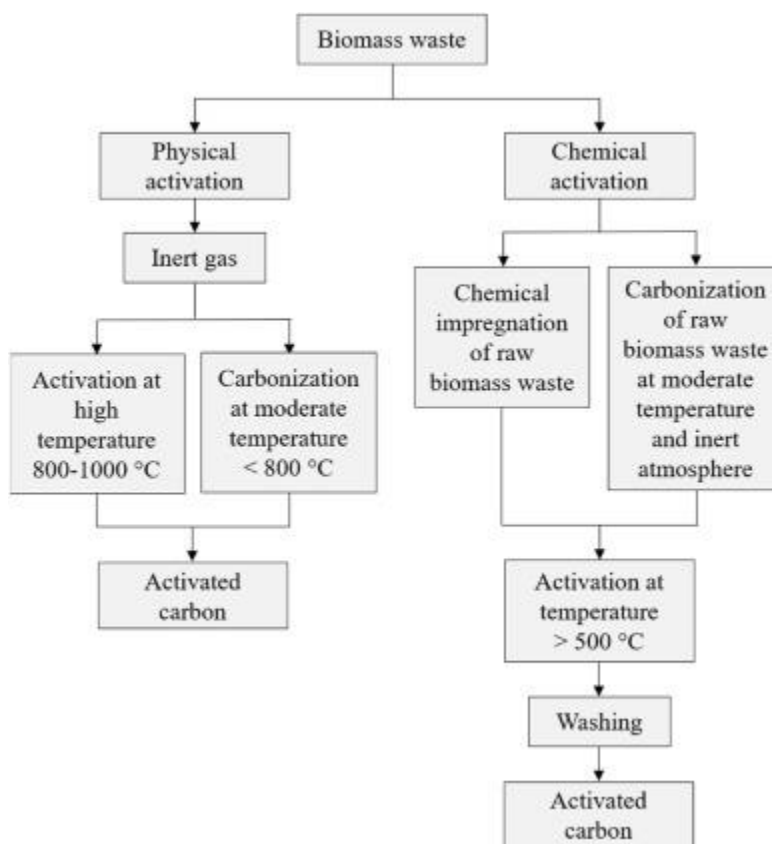


Figure 4. Production methods of biomass-based activated carbon (Gayathiri et al., 2022).

3.1. Physical activation

Physical activation generally involves carbonizing a carbonaceous substance at moderate temperatures and then activating the resulting char at high temperatures ($>800\text{ }^{\circ}\text{C}$) in the presence of suitable oxidizing gases such as steam, carbon dioxide (CO_2), nitrogen (N_2), air, or combinations of these gases. It is a gradual process. CO_2 is widely used as an activation gas due to its clean nature, is easy to manage and also allows better control of the activation step (Zhang et al., 2004). For example, Haykiri-Acma et al. (Haykiri-Acma et al., 2006) heated the biomass sample from room temperature (RT) to $140\text{ }^{\circ}\text{C}$ (held for 10 min) and increased the temperature to $1000\text{ }^{\circ}\text{C}$ (held for 30 min). Additionally, Marcilla et al. (Marcilla et al., 2000) produced activated carbon using two-stage physical activation in which the sample was heated from 275 to $400\text{ }^{\circ}\text{C}$ for the first stage and then heated to $850\text{ }^{\circ}\text{C}$ in the presence of nitrogen gas for the next stage (Marcilla et al., 2000). Carbonization removes moisture and volatiles from biomass waste, consequently developing pores by gasification with an oxidizing agent such as CO_2 and steam (Jjagwe et al., 2021). It has been found that during carbonization at high activation temperature, there is a decrease in volatile matter and an increase in fixed carbon (Aworn et al., 2008), so lignocellulosic biomass with high ash content and less fixed carbon is not suitable to be used as raw materials to produce activated carbon. Activation by CO_2 opens and expands mesopores and macropores, removing the exterior of the particle, contributing to more micropores (Petrovic et al., 2021). Previous literature by (El-Hendawy et al., 2001) found that when corn stover was activated with steam, activated carbon with higher surface area than that produced with CO_2 and enhanced pore formation. Different biomass wastes require different activating agents to obtain high quality activated carbon for use as adsorbent.



3.2. Chemical activation

In contrast to the physical activation step, the chemical activation step is usually accomplished by performing the carbonization and activation steps simultaneously by mixing chemical activating agents such as dehydrating agents and oxidants directly into the precursor. This type of activation procedure has several advantages, such as the ability to be completed in a single process at lower temperatures; This results in the production of a better activated carbon with a greater number of pores and the chemical reagents used in this step can be better recovered. To minimize harmful effects on the environment such as eutrophication in the aquatic environment due to the discharge of harmful chemicals into the aquatic environment (Alzaydien, 2016). Commonly used activating agents are zinc chloride, phosphoric acid and potassium hydroxide, and these chemicals are normally used to impregnate biomass waste, followed by the carbonization step, or the biomass waste is first carbonized and then chemically impregnated. Usually, the chemical activation step is carried out at temperatures above 500 °C and is followed by a washing step to remove chemical residues from carbonized biomass wastes as shown in Figure 4 (Johnson et al., 1999).

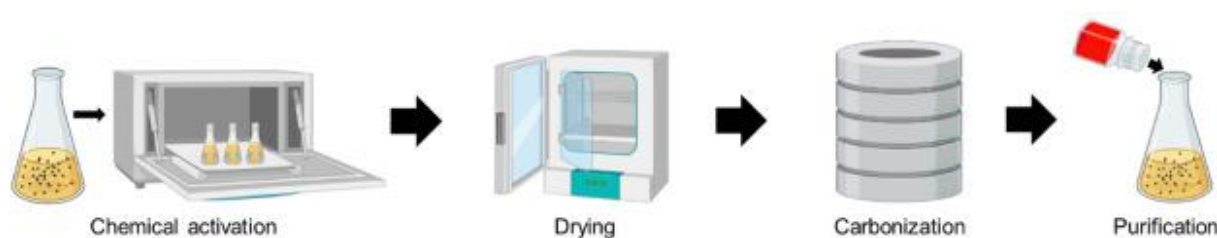


Figure 4. The chemical activation steps (Gayathiri et al., 2022).

Process flow diagram of the basic production of activated carbon by chemical activation. Strong acids or bases are often used as chemical activators followed by drying in an oven. Next, the carbonization process is carried out by heating in an oven in the absence of oxygen and in the presence of inert gas, and finally the resulting product is purified from the washing step using water, strong acids or other reagents (Gayathiri et al., 2022).

Activated carbon produced from wood treated with zinc chloride at 600 °C was found to show significant mercury adsorption compared to those produced by steam activation alone (Hu et al., 2009). Phosphoric acid has previously been used as a chemical activator in various lignocellulosic biomass wastes, such as almond and walnut shells (Ahmedna et al., 2004), peanut shells (Girgis et al., 2002), and corn stover (El-Hendawy et al., 2001). However, it was found that activated carbon produced from almond peel by zinc chloride activation showed better properties than those prepared from phosphoric acid (Ahmedna et al., 2004). Zinc chloride ($ZnCl_2$), which is the same activating agent for both pomegranate seed and grape stem, and the impregnation ratio (2:1/raw material: $ZnCl_2$) are used by (Tsai et al., 1998) corn cobs were chemically activated with zinc chloride for 0.5-4 hours and the carbonization stage was carried out at temperatures ranging from 400 to 800 °C and the highest surface area was $960\text{ m}^2\text{g}^{-1}$ and was obtained with an impregnation ratio of 0.5, and the activation temperature is 500 °C (Tsai et al., 1998). Additionally, when the rice husk was impregnated with argon gas at 600 °C for 3 hours and then with CO_2 for 1 hour, a surface area of $480\text{ m}^2\text{g}^{-1}$ was obtained (Yalçın and Sevinç, 2000). Therefore, it can be observed that despite using the same chemical activator ($ZnCl_2$), factors such as impregnation ratio, type of raw material, and processing conditions, including temperature and time during the carbonization step, affect the surface area of the synthesized activated carbon (Gayathiri et al., 2022).

4. Conclusion

Nowadays, drastic change in technology, population growth, industrial activities and depletion of resource are increasing all over the world the consequences such as massive environmental degradation, ecological imbalance, destruction of biological functions, public health threats. Intensive studies are required to produce optimal quality AC that is much more suitable for the desired applications. AC obtained from biowastes has very effective adsorbent characteristics, is economical and shows a promising approach. Lignocellulosic biomass has been widely used as precursors for the formation of AC due to the availability of three key components such as cellulose, hemicellulose and lignin, which



contribute to high porosity. In addition, the choice of biomass, as well as the type of pre-heat treatment before activation, affects the surface area and porosity of the chars. In addition, the optimization steps and their associated charges are essential to determine the ideal parameters as a result of the highest efficiency of the AC before the production functions.

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POROUS CARBON MATERIALS AS SUPERCAPACITOR ELECTRODES

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ABSTRACT

The performance of supercapacitors (SCs) depends mostly on the charge storage mechanism as well as the specific materials chosen for the electrolyte and electrode components. Therefore, improving new materials and increasing capacitance with advancing performance is an important goal for advanced SC devices. Significant advances in SC materials are exploring a variety of options, including metal oxide, carbon-based materials, and conductive polymers, aimed at increasing conductivity, maximizing active charge storage states, improving overall capacitance, and increasing electrode surface area. Integrating hybrid materials by adding multifunctional materials to simple electrodes contributes significantly to these advances. Carbon-based materials have the advantage of providing significantly higher surface area and pore volume, which is useful for energy storage devices. The ability to change pore size and morphology is a unique property of carbonaceous materials. This is owed to its distinctive properties such as high specific surface area with tunable pore size, advanced pore architecture, and chemical stability of nanoporous carbon materials for energy and environmental applications. Porous carbon materials have become the most common electrode material in EDLC due to their high specific surface area, pore structure, good electrical conductivity, thermal stability and low cost. However, in order to ensure sustainable development and meet the demands of a rapidly developing human society, such devices must also have low cost and acceptable environmental pollution.

In this study, we investigated with a systematic perspective the recent developments regarding the important achievements and main challenges in the development of porous carbon materials for SC applications.

Keywords: Supercapacitor, Electrode, Energy Storage, Porous Carbon Materials

1.Introduction

Küresel ısınma, çevresel bozulma ve yenilenemeyen enerjiye bağımlılık nedeniyle alternatif yakıt, yüksek değerli kimyasallar ve enerji kaynakları bulmak daha önemli hale geldi

Finding of alternative fuels, high-value chemicals and energy sources has become more important due to global warming, environmental degradation and dependence on non-renewable energy (Rawat et al., 2022; Zheng et al., 2022; Fan et al., 2023). Advances in new energy technology could reduce demand for conventional energy (Fu et al., 2019a, Fu et al., 2019b). The rapid depletion of non-renewable energy resources and serious environmental problems greatly promote the use of clean and renewable energy (Béguin et al., 2014; Li and Wang, 2019; Chen et al., 2020). Therefore, the development of alternative energy sources and reliable energy storage technologies has become the key to solving current problems (Cao et al., 2021). Supercapacitors, as an intermittent step during energy utilization, have attracted great attention due to their ultra-fast charge-discharge speed, high power density, low



maintenance, and long cycle life (McCloskey, 2015; Liu et al., 2019; Wang et al., 2020). ; Xie et al., 2020) (Figure 1).

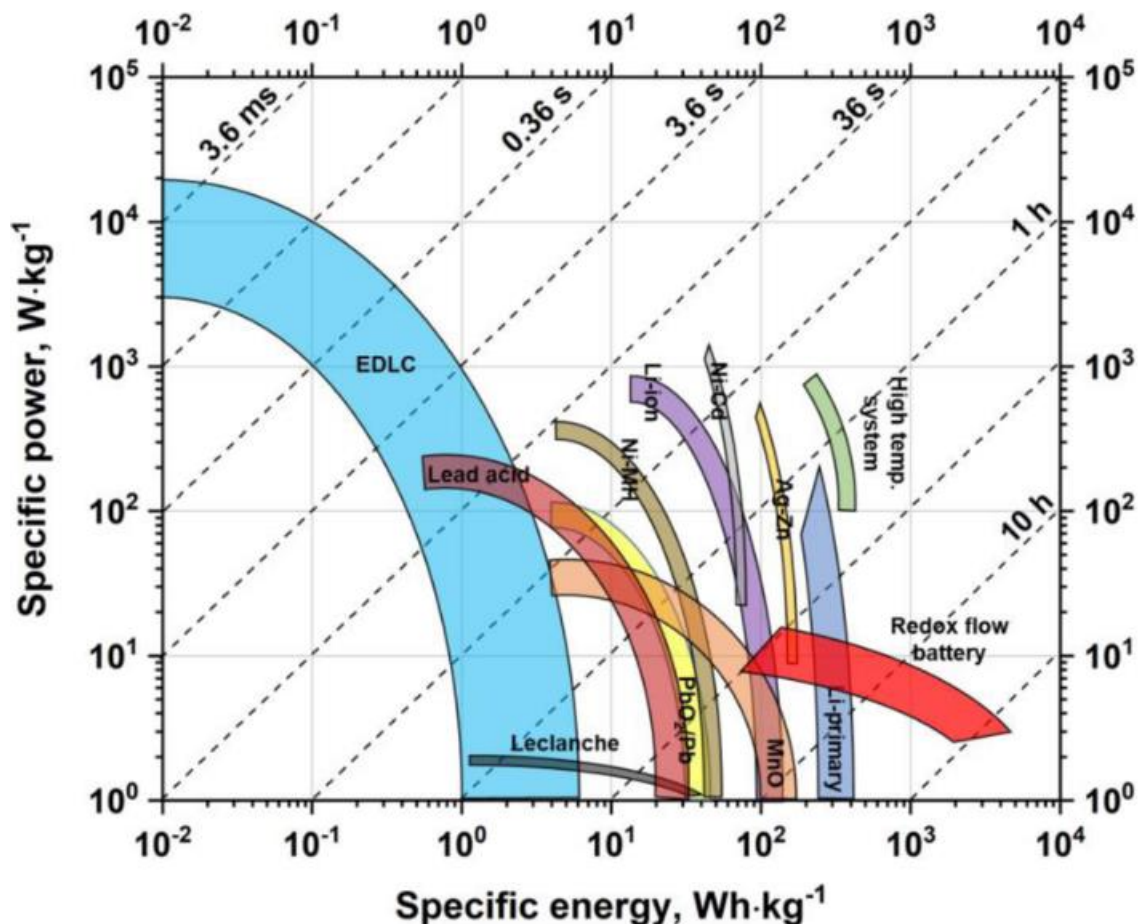


Figure 1. Comparison of Ragone curves of batteries and supercapacitors (Galek et al., 2020).

Therefore, an important goal for an advanced supercapacitor is to choose an ideal electrode material. Among various electrode materials, porous carbons are considered an attractive electrode candidate for supercapacitors due to their large surface area, tunable pore size, high conductivity, and broad chemical stability. However, the limited energy density of current supercapacitors greatly hinders their widespread application. The energy density of supercapacitors critically depends on the structure and properties of the porous carbon electrode, and therefore optimizing it is the key to improving the electrochemical performance of supercapacitors (Xie et al., 2020). Electrode material selection is one of the most important factors to solve this problem. The porous carbon-based material has a high specific surface area, does not undergo chemical reactions during the charging and discharging process, and relies on the electrical double-layer mechanism to store the charge with high reliability and cycling stability (Wang et al., 2021 ; Han et al., 2020 ; Yang et al., 2021). For this type of material, specific surface area and pore structure are the key factors affecting capacitance. According to the electric double layer theory, a larger specific surface area provides more charge storage space and increases the specific capacity. When the specific surface area of the carbon material is small, the specific capacitance is positively correlated with the specific surface area (Cao et al., 2021). This study discusses in detail the porous carbon types and configuration used in supercapacitors, as well as their functional mechanisms.

2.Porous carbons for supercapacitor electrodes

Combining smaller and larger pores is safe and very important for ion transfer within the electrode material (Schwieger et al., 2016; Borchardt et al., 2018). In this case, a large number of porous carbons consisting of pores of different lengths ranging from micro (<2 nm), meso (2~50 nm) and macro pores (>50 nm) have been developed (Trogadas et al., 2016; Liu et al., 2017; An et al., 2017; Gadipelli et al.,

2020) and pore types are shown in (Figure 2-a) (Liu et al., 2017). The main purpose of using these macro-meso-micro porous carbons is the effectiveness of small micropores in filtering the counter ion charge and achieving a high energy density within certain geometric limitations. Macro- and meso pores can provide 'ion path planning' for fast and efficient charge transfer (Figure 2-b) (Zhou et al., 2018; Yu et al., 2015; Lee & Pyun, 2006).

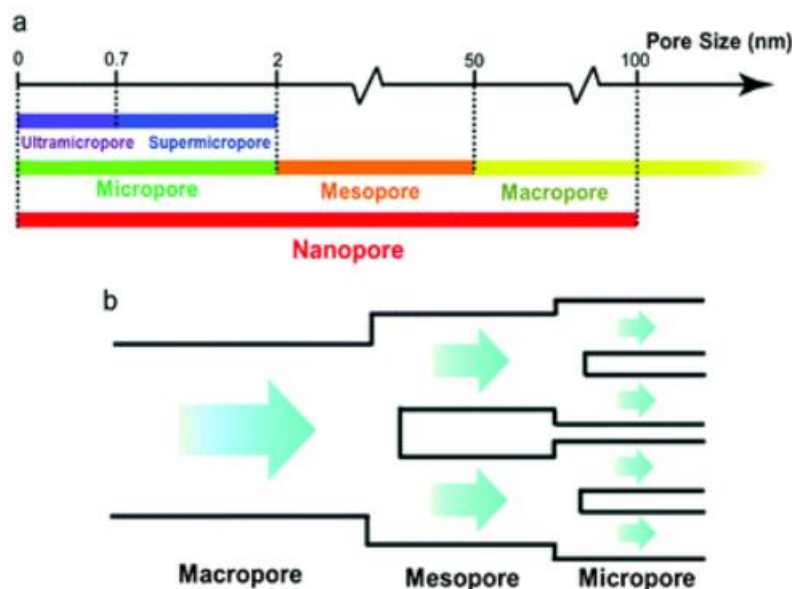


Figure 2. a) Classification based on the width of the pores, b) Schematic representation of ion diffusion path depending on pore structure (Xie et al., 2020).

2.1. Activated carbon

Activated carbon (ACs) is a widely used electrode material with the advantages of large surface area, good electrical properties and low cost. ACs are usually produced by physical (thermal) and/or chemical activation of various carbonaceous materials such as wood, coal, nut shells, etc. (Wang et al., 2021; Wang et al., 2020; Nguyen et al., 2021). Physical activation generally refers to high-temperature (700~1200 °C) processing of carbon precursors in the presence of oxidizing gases such as steam, carbon dioxide, and air. Chemical activation is usually carried out at a lower temperature (400~700 °C) using activators such as potassium hydroxide, sodium hydroxide, and zinc chloride (Lin et al., 2018; Jin et al., 2010).

The electrical conductivity of activated carbon is generally low, which hinders its development (Salunkhe et al., 2015). High conductivity and good pore affinity for electrolytes are two important properties for AC-based high-speed supercapacitor electrodes. However, relatively opposite situations occur, which can typically regulate each other, making it difficult to simultaneously increase conductance and hole affinity due to tug-of-war communication (Wang et al., 2022). Additionally, (Wang et al., 2022) set out to optimize the preparation methods to improve electrical conductivity. Depend on the different oxidation resistance of graphitized carbon and amorphous carbon, activated carbon (HGCAC) with a well-designed heterogeneous structure with graphitized carbon shell, amorphous carbon and hydrophilic pores has been successfully prepared by solid phase milling, catalytic graphitization, heat treatment (Figure 3). And this supercapacitor showed low power density of 250 W kg⁻¹ and high energy density of 7.21 W h kg⁻¹. These mechanisms limiting the evolution of AC are also unresolved: first, the relatively low energy density, and second, the pore formation mechanism after carbonization activation is still unclear (Yang et al., 2013).

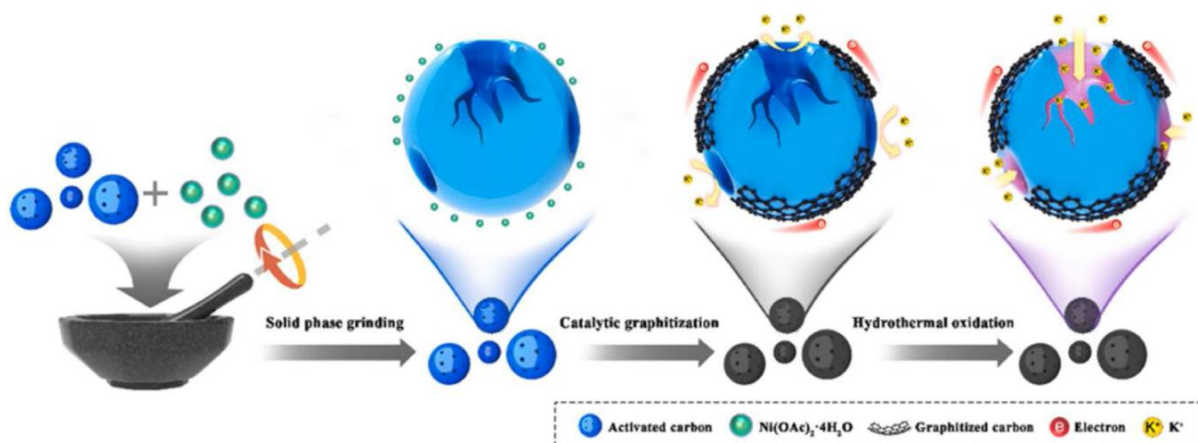


Figure 3. Activated carbon (HGCAC) process with heterogeneous structure (Yang et al., 2013; Wang et al., 2022).

2.2. Templated carbons

Templated porous carbon (TCs) created using the templated carbonization technique can be made with structural control at the nanometer level. There are two different TC production methods, namely the soft template synthesis method and the hard template synthesis method (Figure 4) (Xie et al., 2016).

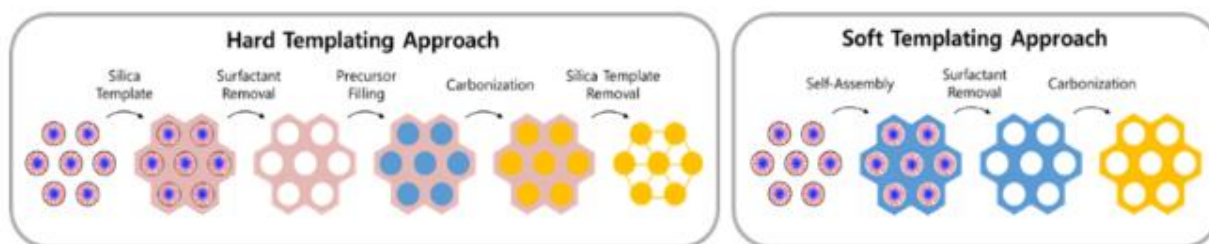


Figure 4. The hard- and soft-templating methods (Kang et al., 2023).

The soft template technique consists of the self-assembly of a carbon precursor and usually a surfactant following carbonization to produce ordered mesoporous carbon. The hard templating method involves selecting a templating agent with a unique pore structure and morphology (such as zeolite or metal oxide), introducing it into the pores of the carbon precursor for high-temperature carbonization, and then removing the templating agent to obtain porous carbon with template-like morphology. The ordered porous carbon produced by the template technique matches the interconnected mesoporous structure of the porous templates (Nishihara& Kyotani, 2012). Selecting or changing of the template's pore structure can directly direct the pore structure of porous carbon (Wang et al., 2021). Template porous carbon can produce a regular mesoporous structure with the template's help, but due to its limited micropores, the specific surface area can rarely exceed $1000 \text{ m}^2 \text{ g}^{-1}$. Consequently, increasing of the specific surface area requires the use of activators to occur micropores, which is also a limitation of the templating technique (Lu et al., 2017). Moreover, high-strength acidic chemicals are often added during the removal of the agent from the template, and causing environmental pollution (Zhang & Zhao, 2009). As a result, this template method is of great importance in the production of ordered mesoporous carbon, but the reduction of the specific surface area and the resulting pollution problem become inevitable (Cao et al., 2021).

2.3. Graphene

A layer of atomically thin carbon atoms forms the two-dimensional crystal known as graphene, which is isolated from the substance graphite. Structurally, it can be viewed as a section of unfolded CNTs. Graphene is used more frequently in supercapacitors due to its numerous special properties. Graphene exhibits exceptional electrical conductivity, thermal stability, chemical stability, flexibility and specific surface area. Graphene shows the most comprehensive properties among currently developed carbon



materials. Xu and co-workers prepared functionalized graphene gels by one-step reduction of graphene oxide with hydroquinone. The resulting functionalized graphene gels exhibit high electrochemical performance in supercapacitors and can be used as electrode materials without the need for additional additives (Xu et al., 2013). It is not difficult to find that the role that a single porous carbon can play as an electrode material is still limited, and there are three main shortcomings: First, the graphite structure of porous carbon is weak, the degree of graphitization is low; Second, the pore structure of porous carbon is undeveloped and the effective surface area is low; Finally, the absence of heteroatom doping. To address these issues and maximize the performance of supercapacitors, porous carbon should be combined with other materials to form binary or even ternary composite systems (Yang et al., 2023). π - π interactions between graphene sheets lead to easy agglomeration and stacking of graphene, resulting in decreased specific surface area, specific capacitance, and energy density. To address this issue, a significant amount of research has focused on creating three-dimensional graphene with open pore structure to increase the specific surface area without reducing the electrical properties of graphene materials (Sivakumar et al., 2011 ; Cao et al., 2021).

2.4. Carbide-derived carbons

Carbide-derived carbon (CDC) is a new type of carbon material produced by etching metal atoms from the carbide lattice. The most advantageous feature of the CDC preparation method is that the shape and size of the carbide does not change during the etching process and the carbon material can be arranged at the atomic level. The simplest and most commonly used preparation method of CDC is the halogen etching method, that is, freshly prepared halogen (F_2 , Cl_2 , Br_2 , I_2) or halogen compounds (CCl_4 , $CHCl_3$, Cl_2 -HCl, Cl_2 - H_2 , HF) are used. Nowadays, precursors such as TiC, SiC, Mo_2C , Al_4C_3 , Fe_3C_4 , Ti_2AlC and ZrC have been reported (Jänes et al., 2007; Ding et al., 2016). CDC has all the properties of an ideal double-layer electrode material: large specific surface area, precise and tunable pore size distribution, high electronic conductivity etc. (Lukatskaya et al., 2014). This pore structure of CDC can be precisely tuned between 0.6 and 1.1 nm by using various precursors or varying the etching temperature throughout production (Chmiola et al., 2006 ; Jänes et al., 2007 ; Ding et al., 2016; Cao et al., 2021).

2.5. Biomass-derived carbon materials

Carbon produced from biomass is a porous carbon material created by high-temperature carbonization and activation reactions using carbon-rich biomass as a carbon precursor. Currently, there are two common raw materials for the preparation of biomass porous carbon: It is a carbohydrate such as glucose (Feng et al., 2020; Tooming et al., 2015) fructose (Cao&Yang, 2018) sucrose (Vazquez-Samperio et al., 2020) and starch (Yadav et al., 2018), and the other is a natural plant and animal matrix materials such as Pollen (Cao et al., 2021), chitin (Zheng et al., 2021), grapes (Wang et al., 2020), cellulose (Ewulonu et al., 2019), hair (Zhao et al., 2020). Biomass raw materials have a large number of natural microscopic pore structures and a variety of heteroatoms, so biomass-based carbon materials also have different microscopic morphology, such as surface chemical properties and a large number of pore structures (Figure 5).

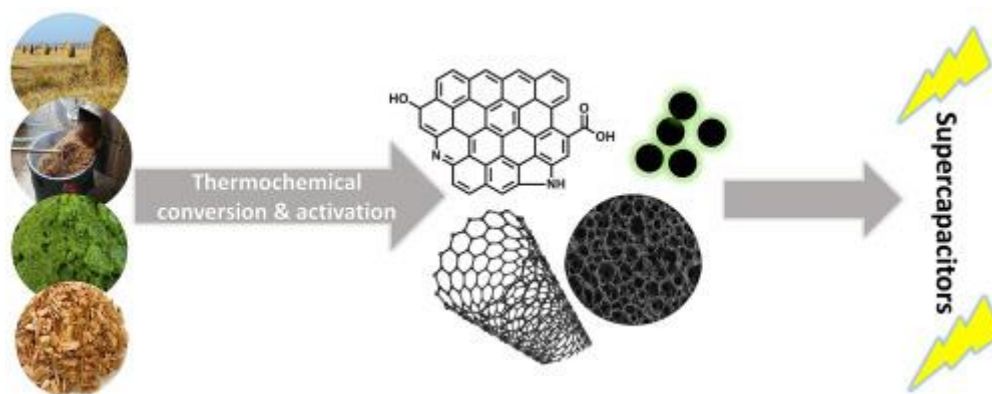


Figure 5. Biomass-derived carbon materials for supercapacitors (Rawat et al., 2022).



Since biomass is not only a carbon source for activated carbon production, but also has a natural structure, using by their full potential of these structures enables the formation of effective pore structures in biomass-derived porous carbon products. The advantages of biomass-based porous carbon materials are their low cost, wide availability, environmental friendliness, and ease of preparation. Its applications in energy storage field are critical for the long-term development and protection of the environment (Cao et al., 2021).

3. Conclusion

As a result;

1-The preparation process of activated carbon is simple and the preparation process is mature, so it has the advantages of low cost, high specific surface area and high specific capacitance, and is very practical. But activated carbon is greatly affected by impurities.

2-Template carbon can control the pore structure of carbon materials through the introduction of templates. Porous carbon with macropores-mesopores-micropores not only reduces ion transport resistance but also provides large specific surface area.

3-Graphene has a very high conductivity and a very large specific surface area. When applied to supercapacitors, it shows fast charge-discharge properties and good cycling stability. However, the disadvantage of graphene is that it is easy to stack up between layers and is very expensive compared to other porous carbons.

4-In particular, the energy density performance of porous carbon supercapacitors is insufficient. Therefore, it is of great importance to develop advanced functional properties of porous carbon materials as high-performance electrode materials for supercapacitors.

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ULUSAL KÜLTÜR DEVRİMİNDE KÖY ENSTİTÜLERİ'NİN ROLÜ: EĞİTİMDE İSMAİL HAKKI TONGUÇ

THE ROLE OF VILLAGE INSTITUTES IN THE NATIONAL CULTURAL REVOLUTION IN EDUCATION, AS ADVOCATED BY ISMAIL HAKKI TONGUÇ

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ÖZET

Bu araştırmada, Türk milletinin Kurtuluş Savaşı'ndaki üstün mücadelesine benzer bir çaba göstererek çağdaşlaşma yolundaki çabaları ele alınmıştır. 1923'te başlayan Kültür Devrimi, Türk milletini aydınlatmayı ve çağdaş medeniyet seviyesine yükseltmeyi amaçlamıştır. Bu hedeflere ulaşılırken, millî kimliğe büyük önem verilmiş ve eğitim programının temel unsurları olan öğrenci, öğretmen ve eğitim programları üzerinde vurgu yapılmıştır. Bu unsurlar, Mustafa Kemal Atatürk'ün özel bir önem verdiği konular arasında yer almıştır.

Türk milletini okuryazar hale getirmek, kültür ve sanat alanında geliştirmek, millî değerleri uygar yollarla zenginleştirmek ve Atatürk'ün inkılaplarını kökleştirmek amacıyla 1932'de 14 il merkezinde "Halk Evleri" kurulmuştur. Bu merkezler, Türk milletine eşit koşullarda eğitim imkânı sunarak bir bütün halinde eğitim-öğretim ve kültür hizmeti vermiştir. Ancak, şehir merkezlerindeki aydınlanma, köylerde aynı ölçüde gerçekleşmemiştir. 1935'te ülke nüfusunun büyük bir kısmının yaşadığı köylerde yeterli okul ve öğretmen bulunmamıştır.

Özellikle 1. Dünya Savaşı ve Kurtuluş Savaşı'nın yükünü çeken köylüler, henüz yeterince aydınlatılmamışlardır. İşte bu noktada, İsmail Hakkı Tonguç'un öne çıktığı görülmektedir. Tonguç, köylerdeki eğitim sorununa dikkat çekmiş ve köylüye yönelik bakış açısıyla Atatürk'ün "Köylü milletin efendisidir!" sözleriyle örtüşmektedir. 1933'te yayımladığı "İş ve Meslek Terbiyesi" kitabında köy enstitüleri sistemine dair ipuçları vermiştir. Bu çalışmasıyla, Türk köylüsünün aydınlatılmasına yönelik çözümler önermiş ve bu yolculuktaki önemli bir durak olarak Köy Enstitüleri'ni vurgulamıştır.

Sonuç olarak, Atatürk İlkeleri ve İnkılaplarının rehberliğinde, Türk köylerine liderlik edecek donanımlı köy öğretmenleri ve meslek erbaplarıyla birlikte Köy Enstitüleri'nin önemi vurgulanmıştır. Atatürk'ün "Köylü milletin efendisidir" sözü, bu çerçevede anlam kazanmış ve Türk milletinin çağdaşlaşma çabalarında eğitimin kilit bir rol oynadığı vurgulanmıştır.

Anahtar Kelimeler: Eğitim, Kültür Devrimi, Köy Enstitüleri, İsmail Hakkı Tonguç.

ABSTRACT

In this research, efforts towards modernization have been discussed by drawing a parallel with the superior struggle of the Turkish nation during the War of Independence. The Cultural Revolution, which began in 1923, aimed to enlighten the Turkish nation and elevate it to the level of contemporary civilization. While striving for these goals, great importance was given to national identity, and emphasis was placed on the key elements of the education program: students, teachers, and educational programs. These elements held a special significance among the topics that Mustafa Kemal Atatürk prioritized.



To make the Turkish nation literate, to develop in the fields of culture and art, to enrich national values through civilized means, and to solidify Atatürk's revolutions, "People's Houses" were established in 14 provincial centers in 1932. These centers provided equal educational opportunities, offering integrated education, training, and cultural services to the Turkish nation as a whole. However, the enlightenment in urban centers did not occur to the same extent in villages. In 1935, there were insufficient schools and teachers in the villages where a significant portion of the country's population resided.

Especially those who bore the burden of World War I and the War of Independence in the villages had not yet been sufficiently enlightened. This is where Ismail Hakkı Tonguç comes to the forefront. Tonguç drew attention to the education problem in villages and his perspective towards the villagers aligns with Atatürk's words, "The peasant is the master of the nation!" In his book "Occupation and Vocational Ethics" published in 1933, he provided clues about the village institute system. With this work, he proposed solutions for the enlightenment of the Turkish peasants and emphasized Village Institutes as a significant stop on this journey.

In conclusion, under the guidance of Atatürk's Principles and Revolutions, the importance of Village Institutes was emphasized, along with equipped village teachers and professionals who would lead Turkish villages. Atatürk's statement, "The peasant is the master of the nation," gained significance in this context, highlighting the crucial role of education in the Turkish nation's efforts towards modernization.

Keywords: Education, Cultural Revolution, Village Institutes, Ismail Hakkı Tonguç.

GİRİŞ

Mustafa Kemal'in liderliğinde, Millî Mücadele Dönemi'nde büyük başarı elde eden Türk milleti, bir kez daha Başöğretmen Mustafa Kemal'in önderliğinde millî eğitim mücadelesine girişmiştir. Bu mücadele, temel olarak Türk milletini aydınlatmayı ve çağdaş medeniyet seviyesine yükseltmeyi hedeflemiştir. Bu amaçla, millî egemenliğe dayanan ve değişim ve gelişime olanak tanıyan bir ortam hazırlayacak olan cumhuriyet rejimi gibi büyük bir devrim gerekmekteydi. Atatürk'ün inkılaplarındaki temel ilke ve değer, Cumhuriyetçilik olmuştur. Bu ilke, Cumhuriyet'in, Atatürk'ün inkılaplarının tüm kazanımlarını temsil eden değişmez bir devlet ve hükümet şekli olduğunu belirtir. Bu özellikle yeni Türkiye devletinin temelini oluşturur ve Cumhuriyetçilik, Türk inkılabının siyasal görüşünü ifade eder.

Bu anlayış, Cumhuriyet ile eğitim alanında yapılacak köklü inkılaplara zemin hazırlamıştır. "Millî, egemenlik hakkına sahip ve laik bir toplum oluşturmak, eğitimdeki iki başlılığın önüne geçmek, eğitimi uygarlık gereklerine göre düzenlemek ve Cumhuriyet'i güçlendirecek eğitim sistemini oluşturmak isteği ile eğitim ve öğretim alanında yeniliklere gidilmiştir." Bu alandaki en önemli adım, Tevhid-i Tedrisat Kanunu'dur. 3 Mart 1924 tarihinde kabul edilen bu kanun, yeni Türk devletinin kültür ve eğitim alanındaki gelişim ve değişimin önemli bir adımını temsil eder. Bu kanun, özellikle 19. yüzyılın sonlarından itibaren iki ayrı yönde ilerleyen medrese ve mektep sistemine son vererek kültür birliğini sağlamayı amaçlamıştır.

Türk dilinin özelliklerine aykırı olan Arap alfabesi, Türk milletinin okuma ve yazma becerilerini zayıflatmış ve kültür alanındaki gelişmeleri olumsuz etkilemiştir. Bu durum, Türkçenin gelişimine ve ihtiyaçlarına uygun olmayan Arap alfabesinin kullanılmasından kaynaklanmaktadır. Türk milleti, 8. yüzyıldan bu yana gelişen Türkçe diline, tarihine ve kültürüne sahip çıkabilmek, millileşebilmek, okuma-yazma becerilerini kolaylaştırmak ve kültür devrimini gerçekleştirebilmek adına Türk alfabesine geçme ihtiyacını hissetmiştir.

Bu düşünceyle, Türk alfabesiyle ilgili çalışmaların temeli atılmıştır. Atatürk'ün ve Bakanlar Kurulu'nun önerisi üzerine 26 Haziran 1928'de görevlendirilen Dil Encümeni, Türk alfabesini Türkçenin ses yapısına uygun, millî bir yapıya kavuşturma görevini üstlenmiştir. Dil Encümeni, önemli bir adım atarak Türk alfabesini oluşturmuş ve çalışmalarını tamamlayarak, Türk milletinin millî değerlerine bağlı, çağdaşlaşmayı amaçlayan köklü bir inkılap olan Harf İnkılabını gerçekleştirmiştir. Bu inkılabın TBMM tarafından 1353 sayılı kanunla onaylanmasıyla 1 Kasım 1928 tarihinde yürürlüğe girmiştir.



“Millet Mektepleri Talimatnamesi” ise Türk milletini yeni Türk harfleriyle okuryazar yapmak amacıyla 24 Kasım 1928'de Resmî Gazete 'de yayınlanmıştır. İsmet Paşa, bu talimatnamede halkın yaşadığı yerlerde uygun zamanlarda okuma-yazma kursları açılması, seyyar öğretmen örgütü oluşturulması, devlet kademesindeki memur-amirlerin Millet Mektepleri teşkilatında görev alması gibi önemli adımların atılacağını belirtmiştir. Atatürk, eğitimi bir milletin gerçek kurtuluşu olarak görmüş ve "Milletimizi gerçek saadete ulaştıracak irfan ordusudur." diyerek eğitime verdiği önemi vurgulamıştır. Bu çerçevede, Türk alfabesi ve eğitimde yapılan inkılaplar, Türk milletinin çağdaşlaşma ve millî değerlere bağlılık yolunda attığı önemli adımları temsil etmiştir.

Eğitim programının ana unsurları olan öğrenci, öğretmen ve eğitim programları, Türk milleti için oldukça önemli bir konu olarak Atatürk tarafından vurgulanmıştır. 1932 yılında, Türk milletini okuryazar hale getirmek, kültür ve sanat alanında geliştirmek, millî değerleri uygar yollarla zenginleştirip Atatürk inkılaplarını güçlendirmek amacıyla 14 il merkezinde "Halk Evleri" kurulmuştur. Bu sayede Türk milletine, eşit koşullarda bütünlük bir eğitim-öğretim ve kültür merkezi sunulmuştur (Aysal, 2004).

Ancak, şehir merkezlerinde aydınlanma yaşanırken köylerde bu durum gerçekleşmemiştir. 1935'te ülke nüfusunun büyük bir kısmının yaşadığı köylerde yeterli okul bulunmamakta ve var olan okullara gönderecek öğretmen eksikliği yaşanmaktadır. Çanakkale ve Sakarya Savaşı'nda yetişen öğrencilerin vatan ve bağımsızlık uğruna şehit düşmesi, özellikle Galatasaray, Konya ve İzmir liselerinin 1915'te bütün öğrencilerini şehit vermesi, köylerdeki eğitim sorununu derinleştirmiştir.

1933 yılında, köylerdeki eğitim sorunlarına çözüm getirmek amacıyla İsmail Hakkı Tonguç tarafından yazılan "İş ve Meslek Terbiyesi" kitabında köy enstitüleri sistemiyle ilgili ipuçları ortaya konulmuştur. Bu dönemde, özellikle köylülerin karşılaştığı zorlukları anlayabilen ve çözüm önerileri sunabilen bir aydın tipinin varlığı büyük önem kazanmıştır. İsmail Hakkı Tonguç'un köylerdeki eğitim sorunlarına dair görüşleri, Atatürk'ün "Köylü milletin efendisidir!" ifadesiyle uyumludur (Tan Gazetesi, 10.11.1942).

İsmail Hakkı Tonguç'un çalışmaları büyük ilgi görmüş ve 1935 yılında Cumhuriyet Halk Partisi'nin Büyük Kurultayı'nda, köyleri kalkındırma hareketinin planlı bir şekilde başlatılması kararı alınmıştır. İsmail Hakkı Tonguç, bu süreçte Milli Eğitim Bakanı Saffet Arıkan tarafından İlköğretim Genel Müdürlüğü'ne atanmıştır. Görevine başladığında, "İlköğretim ve Eğitim Meselesi" adlı bir rapor hazırlayarak Saffet Arıkan'a sunmuştur.

Atatürk'ün önerisi üzerine, küçük köylerde görevlendirmek amacıyla daha önce askerliklerini onbaşı ve çavuş olarak tamamlamış bireylerin kısa süreli kurslardan geçirilmesi önerisiyle, İsmail Hakkı Tonguç'un gözlem ve deneyleri büyük önem kazanmıştır. Bu sürecin ardından 1937 yılında çıkan Köy Eğitimleri Yasası ile eğitim kursları başlatılmış, ilk kurs temmuz ayında Eskişehir Mahmudiye'de 84 adayla açılmıştır. Bu eğitimler, Köy Enstitüleri'nin kurulmasında önemli rol oynamışlardır.

Aynı dönemde, İsmail Hakkı Tonguç'un Avrupa'da yaptığı gözlemleri içeren "Köyde Eğitim" ve "Canlandırılacak Köy" adlı kitapları da gün yüzüne çıkmıştır. 1939'da düzenlenen Birinci Eğitim (Maarif) Şûrası'nda, köy öğretmeni yetiştirecek kurumların sadece okuma-yazma öğretmenliğinin ötesinde zanaat, tarım, hayvancılık, kooperatifçilik ve sağlık bilgisi gibi alanlarda da liderlik yapabilecek çok yönlü köy öğretmenleri yetiştirmesi kararlaştırılmış, bu yeni kurumlar "Köy Enstitüsü" olarak adlandırılmıştır (Tonguç, 1946).

17 Nisan 1940'ta Meclis tarafından kabul edilen ve 22 Nisan 1940'ta resmî gazetede yayınlanarak yürürlüğe giren 3803 sayılı Köy Enstitüleri Kanunu, Türk eğitim sisteminde önemli bir dönemeçtir. Bu kanunla başlatılan eğitim projesi zamanla Köy Enstitüsü projesine dönüşmüştür (<https://hukukbook.com/koy-enstituleri-kanunu/>).

Dünya genelinde dikkat çeken Türk eğitim sistemi, Köy Enstitüleri adı verilen girişimle şekillendirilmiştir. Bu proje, Atatürk İlkeleri ve İnkılapları çerçevesinde Türk milletinin birliğini, onurlu yaşamını, bağımsızlığını ve güçlülüğünü hedefleyen bir amaç taşımaktadır. İsmail Hakkı Tonguç ve dönemin Milli Eğitim Bakanları, bu girişimi oluşturarak Cumhurbaşkanı İsmet İnönü liderliğindeki yeni Türk devletinin öncülerinden biri olmuşlardır.



Atatürk'ün "Millî kültürümüzü, muasır medeniyet seviyesinin üstüne çıkaracağız." sözleriyle örtüşen bu anlayış, Köy Enstitüleri'ni kurma ve yönetme sürecini başlatmıştır. Köy Enstitüleri, 20 yıllık bir planlama ile oluşturulmuş ve toplumsal kalkınmayı hedefleyen bir yapıya sahiptir. Bu enstitüler, eğitim-öğretim-üretim kurumları olarak iç içe geçmiş ve "yokluktan üretmek" ile "yaşayarak ve uygulayarak öğrenmek" ilkelerini benimsemiştir.

Köy Enstitüleri'nin temel amacı, adil, özgüven sahibi, bilinçli, çalışkan, millî değerlere bağlı ve üretken bireyler yetiştirmektir. Bu enstitüler, teorik eğitim ile pratik eğitimi birleştiren, evrensel ve yerel bilgileri kapsayan, aynı zamanda yöreye özgü üretimleri gerçekleştiren eğitim ortamları olarak öne çıkmıştır (Şimşek, 2017).

Köy Enstitüleri, Türk eğitim sisteminin benzersiz bir projesidir ve bu özgünlüğü Hasan Ali Yücel tarafından şu şekilde ifade edilmiştir: "Köy Enstitüleri ilkesi; özgündür, Türk millî eğitim sistemine aittir. Dünyada bir örneği yoktur. Türk'e aittir. Bunun sebebi Köy Enstitüleri ilkesinin millet sevgisine dayanmasıdır. Köy Enstitüleri ilkesi bir eğitim kuramından öte ulusal bir kalkınmanın temel ilkesidir ve ulusal kalkınmanın gerçekleşmesi, hayata geçmesi atılımdır" (Şimşek, 2017).

Köy Enstitüleri Kanunu'nun kabul edildiği 17 Nisan 1940 tarihinde, bu okullara kimlerin kabul edileceği ve hangi niteliklere sahip öğrencilerin seçileceği konusunda şu belirlemeler yapılmıştır: "Kanuna göre, Köy Enstitülerine köy okulunun 5. sınıfı başarıyla bitiren sıhhatli ve yetenekli çocuklar seçilecek ve gerekli sınavlardan geçirilerek kabul edileceklerdir. Köy Enstitülerini başarıyla bitirip öğretmen olarak atanmaların 20 yıllık mecburi hizmete bulunacaklardır" (Gülen, 2022).

Köy Enstitüleri'nin öğrenci yetiştirme prensipleri şu ilkelere dayanmaktadır:

- Köy Enstitüleri öğrencileri köylüler arasından seçilmektedir.
- Seçilen öğrenciler, eğitimlerini köy ortamında alırlar.
- Bilimsel ve geleneksel yöntemlerle çiftçilik öğretimi yapılır.
- Köylüyü kalkındırarak zanaatları öğretmek, bu alanlarda eğitim vermek.
- Kooperatifçilik ilkesini öğretmek ve üretimi desteklemek.
- Kız öğrencilere ev ekonomisi, çocuk bakımı, dikiş gibi aile ve toplum hayatına faydalı dersler vermek.
- Başarı gösteren öğrencilere yükseköğretim imkânı sağlamak.
- Öğretmenlik mesleğine uygun olmayan öğrencilere köyde bir iş yapma serbestisi vermek.
- Öğrencileri zorlu köy hayatına uyum sağlayacak şekilde yetiştirmek.
- Köy Enstitülerini tarıma uygun yerlerde kurmak.
- Enstitülerde sürekli üretim yaparak devlete yük olmamak.

Bu prensipler, Köy Enstitüleri'nin öğrenci yetiştirme ve köy kalkınmasına katkı sağlama amacına yönelik temel ilkeleridir (Aydeniz, 2021).

"Öğrencileri sadece öğretmen olarak değil, aynı zamanda köyde meslek erbapları olarak yetiştirmeme" ifadesi, köylerdeki meslek erbaplarına olan ihtiyacı açıkça ifade etmektedir. Köy Enstitüleri, köylü çocuklarını eğitip geliştirerek onları köylere göndermiş ve bu sayede köylerde eğitimci kadroların oluşturulması için önemli bir adım atmıştır. Köy Enstitüleri mezunu öğretmenler, görev aldıkları köylerde çeşitli etkinlikler düzenleyerek Türk köylüsünü bilinçlendirmeyi hedeflemişlerdir. Bu etkinlikler genellikle kültürel, sanatsal, sosyal ve siyasi alanlarda gerçekleşmiştir. Köy Enstitüleri'nin Türkiye'ye 1940 ile 1954 yılları arasında önemli katkılarda bulunduğu söylenebilir.

Köy Enstitüleri'nde Üretim Güdüllü Tüketim

Köy Enstitüleri, eğitim-öğretim, araştırma, inceleme, üretim ve yönetim aşamalarını birleştiren bir modelle faaliyet gösterdiği için adları "enstitü" olarak belirlenmiştir. Köy öğretmeni ve meslek erbabını yetiştirmek amacıyla tarıma uygun arazilerde Köy Enstitüleri kurulmuştur. İsmail Hakkı Tonguç, bu



enstitülerin fikrini ortaya koyan ve hayata geçiren kişi olarak bilinir. Bilgi ve birikimin, hayatla bütünleştirilmesi gerekliliğini vurgulayan Tonguç, öğretmenler, müdürler, usta öğreticiler ve öğrenciler arasında iş ve üretim odaklı bir iş birliği kültürü oluşturmuştur.

Köy Enstitüleri'nde, öğretmen ve öğrenciler arasında işleri imece usulüyle paylaşan bir çalışma ortamı oluşturulmuştur. İmece anlayışı, işlerin birlikte yapılmasını ve dayanışmayı teşvik etmiştir. Bu çalışma modeli, öğrencilerin yaşam alanları, üretim alanları ve eğitim-öğretim alanlarını bir arada yönetmelerine olanak tanımıştır.

Enstitüler, yaşadıkları bölgelerde uygun eski binaları kullanarak tadilat yapmış veya yeni binalar inşa etmiştir. Elektrik üretimi ve yol inşası gibi faaliyetlerle çevre köyleri aydınlatmayı amaçlamışlardır. Köy Enstitüleri, nitelikli insan gücü yetiştirerek köylere eğitim ve sağlık hizmetlerini götürmeyi başarmıştır. 1946 yılına kadar 17.000 öğretmen ve 7300 sağlık memuru yetiştirilerek, köylerde temel hak olan eğitim ve sağlık hizmetleri sunulmuştur.

"Köy Enstitüsü Ders Programı, köylerin kalkınmasına katkıda bulunmayı hedeflediği için, kültür ve meslek bilgisi derslerinin yanı sıra ziraat ve teknik derslere de yer verilmiştir. Ayrıca, zirai işletme ekonomisi ve kooperatifçilik dersleriyle öğretmen adaylarına uygar bir kalkınma anlayışı aşılanmıştır." (Aysal, 2005). 17 Nisan 1940 tarihinde kabul edilen 3803 sayılı yasaya göre,

"Mezunlara 6 yıl boyunca 20 TL maaş ödenecek, 6. yılın sonunda 7. yıl itibarıyla 30 TL maaş alacaklar, 15. yılın sonunda ise 40 TL maaş alacaklardı. Ayrıca, Köy Enstitüsü mezunlarının atanmalarında bir kereye mahsus olmak üzere 60 TL verilmesi öngörülmüştür. Bu 60 TL'lik sermayenin yanı sıra, mezun öğretmenlere ailesinin geçimini sağlamalarına yetecek devlet arazisi ve tarım araçları temin edilecekti." (Aysal, 2005). Bu yasa hükmüyle, devlet mezunlara üretime teşvik sağlamıştır. Köy Enstitüsü mezunlarının, gittikleri köylerde özellikle tarım alanında rol model olmaları amaçlanmıştır.

Köy Enstitüleri'nde Okuma Hevesi

Okuma, bir bireyin gelişimine büyük ölçüde katkıda bulunan önemli bir etkidir. Özellikle geniş bir bakış açısına sahip, sürekli kendini geliştirmeyi amaç edinmiş, eğitim sürecinin yaşam boyu devam ettiğine inanan, bilgili ve kültürlü rehberlerin rehberliğinde, okuma faaliyeti büyük bir değer taşır.

Köy Enstitüsü öğrencileri genellikle ailelerinde okuma alışkanlığını görmemiş ve kitaplara, dergilere kolay ulaşamamış olsalar da ellerindeki imkanları zorlayarak büyük bir okuma alışkanlığı edinmişlerdir. Öğrenmek, bilgi sahibi olmak, düşünmek ve anlamak için çok sayıda kitap okuma pratiği, bu öğrencilerin genel öğrenim sürecine hâkim olmalarını sağlamıştır. Bu görüşü destekleyen bir örnek olarak, Köy Enstitüsü mezunu şair Mehmet Başaran'ın şu ifadeleri öne çıkar: "Evet, savaş bitecek, dünya değişecekti. Ancak, çok çalışmak, çok okumak zorundaydık. Hiç yitirecek zamanımız yoktu. İnsanlığın kültür kaynaklarına yeni yeni açılyorduk daha. Yunan klasiklerinden başlayıp günümüze doğru tüm düşünce ve sanat ürünlerini özümlemeliydik." (Keseroğlu, 2022).

Köy Enstitülerinin özgün bir amacı olan köy öğretmeni yetiştirmek, öğrencilerini geniş bir okuma kültürüne sahip bireyler olarak yetiştirmeyi de beraberinde getirmiştir. Enstitülerin, yazar yetiştirme konusunda tipik, özgün ve düşünülmesi gereken bir özellik taşıması, bu eğitim kurumlarının önemini vurgular.

Köy Enstitüsü mezunu yazar ve şairlerin ortaya koydukları eserler, toplumsal gerçekçi bir perspektifle şekillenmiş ve dikkat çekici olmuştur. Bu eğitim kurumlarında yetişen yazarların bu başarılarının temelinde ise çok yönlü ve bilinçli okuma alışkanlıkları bulunmaktadır. Ayrıca, demokratik bir okul yönetimi sayesinde düşüncelerini ve duygularını özgürce ifade edebilmeleri, eserlerini yazma ve paylaşma sürecini kolaylaştırmıştır.

Bu dönemde Türk edebiyatına önemli katkılarda bulunan unsurlardan biri de çok sayıda kitabın tercüme edilmiş olmasıdır. Milli Eğitim Bakanı Hasan Ali Yücel'in atanması ve 'Tercüme Bürosu'nun açılmasıyla birlikte, Bakan Yücel'in liderliğinde 649 klasik eserin Türkçe 'ye kazandırılması gerçekleşmiştir. Bu önemli çalışmaların yanı sıra, çeşitli dergi ve danışma kaynaklarının hazırlanması da Hasan Ali Yücel'in döneminde gerçekleşmiştir (Kalyancıoğlu, 2010).



Köy Enstitülü öğrencilerin yoğun kitap okuma alışkanlığı, büyük ölçüde öğretmenlerinin benzer bir alışkanlığa sahip olmalarından kaynaklanmaktadır. Öğrenciler, öğretmenlerinin kitap okuma eylemlerini gözlemleyerek kendilerini bu alışkanlığa yönlendirmişlerdir. Hasan S. Keseroğlu'na göre, öğretmenin kitap okuma pratiği, okuyan, düşünen bir birey olma özelliğini yansıtmaktadır. Bu durum, öğretmenlerin kitap okuma alışkanlıklarının, ilköğretimden başlayarak orta öğretime ve hatta yükseköğretime kadar olan eğitim süreçlerinde öğrencilerin kitap okuma alışkanlıklarını etkilediği gözlemlenmektedir (Keseroğlu, 2016).

Köy Enstitülerine Karşı Adaletsiz Muhalefet

1943 yılındaki 2. Eğitim Şurası'nda Köy Enstitüleri'ne yönelik artan olumsuz eleştiriler, genellikle araştırma ve gözlem yapılmadan, önyargılı düşüncelerle yapılan propagandalardan kaynaklanmıştır, özellikle muhafazakâr gruplar tarafından ortaya konulmuştur (Murtezaoğlu, 2022). Bu eleştirilere öncülük edenlerden biri Reşat Şemsettin Sırer olmuştur. Sırer, Köy Enstitüleri'nde öğrencilere verilen yetkiyi, demokratik eğitimi ve Atatürk ilke ve inkılaplarının öğretilmesini eleştirmiştir. Ayrıca, karma öğretimin Türk aile ve ahlâk anlayışına uymadığına dair eleştirilerde bulunmuştur. İlk tepkiyi gösteren isim ise Kâzım Karabekir olmuştur. Karabekir, Köy Enstitüleri'nin köylü-kentli ayrımı yarattığını düşünerek Halkçılık ilkesine uygun bulmamıştır. Ancak Milli Eğitim Bakanı Hasan Âli Yücel, köylerden 5. sınıfa bitirerek gelen öğrencileri sınava tabi tutarak bilgilerini ölçtüklerini ve amacın akıllı, sağlıklı, ahlâklı öğrencileri seçip köyden bilgili, sıhhatli, memleketine bağlı ve sorumlu vatandaşlar yetiştirmek olduğunu belirtmiştir. Hasan Âli Yücel, köylü çocuklarını köy ortamında kalkınmaya önderlik edecek şekilde bilgi ve kültürle donatarak köy üretimi ve yaşamının içinde kalmasını sağlamayı amaçladıklarını vurgulamıştır (Aysal, 2004).

Bu eleştirilere karşı Hasan Âli Yücel ve İsmail Hakkı Tonguç, 1940'ta köyden kente göçün önüne geçmek ve köylü çocuklarını köyde kaldırmak amacıyla Köy Enstitüleri'ni kurarak bu soruna çözüm getirmeye çalışmışlardır (Şimşek ve Gürler, 1994).

Toprak ağaları ve aşiret reislerinin mecliste ve siyasette etkili oldukları dönemde, "köye aydınlanmayı götürme" fikrine karşı olumsuz bir tutum sergiledikleri görülmektedir. Bu kesim, Köy Enstitüleri'ni eleştirirken "dinsizlik" ve "komünizm" suçlamalarını öne çıkarmışlardır. 1946 seçimlerinde CHP'nin ilerici kadroları büyük ölçüde tasfiye edilmiş ve sağın parti içinde etkili olmasına İsmet İnönü sessiz kalmıştır.

1946'da CHP iktidarı döneminde, toprak ağalarının muhalefetiyle birlikte Millî Eğitim Bakanlığı'na Reşat Şemsettin Sırer atanmıştır. Sırer, Köy Enstitüleri'ni Köy Öğretmen Okulları'na dönüştürmüş ve bu dönemde eğitim kadrosunda ve sisteminde önemli değişikliklere gitmiştir. Köy Öğretmen Okulları, 1954 yılına kadar eğitime devam etmiştir (Ataay, 2020). Sırer döneminde öğrencilerin eğitim alanlarında, temizlik işlerinde, tarım ve teknik uygulamalarda aktif olarak görev almasının, Köy Enstitülü eğitim kadrosunu komünist olarak suçlama noktasında etkili olduğu görülmektedir.

Eleştirilere tepki gösteren İsmail Hakkı Tonguç, eleştirilere karşı şu sözleri sarf etmiştir (Ataay, 2020): "Köy Enstitülerinin yöneticisi olarak, Köy Enstitülerinde çocukları tamamen kararlaştırıldığı gibi Köy Enstitüleri Kanunu'na göre çalıştırmaktayız. Ancak, saygıdeğer komisyonun fikir birliğinden ve anlatımlarından kuşulanıyorum ve Köy Enstitülerine karşı kötü niyet ve bozgunculuk hissediyorum."

Köy Enstitüleri'nin kapatılma sürecinde düzenlenen oylamada, 148 milletvekilinden üçü (Celal Bayar, Adnan Menderes, Fuat Köprülü) katılmamıştır. Bu üç milletvekili, mecliste Köy Enstitülerine karşı muhalefet etmişlerdir (Mısırlıoğlu, 2018). Celal Bayar, Adnan Menderes ve Fuat Köprülü gibi isimler, Demokrat Parti'nin kurucuları arasında yer almış ve 1950 seçimleri sonrasında iktidara gelmişlerdir. Demokrat Parti, 27 Ocak 1954 tarihinde çıkarılan 6234 sayılı kanunla Köy Enstitüleri'ni kapatmıştır. Bu kararın Türkiye'nin ilerlemesini durdurduğu iddia edilmiştir (www.sozcu.com.tr/2018/yazarlar/sinan-meydan/cumhuriyetin-sabah-gunesi-koy-enstituleri-2352176/?ysclid=lggtv96izj917486348).

SONUÇ

Cumhuriyet sonrasında Türkiye'de eğitim alanında gerçekleşen en önemli devrimler sırasıyla Tevhid-i Tedrisat Kanunu, Harf İnkılabı, Millet Mektepleri, Halk Evleri, Köy Eğitim Kursları ve Köy Enstitüleri olmuştur. Bu devrimler, hızlı ve planlı bir şekilde gerçekleştirilerek Türk milletinin



gerçekleri ve ihtiyaçları göz önünde bulundurulmuştur. Türkiye'ye özgü, Atatürk'ün ilkelerine bağlı, demokratik ve karma eğitilmiş 21 köy enstitüsü, kendi kendine yetebilme özelliğiyle öne çıkmıştır. Bu enstitüler, buldukları bölgelere yol açma, elektrik üretimi, bina inşa etme gibi faaliyetleriyle devlete yük olmadan eğitim-öğretim faaliyetlerini sürdürmüşlerdir.

Ancak, günümüzde tartışma konusu olan bir mesele olarak, bu özelliklere sahip olan köy enstitülerinin kapatılması, Türk gençliğini özgün bir eğitim kurumundan mahrum bırakmıştır. Köy Enstitüleri'nin eğitim anlayışı, teoriye odaklanmak yerine uygulama ve yaratıcılığa vurgu yapmış, ancak zaman içinde ezberci eğitimin yerleştiği öğretmen okullarına dönüştürülmüştür.

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COMPARING THE PRESERVATION OF 19TH-CENTURY ARCHITECTURAL HERITAGE IN ISTANBUL AND IN SALVADOR, BRAZIL: STRATEGIES, CHALLENGES, AND IMPACTS

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ABSTRACT

The preservation of 19th-century architectural heritage in urban contexts poses significant challenges and requires different strategies. Hence, this study contrasts the preservation of 19th-century architectural heritage in historical districts of two culturally distinct cities: Istanbul in Türkiye and Salvador in Brazil. Both cities have been capitals of their countries and currently boast significant historical centers and rich architectural heritage. However, the preservation, adaptation, and use of these monuments present unique challenges. Istanbul is a millennium-old city that hosts a diverse range of buildings from various periods, including many from the 19th century. Salvador, on the other hand, is the capital of the Bahia state in Brazil and was established as a colonial city in the 16th century, serving as the country's first capital. It also holds substantial architectural heritage dating back to the 19th century. Thus, understanding how strategies for preserving this architecture are developed and implemented today is crucial. The comparison between the cities contributes to a deeper understanding of issues related to the preservation of 19th-century architectural heritage and aids in the development of more effective and culturally sensitive strategies. Besides providing valuable insights into the challenges and impacts encountered in different cultural and geographical contexts, the historical and cultural contexts of these two cities are vastly different, with Istanbul being a cosmopolitan city that has been the capital of three major empires and has hosted various cultures throughout its history. Salvador, on the other hand, is a city with a strong African heritage alongside Portuguese influences. Historical and cultural disparities have unquestionably shaped the perception, valuation, and subsequent preservation of architectural heritage in each city. Despite these differences, the comparison between the two cities can help identify good preservation practices that can be shared and adapted between them. Currently, both face similar challenges in preserving architectural heritage, as they continue to experience growth and expansion, which can pose risks to historical buildings. Economic challenges in them may also make it difficult to invest in the preservation of marginalized architectural assets. Being so, this study begins with a literature review on 19th-century architecture in Istanbul and Salvador, as well as on its preservation. Subsequently, a comparative case study will be conducted, involving data collection on both cities. At the end, a qualitative analysis of the findings will be carried out, aiming to identify intrinsic patterns, unveil common challenges, and discern effective strategies.

Keywords: Architectural Heritage Preservation, 19th-Century Architecture, 19th Century Architecture Preservation, Comparative Case Study, Conservation.

1.1 Contextualization of the Problem

Preservation of 19th-century architectural heritage in urban contexts presents significant challenges and distinct strategies. Thus, this work compares the preservation of 19th-century architectural heritage in historic neighborhoods of Istanbul, Turkey, and Salvador, Brazil, two distinct cultures. Both cities were



capitals of their respective countries and remain important historical centers with rich architectural heritage but face unique issues related to the conservation, adaptation, and use of these monuments. Istanbul, a millennia-old city, hosts a wide array of buildings from different periods, including many from the 19th century. Salvador, now the capital of the state of Bahia and the former capital of Brazil, is a colonial city founded in the 16th century that also boasts significant 19th-century architectural heritage.

The comparison of 19th-century architecture is relevant given that it was a century of significant change in global architecture. This architecture, however, was long disregarded by many historians and architects, classified as architecture lacking commitment to ideas, as nostalgic architecture, and as a design approach that undervalued architecture as civic art (RABL, 1997). Peter Rowe, an internationally recognized architect and academic with significant contributions to the fields of architecture and urbanism, describes eclecticism as often a style that contributed little to the advancement of the study of architectural language and its significant uses. According to Rowe, eclectic works can be seen as mere appropriations of history, often used indiscriminately for stylization purposes (ROWE, 1987).

Renowned American historian and biographer Robert Twombly, primarily recognized for his studies and writings on American architecture and culture, states in his book "Power and Style: A Critique of Twentieth-Century Architecture in the United States" that, in sum, eclectic architecture in the United States was not socially neutral; it reflected the aspirations and status of the economic and social elite while incorporating a variety of international styles adapted to local circumstances and preferences. For him, eclecticism was a way to reduce architects' ability to think independently from those commissioning buildings (TWOBLY, 1995).

In the words of Philip Goodwin, a significant American architect, 19th-century architecture could be seen as "trends increasingly distant from reality" (CABRAL, 2010). In his book "Brazil Builds," the architect mentions an unstable fashion in 19th-century architecture that did not align with contemporary life or modern construction techniques (GOODWIN, 1943). Yves Bruand, a renowned Brazilian architect and urban planner, described eclecticism as an era "characterized by a lack of originality and an extreme complex of inferiority" (CABRAL, 2010).

Henrique Mindlin, a renowned Brazilian civil engineer and professor, in his book "Modern Architecture in Brazil," says that the nature of 19th-century architecture was originally imitative and followed its course by indiscriminately copying various models (MINDLIN, 2000).

Hugo Segawa, a renowned Brazilian architect and researcher, in his book "Arquiteturas no Brasil: 1900-1990," mentions the architects of the 19th century as more concerned with ephemeral pleasures than with lasting achievements, considering it a cultural inheritance without focus on modern techniques (SEGAWA, 2010).

Despite strong opposition to this typical 19th-century architecture, especially by proponents of modern architecture, and sometimes characterized as intellectual and architectural disorder, other critics proposed that eclecticism is indeed a distinct and coherent theory in its entirety.

Heinrich Klotz, a renowned German architectural historian and theorist, in his book "History of Postmodern Architecture," describes his idea regarding eclecticism. Klotz states that eclecticism embraces modernism, recognizing it as the most prominent style among all possibilities. Discussing "progress" in eclecticism is irrelevant, as its focus lies in the appeal of aesthetic play, a highly conservative approach fueled by consideration of effect. Furthermore, in his view, eclecticism emerges as a substitute, representing what is absent, casting its shadow over predominant ideas of the time, and delving deeply into the history of architectural forms, avoiding blind acceptance of historicism but also rejecting ironic and detached distance. However, Klotz asserts that good taste is an essential element of eclecticism, reflected in the careful choice of materials and in elegant and subtle details. Moreover, seen from two perspectives, eclecticism acts as an antidote to the absolute claims of the Modern Movement, addressing its deficiencies and representing seriousness, freedom of choice, and good taste. Against



postmodernism, eclecticism affirms history, adapting it for modern use without contradictions, smoothing its edges and incorporating its signs as reminders of past life (KLOTZ, 1988).

Peter Collins, a renowned British architectural writer and critic, known for his significant contributions to the understanding and analysis of contemporary and modern architecture, in his book "Changing Ideals in Modern Architecture 1750-1959," expresses an ambiguous view of eclectic architecture and eclecticism. On one hand, he recognizes that the resulting confusion from the combination of diverse styles may seem absurd and lead to deficient buildings from the perspective of research and experimentation. On the other hand, he considers this confusion as a necessary condition for the progress of architecture, a healthy activity that would allow general development in the architectural field. The author highlights the humility of the theorists of the time, who recognized the inadequacy of their own architecture and sought history as a guide for the future. However, they faced challenges in dealing with new technology and its ability to predict the architectural forms it would produce. Additionally, the author points out that despite criticisms of eclectic confusion, success in contemporary architecture was important to shift attention away from traditional concerns with form and style, allowing greater focus on practical issues of the time. Architects, while continuing to practice eclecticism, also maintained their interest in historical studies as a source of inspiration and elements incorporable into modern buildings. In summary, the author acknowledges the challenges and contradictions of eclecticism in architecture but highlights its role in the evolution and development of the field, both aesthetically and practically (COLLINS, 1965).

John Mordaunt Crook, an eminent historian of British architecture, described in his book "The Dilemma of Style: Architectural Ideas from the Picturesque to the Post-Modern" eclecticism in 19th-century England as a result of an attitude toward complex times. For him, eclecticism was seen as a solution to the style dilemma, offering a way to reconcile history and progress, art and industry, architecture and engineering. It was a way for architects to experiment with evolving ideas of industrial production, new materials, new conceptions of the past, and secular society. Crook also highlights eclecticism as a response to a transitional period, when the old rules and principles of architecture were suspended, but new rules had not yet developed (CROOK, 1987).

In Bruno Rabl's master's dissertation, he mentions that Robin Boyd, a renowned Australian architect, writer, and architectural critic, viewed eclecticism not as a system of ideas but rather as the freedom to choose a specific approach depending on the purpose or location of a building or the architect's mood (RABL, 1997).

Eclectic architecture was often seen as a discontinuity from the coherent line drawn for modernity (CABRAL, 2010). However, previous analyses of 19th-century architectural eclecticism highlight that criticism was not exclusively limited to unfavorable aspects of this architecture. The rejection of this style as a form of architecture, however, certainly impacted the recognition of this architectural expression as heritage. This scenario resulted in the demolition, abandonment, and modification of many buildings from this period, especially during the modern period.

In Brazil, for example, several modern buildings were listed as heritage sites early on, such as the Church of São Francisco de Assis in Belo Horizonte (designed by architect Oscar Niemeyer) in 1947 and the Ministry of Education and Health in Rio de Janeiro in 1948 (designed by architect Lúcio Costa). The "modernist-preservationists" who listed their own works made the process a self-consecration, disregarding works from the same period. The preservationist treatment regarding eclectic buildings, however, was different, evidenced by Lúcio Costa's statements about the listing of eclectic buildings on Rio Branco Avenue in Rio de Janeiro in the 1970s. Lúcio Costa strengthened the narrative that helped build that eclectic architecture did not belong to the "true architectural evolutionary line" and could not, in that sense, be classified as a representative of "authentic tradition." He denied it a place in Art History, stating that this architecture was not a period but a "hiatus" in that history (CABRAL, 2010). Only four eclectic buildings were listed in this process, indicating a restricted sample of aesthetic quality allowed for the eclectic style (CABRAL, 2010).



Therefore, it is crucial to understand how preservation strategies for this architecture were and are developed and implemented today so that they can protect this architecture. The comparison between Istanbul and Salvador contributes to a deeper understanding of issues related to the preservation of 19th-century architectural heritage, as well as to the development of more effective strategies that are culturally sensitive. Comparing cities like Istanbul and Salvador also offers valuable insights into the challenges and impacts faced by different cultural and geographical contexts since the two cities have very different histories and cultural contexts. Istanbul is a cosmopolitan city that was the capital of three great empires, such as the Byzantine Empire and the Ottoman Empire, and home to various cultures throughout history. Salvador, on the other hand, is a Portuguese-Brazilian city with a strong African heritage. These historical and cultural differences surely had an impact on how architectural heritage was seen, valued, and consequently preserved in each city. Despite their differences, the comparison between the two cities and nations can help identify good preservation practices that can be shared and adapted between the two cities.

Today, both cities face similar challenges regarding the preservation of architectural heritage since both continue to grow and expand, which can put historical buildings at risk. The fact that cities face economic challenges can also hinder investment in heritage preservation, especially on architecture that has been excluded from history at times.

1.2 Research Objectives

The comparison of the preservation of 19th-century architectural heritage in two historic districts in Istanbul and in Salvador has various important objectives and purposes for the field of studies and the involved communities. They will be listed below:

1. Analyze the different preservation strategies adopted in Istanbul and the Comércio district in Salvador for the preservation of 19th-century architectural heritage.

1.1 Identify successful preservation strategies: By comparing the approaches adopted in Istanbul and Salvador, it is possible to identify best practices that can be replicated or adapted in other locations.

1.2 Identify unsuccessful preservation strategies: This will help exclude possible ineffective strategies.

2. Address the importance of 19th-century architecture from a global perspective, with particular emphasis on the two countries under study, while reinforcing the need for the preservation of this architectural heritage.

3. Analyze the legal and local challenges faced by each city in preserving 19th-century buildings, considering cultural, geographical, and socioeconomic factors: The comparison highlights local challenges that may be unique or shared, contributing to more contextualized and effective strategies.

4. Examine the legal, social, economic, and cultural impacts of preservation strategies, highlighting how these practices influence and affect local communities: Identify strategies that promote community engagement and the appreciation of cultural heritage, ensuring a more inclusive and participatory preservation.

5. Provide recommendations to enhance preservation practices in both cities, aiming for a more effective and sustainable approach.

6. Promote understanding and collaboration among different cultures: The comparison fosters dialogue among the involved communities, facilitating the exchange of knowledge and experiences, promoting a more global approach to preservation.

7. Contribute to the creation of global or universal guidelines for heritage preservation: By extracting lessons learned from diverse contexts, one can contribute to the development of guidelines applicable in different parts of the world.



1.3 Justification:

There are distinct reasons why it is relevant to compare the preservation of 19th-century architecture in the cities of Istanbul and Salvador. Firstly, both cities hold significant cultural and historical importance on the global stage.

Salvador, located in the state of Bahia, Brazil, was founded in 1549 to be the seat of the General Government of Brazil, the largest colony of Portugal. The first capital of Brazil, it was also the main administrative and economic center of the colony for many years (1549 to 1733) (PINHEIRO, E., 2011). During the 16th and 17th centuries, Salvador was a crucial hub for sugar production, one of the main economic activities in the colony at the time. The city grew in importance due to the sugar trade, which was exported to Europe. Furthermore, in modern times, Salvador is known for preserving and promoting Afro-Brazilian culture. The city was a major center for the African slave trade, and this African influence is evident in aspects such as music, dance, religion, and cuisine. Pelourinho, the historic center of Salvador, is recognized as a UNESCO World Heritage site. This area preserves Portuguese colonial architecture and is a significant tourist destination. Salvador's Carnival is one of the largest and most famous in the world, attracting thousands of people to the city streets for this massive street party. In summary, Salvador has a rich history reflecting Brazil's cultural and ethnic diversity, making it a culturally and historically important center.

Throughout history, Istanbul has played significant roles as the capital of the Roman Empire and the Ottoman Empire, hosting diverse civilizations. From Roman times to the present day, the city has captivated countless travelers with its imposing walls, majestic palaces, inns, baths, historic bazaars, as well as picturesque public spaces like the gardens of churches and mosques, along with intriguing streets (Belge, 2006, cited in Toprak, M., & Kaşıkırık, A., 2021).

By allowing the development of diverse cultures, religious beliefs, architectural structures, and economic activities, the city has become a true synthesis of differences and riches, consolidating itself as a significant memory on the global stage.

Istanbul's topographical history over centuries has been shaped by factors such as physical topography, spatial characteristics, historical processes, socio-economic structure, cultural accumulation, and typology. In summary, the city has transcended temporal and technological boundaries, reaching a level that many other cities only achieved much later. Istanbul is thus a living testament to the unique intersection of past and present (KARAKUYU, M., TEZER, S. T., BALIK, H., 2010).

Furthermore, exploring 19th-century architectural heritage is not only interesting but also essential. This study is justified by its ability to provide fundamental insights into the complex transformations that occurred in society at the time, covering economic, social, architectural, and cultural aspects.

The end of the 18th century was marked by the emergence of a series of scientific and technological innovations and economic changes in England that, throughout the 19th century, had a significant impact on the transformation of the structure of mercantile capitalism. These transformations, known as the Industrial Revolution, were characterized by the development and international dissemination of technological and economic advancements, fundamentally altering the landscape of artisanal production and commercial distribution relationships.

The Industrial Revolution was associated with technological and economic phenomena such as industrialization but also linked to sociological phenomena like rapid demographic growth and socio-economic phenomena, including internal migrations from rural areas to large industrial cities. Political aspects, such as the increasing prominence of the bourgeoisie and the working proletariat, also played a significant role, along with strictly cultural phenomena such as the progressive spread of literacy, the development of primary education, and the emergence of new scientific disciplines. This complexity constitutes the multifaceted and transformative reality of this historical period (CALDUCH CERVERA, R., 2006).



Therefore, these transformations also ended up impacting the field of architecture, as it is a product of the social and economic relations of society. 19th-century architecture was conceived as a style of collective language and a universal system of forms that transcended singularities and individual expressions.

Considering the structural factors of the period, such as the consolidation of bourgeois power, the course of industrial civilization, and the intertwining, in romantic culture, of national and independence ideals with economic problems, Eclecticism emerged as the characteristic architectural culture of a bourgeois class that prioritized comfort, progress, and novelties but relegated artistic and architectural production to the level of fashion and taste. The architectural culture of this period delighted, for over a hundred years, in embracing the most varied lexical elements from all times and regions, reassembling them in different ways according to ideological principles. Three main currents can be distinguished: stylistic composition, based on the coherent imitative adoption of forms belonging to specific architectural styles of the past; typological historicism, guided by pre-conceived analogical choices that shaped the style of each building according to its purpose; and compositional pastiches, which "invented" stylistic solutions historically inadmissible with freedom, sometimes bordering on bad taste but often concealing interesting and advanced structural solutions (PATETTA, L., 1987).

In addition to significant historical and cultural importance, the cities of Istanbul and Salvador present unique geographical contexts (whether due to their relief, climate, natural risks, borders and limits, and location), which impose specific challenges to the preservation of 19th-century architectural heritage. This geographical singularity fundamentally justifies the need for this study, allowing a deeper understanding of the factors involved and the strategies necessary for the conservation of these important architectural legacies.

The strategic location of the city of Salvador, founded in 1549 as the seat of the General Government of Brazil, reflects a calculated decision by the Portuguese Metropolis to exert more effective control over its largest colony. The choice of the location involved strategic criteria, requiring the new city to be situated at a point that would allow comprehensive monitoring of the coastline while simultaneously providing protection against potential attacks by indigenous people and foreigners, both by land and sea.

The region selected for the construction of the city is within the Bay of All Saints, located in northeastern Brazil. This geographical position is equidistant from the north and south of the Brazilian coast, providing more effective control over any point along the coastline. Additionally, the city benefits from being a strategic natural port, becoming a mandatory stop for vessels traveling from the Metropolis to other destinations in Brazil or as a transit point for Portuguese colonies in Africa and Asia (PINHEIRO, E., 2011).

Istanbul is historically recognized as the "Historical Peninsula" within the city walls, consisting of seven hills that were preserved by Fatih Sultan Mehmet after the Ottoman conquest. The city's topography is unique, located between two seas and situated on the historical peninsula. Over the centuries, Istanbul has seen its geographical characteristics shape and transform its topography. Residences, monumental buildings, green areas, and means of transportation reflect the characteristics of each civilization, creating layered topography. With the overlap of spatial layers, the city has developed with diverse forms and heights, maintaining a remarkable continuity (TOPRAK, M., KAŞIKIRIK A., 2021).

The city's relationship with the sea plays a crucial role, as observed from the early settlements along the northern coast of the Sea of Marmara, dating back to 7000-8000 B.C. The presence of ship figures in caves suggests ancient maritime activities. Istanbul is one of the most important cities in the world (KARAKUYU, M., TEZER, S. T., BALIK, H., 2010).

The comparison between these two cities also reveals relevance in the preservation context, as it can significantly contribute to the development of global strategies and guidelines. Furthermore, this comparison has the potential to foster cultural and diplomatic exchange between Istanbul and Salvador, encouraging international collaboration on heritage preservation issues.



Thus, the comparative analysis not only provides valuable information for local authorities in both cities, assisting in optimizing their preservation strategies and adapting 19th-century buildings but also contributes to understanding the social, economic, and cultural impacts of these strategies. This in-depth understanding can, in turn, directly benefit local communities, ensuring their participation in the preservation process and driving sustainable development.

Choosing comparison as the method of analysis between these two cities may also reveal crucial patterns, differences, and similarities. Comparative analysis can highlight how historical influences affect preservation decisions, explore how preservation practices are shaped by unique cultural contexts, and reveal how geographical factors influence preservation strategies. The act of comparing is also capable of identifying best preservation practices and specific challenges faced by each city regarding heritage preservation.

1.4 Methodology:

The methodological procedures to be employed in this work will be presented below.

Literature Review: This dissertation begins with a meticulous review and analysis of literature relevant to 19th-century architecture. Therefore, a thorough investigation of the historical context of both Istanbul and Salvador will be carried out, including the specific regions to be addressed in each of these cities. Additionally, the research will encompass an extensive review of literature dedicated to the preservation of architectural heritage, incorporating conservation theories, their strategies, and fundamental approaches. This investigation will be conducted through consultations in digital libraries, physical libraries, archives, collections, and institutional repositories, with the primary goal of collecting essential data and information for the comprehensive development of this study.

Comparative Case Study: Subsequently, data collection will proceed concerning Istanbul and Salvador, utilizing the gathering of official documents related to preservation. This will include the analysis of historical documents, municipal records, urban plans, and existing preservation reports. Additionally, a photographic survey will be conducted, covering current and historical images, consultations with libraries and archives, online research through academic studies, articles, and news, and a meticulous analysis of municipal policies, including building codes, regulations, and current incentives.

Qualitative Analysis: After the meticulous collection of data, an in-depth qualitative analysis will be carried out, employing established methods such as content analysis and cross-comparison. These methodological approaches will be applied to identify intrinsic patterns, unveil common challenges, and discern effective strategies. This detailed analysis process will provide a broader and contextualized understanding of the elements identified in the collected data, allowing for an enriched interpretation of the inherent complexities related to the addressed themes.

1.4 Organization of the dissertation:

The dissertation will unfold into a total of six chapters, each contributing to a comprehensive and in-depth analysis of the subject at hand. The first chapter, pertaining to the Introduction, will be responsible for presenting the topic, contextualizing the problem, defining the research objectives, justifying the study, and detailing the adopted methodology.

The second chapter will encompass the historical and architectural context of the 19th century, including a brief history of the cities of Istanbul and Salvador, with emphasis on the architectural developments of this period. In the third chapter, the analysis will turn to the conservation of architectural heritage, addressing its concepts, theories, strategies, and various approaches.

The subsequent chapters will dedicate themselves to a meticulous examination of conservation strategies and specific challenges faced by Istanbul (Chapter 4) and Salvador (Chapter 5). In the sixth chapter, a detailed comparison will be conducted between the two cities, analyzing the preservation strategies adopted in each, highlighting both similarities and differences, and evaluating the effectiveness of such strategies. Additionally, an in-depth discussion will be promoted regarding the particular challenges faced by Istanbul and Salvador in preserving 19th-century architectural heritage. In this same chapter,



the social, economic, and cultural impacts of preservation strategies will be examined, with a special focus on local communities.

The conclusion of the dissertation will consolidate the most relevant findings, outline implications for the conservation of architectural heritage, propose best practices, and present final conclusions. Special emphasis will be given to the significant contributions of this study to the field of heritage preservation, especially 19th-century heritage, solidifying its impact and relevance.

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GIDALARIN DEĞERLENDİRİLMESİNDE KADIN KOOPERATİFLERİNİN ÖNEMİ: ADANA İLİ ÖZELİNDE BİR DEĞERLENDİRME

THE IMPORTANCE OF WOMEN'S COOPERATIVES IN FOOD VALORIZATION: AN EVALUATION IN ADANA PROVINCE

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ÖZET

Kooperatif kavramı, bireylerin mevcut işlerini birlikte en iyi şekilde ve uygun maliyetle yapmak için ekonomik güçlerini, bilgi ve deneyimlerini bir araya getirmeleri olarak açıklanabilir. Yerel ürünlerin geleneksel üretim tekniklerine uygun olarak üretilmesi ve faaliyetlerin devamlılığında kooperatifin etkili olduğu görülmektedir. Son yıllarda dünyadaki nüfus artışı ile birlikte COVID 19 pandemisi, doğal afetler, deprem, salgın hastalıklar gibi olumsuz koşulların da etkisiyle gıda arz güvenliği önemli hale gelmiştir. Özellikle tarımsal üretimin ardından ikincil üretim olarak adlandırabileceğimiz temel gıda üretimi alanında güvenli gıda kavramı ortaya çıkmaktadır. Bu nedenle gıda güvenliği talebi; organik ürün, doğal ürün, yerel lezzetler, paketli ürünleri içine alarak gelişmekte dolayısıyla da gıda üretimi bu talepleri karşılayacak şekilde değişim göstermektedir. Bu değişimde kadın kooperatifleri bir işletmecilik modeli sunmaktadır. Kadınlar tarafından yönetilen kooperatiflerde yöresel ürünlerin yerel lezzet olarak ticari değer kazanması yanında sosyal ve ticari hayatta daha çok görünür olan kadınların özgüveni de artmaktadır. Kadınlar kooperatif aracılığıyla geleneksel yöntemleri araştırmakta ve modern bilgiler ile bir araya getirerek hibrit teknikler geliştirebilmektedir. Böylece geleneksel üretim tekniklerini kayıt altına aldıkları gibi hibrit tekniklerle ürettikleri ürünleri de tüketiciye ulaştırmaktadırlar. Aynı zamanda coğrafi işaretli ürünlerin üretimi ve/veya paketlenmesinin ve satışının kooperatifler tarafından yapılması bölgenin tanıtımına ve gastronomisine de fayda sağlamaktadır. Bu çalışmada, Adana'da bulunan üretici kadın kooperatiflerinin mevcut durumu, hangi gıda ürünlerinin üretildiği ve pazarlamasının yapıldığı, karşılaştıkları sorunlar, üretimde ve kalitede sürdürülebilirliğin sağlanması için yapılacaklar ortaya konulmuştur.

Anahtar Kelimeler: Kadın Kooperatifi, Gıda, Coğrafi İşaret, Adana

ABSTRACT

The concept of cooperatives can be explained as the gathering of economic power, knowledge and experience of individuals to do their current work together in the best way and at an affordable cost. It is seen that cooperatives are effective in the production of local products in accordance with traditional production techniques and the continuity of activities. In recent years, food supply security has become important due to population growth in the world and adverse conditions such as the COVID 19 pandemic, natural disasters, earthquakes and epidemics. The concept of safe food emerges especially in the field of basic food production, which we can call secondary production after agricultural production. For this reason, the demand for food safety has evolved to include organic products, natural products, local flavors, and packaged products, and food production has changed to meet these demands. In this change, women's cooperatives offer a business model. In cooperatives run by women, not only



do local products gain commercial value as local delicacies, but women's self-confidence increases as they become more visible in social and commercial life. Through the cooperative, women can research traditional methods and develop hybrid techniques by combining them with modern knowledge. In this way, they not only record their traditional production techniques, but also deliver the products they produce with hybrid techniques to consumers. At the same time, the production and/or packaging and sale of geographically marked products by cooperatives also benefits the promotion and gastronomy of the region. In this study, the current situation of producer women's cooperatives in Adana, which food products are produced and marketed, the problems they face, and the actions to be taken to ensure sustainability in production and quality were revealed.

Keywords: Women's Cooperative, Food, Geographical Indication, Adana

GİRİŞ

Kooperatif kelimesi latince kökenli co-operation kelimesinden türemiştir ve toplu yardımlaşmanın belli kural, kanun ve düzen çerçevesinde işbirliği ile yapılması anlamına gelmektedir (Hoşcan, 2021). 1163 Sayılı Kooperatifler Kanunu'na göre ise kooperatif; tüzel kişiliği haiz olmak üzere ortaklarının belirli ekonomik menfaatlerini ve özellikle meslek veya geçimlerine ait ihtiyaçlarını işgücü ve parasal katkılarıyla karşılıklı yardım, dayanışma ve kefalet suretiyle sağlayıp korumak amacıyla gerçek ve tüzel kişiler tarafından kurulan değişir ortaklı ve değişir sermayeli ortaklıklar olarak tanımlanmıştır.

Kooperatifçiliğin dünyada ortaya çıkışı 1800'lü yılların ortalarında olmuştur. Sanayi devrimi ile birlikte görülen hızlı değişim, işsizlik, iç göç, kentleşme, gelir dağılımındaki farklılıklar gibi sosyal ve ekonomik faktörler kooperatifçiliğin ortaya çıkmasına sebep olmuştur (TMMOB, 2022).

Uluslararası Kooperatifler Birliği (ICA) 20-23 Eylül 1995 tarihleri arasında İngiltere'nin Manchester kentinde yapılan 31. Kongrede kooperatifçilik ilkeleri gözden geçirilmiş ve bütün ülkelere kooperatifçiliğin evrensel ilkeleri olarak 7 başlık altında kabul görmüştür. Bu kooperatifçilik ilkeleri; Gönüllü ve herkese açık üyelik, Üyeler tarafından gerçekleştirilen demokratik denetim, Üyelerin ekonomik katılımı, Özerklik ve bağımsızlık, Eğitim, öğrenim ve bilgilendirme, Kooperatifler arasında işbirliği ve Topluma karşı sorumlu olma şeklinde sıralanabilir (TMKB, 2023).

Kişilerin birlikte çalışmasını teşvik eden kooperatifler, ortaklarının teknik bilgi ve donanımlarını arttıran, ekonomik ve sosyal açıdan yenilikçi hizmetler yaratan, üretim miktarının ve kalitenin artırılmasında önemli rol oynayan, ekonomik ve sosyal kazançlar ile toplumların yaşam standartlarını yükseltmektedirler (Doğan ve Atabay, 2022). Demokratik olarak yönetilen kooperatifler kamu ve özel sektörün yanında üçüncü oluşum olarak kabul edilmektedir (Everest ve ark., 2022).

Türkiye'de kooperatifçilik Osmanlı Devleti döneminde Mithat Paşa'nın kurduğu "Memleket Sandıkları" ile başlamıştır. 1925 yılında kurulan ilk kooperatif "Ankara Memurlar Tüketim Kooperatifi"dir. 1924 yılında "İtibari Zirai Birlikler Kanunu" ile 1929 yılında "1470 Sayılı Zirai Kredi Kooperatifleri Kanunu" kabul edilmiştir. 1935 yılında "2834 Sayılı Tarım Satış Kooperatifleri ve Birlikleri Kanunu" ve "2836 Sayılı Tarım Kredi Kooperatifleri ve Birlikleri Kanunu" yürürlüğe girmiştir. Daha sonra kooperatifçiliğe 1961 Anayasasında yer verilmiş olsa da en önemli gelişme 1969 yılında "1163 sayılı Kooperatifler Kanununun" yürürlüğe girmesi olmuştur. 1982 Anayasası'nda da kooperatifçiliğe önem verilmesi ve geliştirilmesi gerektiği "Devlet, milli ekonominin yararlarını dikkate alarak, öncelikle üretimin artırılmasını ve tüketicinin korunmasını amaçlayan kooperatifçiliğin gelişmesini sağlayacak tedbirler alır" şeklinde belirtilmiştir.

Ülkemizde kooperatifler tarımsal amaçlı ve tarım dışı olmak üzere iki gruba ayrılmaktadır. Tarımsal amaçlı kooperatif grubu; Tarımsal Kalkınma, Sulama, Su Ürünleri, Pancar ve Tarım Satış, Yaş Meyve ve Sebze Üretim Pazarlama, Tarım Kredi Kooperatifleridir.

Kooperatifler Tarım ve Orman Bakanlığı, Çevre ve Şehircilik Bakanlığı ile Ticaret Bakanlığı'nın sorumluluğu altında çalışmalarına devam etmektedirler.



Kadın Kooperatifleri

Kadınların istihdam içindeki payının düşük olması, karar mekanizmalarında yer almamaları ve örgütlenme yetersizlikleri gibi nedenlerden dolayı kadınların güçlenmesini sağlamak ve kadınların toplumdaki rollerinin güçlenmesi için kooperatifler önemli bir araç olabilirler (Candan Demirkol, 2022). Kadın kooperatifleri de diğer kooperatif türleri gibi 1163 sayılı Kooperatifler Kanuna'na tabidir. Ancak sosyal ve ekonomik amaçların birlikte hedeflenmesi ve geleneksel olarak kadınlıkla ilişkilendirilen roller etrafında düşünüldüğü için özel bir kategori olarak ortaya çıkmıştır (KEİG, 2018)

1999 yılı Marmara depreminden etkilenen bölgelerde yaşayan kadınların ekonomik kazanç sağlamaları, sosyal ve kültürel faaliyetler içinde bulunmaları amacıyla 2000'li yılların başında kadın girişim faaliyeti olarak kadın kooperatifleri kurulmuştur. Sonrasında kurucuları kadın olan ve kadın istihdamı sağlayan kooperatiflerin kurulmasına yönelik olarak çalışmalar başlamış ve "Kadın, Çevre, Kültür ve İşletme Kooperatifi" ana sözleşmesi 2011 yılında uygulanmaya konmuştur. Bu ana sözleşmenin yayınlanmasıyla kadın faaliyetleri direkt olarak kadın kooperatifi adını almıştır. Aynı yıl ülkemizin ilk kayıtlı kadın kooperatifi faaliyetlerine başlamıştır. Kadın kooperatiflerinin ortaklık yapısına bakıldığında ortakların %80-100'ünün kadınlardan oluştuğu görülmektedir (Başaran ve Irmak, 2022). Kadın kooperatifi ana sözleşmesinde "Kooperatifin amacı ortaklarının ekonomik, sosyal ve kültürel ihtiyaçları ile ekonomik faaliyetleri kapsamında yer alan mal ve hizmet üretimi ile bunların pazarlanmasına yönelik ihtiyaçlarını karşılamak, girişimlerini desteklemek, üretim becerilerini geliştirmek, böylece ortaklarının ekonomik menfaatlerini koruyarak sağlıklı ve gelişmiş bir çevrede yaşamalarını sağlamaktır" denilmektedir. Diğer kooperatiflerden farklı olarak kadın kooperatiflerinde, üretim becerisini geliştirmeye vurgu yapıldığı görülmektedir (Emiroğlu, 2014). 2023 yılında 11 ili 16 milyon insanı etkileyen Kahramanmaraş merkezli depremden sonra yaşamın sürdürülmesinde de örgütlenmenin ve kooperatiflerin önemi bir kez daha anlaşılmıştır.

Kadınlar, kooperatife katılmada birtakım engellerle karşılaşmaktadırlar. Bu engeller, yaşanan toplum ve kültür içinde kadına ve erkeğe yüklenen rolleri içeren cinsiyet eşitsizliği gibi sosyo- kültürel engeller, kaynaklara ve fırsatlara erişim, bu fırsatların kontrolünün eşitsizliğinden kaynaklı engeller, finansal destek eksikliği veya kadının kendine olan güvenini sağlayamaması gibi durumlar olarak sıralanabilir (Majurin, 2012). Ancak tüm bu olumsuz koşullara rağmen kooperatifler kadınlara sahip oldukları üretken, idareci ve güçlü potansiyellerinin farkına varmalarını sağlamıştır (Akgül, 2022). Yaşantılarını değiştirmek, ekonomik gelir elde etmek, hedeflerine ulaşmak, sosyal refahı ve aile ekonomisinin geliştirilmesinde önemli bir role sahip olmuşlardır (Şen, 2021).

Kadın kooperatiflerinin yerel ekonomilerin kalkındırılması için önemli bir faktör olduğu belirtilebilir. Bu doğrultuda bu kooperatifler üretilen tarımsal ürünleri satın alıp, onları işleyerek, yerel ürüne dönüştürmekte yerel ve ulusal pazarlarda satışa sunmaktadır (Başaran ve Irmak, 2022). Bu kapsamda üreticilerin tüketicilere doğrudan ulaşmada güçlük yaşandığı bilinmektedir. Ürünlerin doğrudan tüketiciye ulaştırılabildiği yerlerin yaygınlaştırılması ise yerel yönetimlerin sağlayabileceği en önemli katkı olacaktır (TMMOB, 2022). Buna örnek olarak Adana'nın Pozantı ilçesinde, Pozantı Belediyesi tarafından başvurusu yapılan, Çukurova Kalkınma Ajansı tarafından desteklenen ve Kuzey Adana Kalkınma Programı kapsamında Pozantı'ya kurulan bal paketleme ve meyve sebze kurutma merkezi verilebilir. Pozantı'nın 21 mahallesinde yetişen doğal ürünler Pozantı Belediyesi tarafından satın alınarak 8 kadın tarafından bal paketleme ve meyve sebze kurutma merkezinde kurutulduktan sonra el değmeden ve hijyen kurallarına dikkat edilerek paketlenmekte ve tüketiciye sunulmaktadır. Bu ürünler; brokoli, pırasa, havuç, portakal, elma, kivi, muz, çilek, çorbalar için çeşni, mantar, ıspanak, kereviz, soğan, kırmızıbiber, sarımsak olarak sıralanabilir. Ayrıca kışlık tüketim için reçel, marmelat, salça ve bal ile farklı lezzetlerde sunulmaktadır. Bu ürünlerin internet sitesi ile Akçatekir ve Adana'nın çeşitli yerlerinde kurulacak ürün stantlarda da satışının yapılması için girişimlerde bulunulmuştur. Coğrafi işaretli ürünler endüstriyel ürünlere göre tercih edilmekte ve onların satışlarını etkileyen faktörlerin başında gelmektedir. Bu kapsamda, 2023 yılında coğrafi işaret almış Pozantı çileği direkt olarak, kurutulmuş veya reçel gibi ürünlere dönüştürülerek satışının yapılması hem üreticilere hem de bölgeye katma değer sağlayacaktır.



Ülkemiz zengin geleneksel ürün ve gıda envanterine sahip olmasına rağmen bu değerler çoğunlukla belli bir yöreyle sınırlı kalmaktadır. Geleneksel ürünlerin coğrafi işaretleme yoluyla sürdürülebilirliği sağlansa da gıdaların üretim biçimleri nesilden nesile sözlü aktarım yoluyla yöredeki kadınların sorumluluğunda gerçekleşmektedir (Özdemir ve ark., 2019). Kadın kooperatifleri aracılığıyla bu ürünlerin tatlarının yok olmaması ve daha fazla tüketiciye ulaşması sağlanabilmektedir.

Son yıllarda gıda güvenliği kaynaklı sorunların artması ve COVID 19 pandemisi gibi nedenlerle doğal ürünleri tüketmeye olan ilgi artmaktadır. Bu nedenle geleneksel yöntemlerle üretilen ürünlere/gıdalara olan ilgi ve talep her geçen gün daha da artmaktadır (Özdemir ve ark., 2017). Bu nedenle gıda ile ilgili faaliyet gösterecek kooperatifler, kuruluş prosedürlerini tamamlarken gıda güvenliğinin ve güvenilirliğinin sağlanması için gerekli adımları planlamalıdır. Doğru ve uygun hammadde seçiminden ürünün piyasaya arz koşullarına kadar geçen sürecin de iyi yönetilmesi gereklidir (TMMOB, 2022).

Çalışmada Adana ilindeki kadın kooperatiflerinin kooperatif faaliyetleri kapsamında ürettikleri gıda ürünleri, bunların pazarlanması ile gıda güvenliği kapsamında üretimde sürdürülebilirliğin sağlanması konuları incelenmiştir.

Adana Kadın Kooperatifleri

Türkiye'nin güneyinde, Akdeniz Bölgesi'nde yer alan Adana, bulunduğu jeopolitik konumu gereği ve farklı iklim desenine sahip olmasından dolayı çok çeşitli tarımsal ürünlerin yetişmesine olanak sağlamaktadır. Bu tarım ürünlerinin değerlendirilmesi ve bunların ürünlere dönüştürülmesinde kooperatifler aktif rol oynamaktadır. Adana'da Adana Ticaret Odasına kayıtlı gıda üretimi yapan bazı kadın kooperatiflerinin isimleri ve ürettikleri ürünler Tablo 1'de verilmiştir.

Karataş Kadın Girişimi Üretim ve İşletme Kooperatifi; 2019 yılında 7 ortak ile birlikte faaliyete geçmiştir. Amacı; kadın emeğinin değerlendirilmesi, Karataş ilçesinde istihdam yaratması ve yöresel ürünlerin yurt genelinde tanıtılmasını sağlamaktır. Kooperatif çalışmalarında kadınların aile bütçesine katkıda bulunmasını sağlarken aynı zamanda sosyal ve kültürel projelerle ilçelerini tanıtıyorlar. Kendilerine ait yöresel ürünleri ürettikleri bir mutfığa da sahiptirler. Karataş ilçesine özgü coğrafi işaret almış kıddes başta olmak üzere domates konservesi, turşu, havuç reçeli, sebzeli erişte üretimleri yapılmaktadır. Adana Kadın Kooperatifleri Birliği satış mağazasında ürünleri bulunmaktadır.

Güney Adana Kadın Girişimciler Tarımsal Kalkınma Kooperatifi; 2018 yılında Güney Adana Kalkınma Projesi ile Adana Tarım İl Müdürlüğü, Çukurova Kalkınma Ajansı, Adana Büyükşehir Belediyesi ve Adana Valiliği ortaklığı ile hazırlanmıştır. Projenin amacı; Güney Adana yöresinde kadınlara istihdam yaratabilmektir. Projede Kalkınma Ajansı tarafından Belediyenin proje için tahsis ettiği alana endüstriyel bir mutfak kuruldu. Valilik ve İŞKUR tarafından 25 kadına yöresel tatlar eğitimi verilmiştir. Ayrıca hijyen, girişimcilik, kooperatifçilik eğitimleri ile kadınlar bilinçlendirilmiş, üretim yapmanın kaliteli ve sistemli çalışmanın getireceği kolaylıklar anlatılmıştır. 18/09/2019 tarihinde resmi olarak kooperatif kurulduğunda kadınlar için yeni bir istihdam alanı hayata geçmiştir. Önce üretime yer fıstığı ezmesi ile başlanmış ve bunun çeşitlendirilmesi ile beğenileceği düşüncesi oluşmuştur. Beklenildiği üzere balı tarçınlı ve balı tuzlu çeşitleri de çok beğenilmiştir. Kooperatif, güneş enerjisi ile kurutma tesisini kurarak bin metrekarelik bir üretim tesisi haline gelmiştir.



Tablo 1. Adana Ticaret Odasına Kayıtlı Gıda Üretimi Yapan Bazı Kadın Kooperatifleri

KADIN KOOPERATİFİ ADI	ÜRETİLEN ÜRÜNLER
Çukurova Hünerli Eller Kadın Girişimi Üretim ve İşletme Kooperatifi	Biber salçası, Kurutulmuş biber, Toz biber, Reçeller (kabak, havuç, limon, incir, çilek portakal çiçeği, kudret narı, süt reçeli), Zeytin, Zeytin ezmesi, Zeytinyağı, Bal, Pancar turşusu, Menemen, Domates sosu, Kantaron yağı, Karadut özü, Pancar kvass, Kozalak şurubu, Pancar pekmezi, Kombuçya çayı
Çukurova Gülen Yüzler Kadın Kooperatifi	Gastronomi ürünleri
Yedirenk Kadın Girişimi Üretim ve İşletme Kooperatifi	Salça, Reçel (acı biber, üzüm, pancar, süt), Dondurma, Sirke, Tarhana, Erişte, Kurabiye, Çikolata, Yerfıstığı ezmesi
Toros Kadın İnsiyatifi, İstihdam, Çevre Kültür ve İşletme Kooperatifi	Reçel (turunç, yeşil incir), Erişte, Sirke, Kabak tatlısı
Karataş Kadın Girişimi Üretim ve İşletme Kooperatifi	Gastronomi ürünleri, Kıddes, Domates konservesi, Turşu, Havuç reçeli, Sebze erişte
Güneşin Kadınları Adana Kadın Girişimi Üretim ve İşletme Kooperatifi	Kantaron yağı, Kozalak şurubu, Reçel (acı biber, turunç, süt), Turunç ekşisi, Nar Ekşisi, Tahıl ve bakliyatlar (Karakılçık buğdayı), Fıstık ezmesi, Tahin, Turşu, Hatay peynirleri, Salça, Acuka
Güney Adana Kadın Girişimciler Tarımsal Kalkınma Kooperatifi	Domates tatlısı, Reçel (limon, portakal, ceviz), Salça, Kurutulmuş mantar, Erişte, Biber, Yerfıstığı ezmesi (sade, ballı, tarçınlı)
Aladağ Girişimci Kadınlar Tarımsal Kalkınma Kooperatifi	Harnup pekmezi, Kozalak şurubu, Kurutulmuş sebzeler, Bitki çayları
Seyhan Üreten Kadınlar Kooperatifi	Glutensiz ürünler, Tıbbi aromatik bitkiler
Meryem Kadın Girişim Üretim ve İşletme Kooperatifi	Meyve ve sebze kurutma, Mantar yetiştiriciliği, Sera sebze yetiştiriciliği
Pozantı İlçesi Kadın Çiftçiler Tarımsal Kalkınma Kooperatifi	Çilek Pestili, Portakallı Pestil, Mürdüm eriği pestili, Cevizli bandırma, Reçeller, Sebze erişte, Tarhana, Kurutulmuş meyve ve sebzeler, Tereyağ, Keven petek bal, Köy yumurtası, Ceviz kurusu, Domates Salçası, Biber Salçası

Sürdürülebilir enerji kaynağı ile daha etkili ve verimli üretim yapmaktadır. Pandemi dönemiyle beraber turunçgilin reçeline olan artan talep basında yer almış ve kooperatifçe üretilerek pazara sunulmuştur. Bunun yanı sıra sebzeli erişte üretimi de yapılmaktadır. Adana Kadın Kooperatifleri Birliği satış mağazasında ürünleri bulunmaktadır.

Adana'daki diğer üretici kadın kooperatifleri de Tablo 2'de verilmiştir. Gıda üretimi dışında açtıkları merkezlerde okul öncesi eğitim hizmetleri vermektedirler. Yine çocuk yuvaları, oyuncak kütüphaneleri, rehabilitasyon merkezleri açmaktadırlar. Kadınların el emeği ürettikleri giyim, hediyelik eşya gibi ürünler üretilmekte ve pazarlanmaktadır. Bu kooperatiflerin sayısı günden güne artmakta ve çalışmalar devam etmektedir.



Tablo 2. Adana'daki Diğer Üretici Kadın Kooperatifleri

KADIN KOOPERATİFİ ADI
Adana Kadın Emegini Destekleme Kadın Girişimi Üretim ve İşletme Kooperatifi
Adana İmece Kadın Girişimi Üretim ve İşletme Kooperatifi
Akdeniz Kadınları Kalkınma Kadın Girişimi Üretim ve İşletme Kooperatifi
Adana Üreten Kadın Girişimi Üretim ve İşletme Kooperatifleri Birliği
Umay Ana Kadın Girişimi Üretim ve İşletme Kooperatifi
Türev Kadın Girişimi Üretim ve İşletme Kooperatifi
Karaisalı Çeçeli Kadın Girişimi Üretim ve İşletme Kooperatifi
Güçlü Kadınlar Kadın Girişimi Üretim ve İşletme Kooperatifi

Adana'da faaliyet gösteren kadın girişimi üretim ve işletme kooperatiflerinin ortaklığı ile Temmuz 2021'de Adana Kadın Kooperatifleri Birliği'nin birlik satış mağazası faaliyete geçmiştir. Kadın kooperatifleri burada ürün satışlarını yapabilmektedir. Ayrıca ürün satışları şehirde bulunan Esas 01 Burda AVM her Cumartesi yöresel ürünler pazarı ile Adana Atatürk Parkında hafta sonu kurulan Slowfood-Adana yeryüzü pazarında da satışa sunulmaktadır. Pandemi sürecinde ürünlerin pazarlamasında sosyal medyanın kullanıldığı ve e-ticaret ile satışların yapıldığı bilinmektedir. Yine her yıl Ekim ayında düzenlenen Adana Lezzet Festivali ile Nisan ayında gerçekleştirilen Uluslararası Portakal Çiçeği Festivallerinde de kadın kooperatifleri tanıtım ve satış faaliyetlerinde bulunabilmektedir.

Coğrafi işaretleme, yerel değerlerin sürdürülebilir bir şekilde korunmasına, bu değerlerin gelecek nesillere aktarılmasına, bölge ve kırsal ekonominin gelişmesine yardımcı olmaktadır. Coğrafi işaretlerden sadece o ürün için belirlenen özelliklere göre üretim yapan üreticiler yararlanabilmektedirler (Dayısoylu ve ark., 2017). Adana ilinde coğrafi işaret almış olan ürünlerin bir kısmı kadın kooperatiflerinde değerlendirilmektedir. Ancak tamamı için de üretim ve pazarlanması çalışmalarının artırılması üretimde ve kalitede sürdürülebilirliğin sağlanması açısından önemlidir. Bu kapsamda, Türk Patent Enstitüsü verilerinden yararlanılarak düzenlenen Tablo 3'de ürünlerin menşe adı veya mahreç işareti alma durumları özetlenmiştir.

Tablo 3. Adana İli Coğrafi İşaret Almış Ürünler

ÜRÜN ADI	İŞARET NEVİ
Adana Analı Kızılı	Mahreç İşareti
Adana Aşlama	Mahreç İşareti
Adana Bici Bici	Mahreç İşareti
Adana Halka Tatlı	Mahreç İşareti
Adana İçli Köfte	Mahreç İşareti
Adana Karakuş Tatlısı	Mahreç İşareti
Adana Karpuzu	Mahreç İşareti
Adana Kebabı	Mahreç İşareti
Adana Kol Böreği	Mahreç İşareti
Adana Şalgamı	Mahreç İşareti
Adana Şırdan	Mahreç İşareti
Adana Taş Kadayıf	Mahreç İşareti
Adana Yerfıstığı	Mahreç İşareti
Ceyhan Zeytinyağı	Mahreç İşareti
Karataş Kıddesi	Mahreç İşareti
Kozan Portakalı	Menşe Adı
Kuytucak Narı	Mahreç İşareti
Pozantı Çileği	Menşe Adı
Tufanbeyli Kurufasulyesi	Menşe Adı



SONUÇ VE ÖNERİLER

Kadın kooperatiflerinin Adana ve ülke genelinde yaygınlaşması söz konusu olsa da bazı eksiklikler mevcuttur. Sonuç olarak, kadın kooperatiflerinin geliştirilmesi ve devamlılığının sağlanması için şunlar önerilebilir:

- Mevcut desteklere ilave yönetim, finansman, işletme bilgisi, pazarlama, lojistik gibi alanlarda desteklerin artırılması.
- Kooperatifçilik satış pazarlama, finansal okuryazarlık, internet satışı, hijyen, tasarım ve ürün geliştirme, pişirme teknikleri, reçete oluşturma, maliyet hesaplama gibi konularda eğitimlerin verilmesi.
- Geleneksel üretim yöntemlerinin kayıt altına alınması ve bu yöntemlerin yeni yöntemler ile entegre edilmesi. Bu sayede gıda ürünlerinin izlenebilirliğinin sağlanması da gereklidir.
- Coğrafi işaretli ve geleneksel ürünlerin daha fazla oranda mevcut kooperatiflerde değerlendirmeye alınması, paketlenmesi/işlenmesi ve satışa sunulması.
- Kooperatiflerde farklı ürünlerin üretilmesi özellikle de yerel ürünlerin ön plana çıkarılması gerekmekte ve bunların envantere ilave edilmesi.
- Geleneksel ürünlerin üretimlerinde reçetelerin oluşturulması, üretimde bu reçetelerin dışına çıkılmaması. Restoranların da bu geleneksel ürünleri menüye ilave etmeleri ve devamlılığın sağlanması.
- Hijyen uygulamalarının sadece paketli/paketsiz ürünler için değil, o ürünlerin yetiştirilmesi sırasında da göz önünde bulundurulması.

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THE OPTIMUM DESIGN OF MULTIPHASE NATURAL/SYNTHETIC CNT-FIBER REINFORCED NANOCOMPOSITE PLATE UNDER DIFFERENT LOADING CASES FOR MAXIMUM CRITICAL BUCKLING LOAD CAPACITY

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ABSTRACT

With the growing demand for lightweight and sustainable materials with superior mechanical properties in automotive and aerospace applications, several efforts have been undertaken to develop composite materials with a high specific strength-to-weight ratio. A recent trend in these materials is to combine or replace synthetic and natural fibers with nano-reinforcements such as carbon nanotubes and graphene nanoplatelets. This study aims to solve the optimum design problem of multiphase CNT-Fiber reinforced nanocomposites for maximum critical buckling load factor. The results are then compared with those of two-phase fiber-reinforced composites for different load cases. The design variables include the fiber stacking sequences and the CNT weight content at each layer. The effects of CNT reinforcement on the maximum critical buckling load factor for carbon, glass, and flax fiber-reinforced composite plates are investigated using Modified Differential Evolution Stochastic Algorithm. The optimization results of fiber-CNT reinforced composites under specific loading conditions show that the addition of 1% CNT to the matrix material increases the critical buckling load by 19.50% and 23.52% for glass and flax fiber-reinforced composite laminates, respectively, for the same weight. The study shows that adding low levels of CNTs can increase the buckling performance of natural fiber-reinforced materials without increasing weight, and these materials can be used as an alternative to two-phase synthetic materials.

Keywords: Multiphase Composite, Nanocomposite, Critical Buckling Load, Stochastic Optimization, Carbon nanotube, Flax fiber, Natural Fiber

INTRODUCTION

A composite laminate is made up of reinforcement materials such as fibers, particles, flakes, and fillers embedded in a matrix of polymers, metals, or ceramics. The matrix serves to hold the reinforcement in place and provide the desired shape, while the reinforcement enhances the mechanical properties of the matrix. In order to use laminated composite plates effectively, it is important to conduct a theoretical analysis and optimization that can predict their structural and dynamic behavior. Due to their



complexity, studying the structural instability behavior of laminated composite plates is an important research area. Many studies on the stability of laminated composite plates have focused on rectangular plates and examined the effect of design parameters such as boundary conditions, fiber orientation, and geometric aspect ratio on stability. Thin composite structures are prone to instability, resulting in buckling when subjected to mechanical or thermal loading. The buckling behavior of composite plates includes complex analysis, and more details can be found in references (Kaw, 2006; Muc, 1988; Nemeth, 1986; Zor et al., 2005) Carbon nanotubes (CNTs) are a significant additive material for high-performance structural composites and hold great potential for various applications, making them an object of interest for scientists and researchers who are highly invested in nanostructures (Thostenson et al., n.d.). As the dimensions of these structures reduce to micro and nano scales, both experimental and atomistic simulations have demonstrated that the size effect on mechanical properties becomes increasingly significant (Wuite & Adali, n.d.). A single-walled carbon nanotube (SWCNT) is a cylinder with a diameter of 1 nm, while a multi-walled carbon nanotube (MWCNT) consists of a concentric form and a separated array of cylinders, ranging from 2 to 100 nm in diameter and tens of microns in length (Liew et al., 2014). The another studies reported the experimental elastic properties of both SWCNT and MWCNT, revealing that the elastic modulus of CNTs can vary widely, ranging from 200 GPa to 5.6 TPa. CNT-based fiber-reinforced polymer (FRP) composite materials have high strength-to-weight and stiffness-to-weight ratios (Fidelus et al., n.d.; Kang et al., 2006). Studies have shown their potential in various applications, and there is growing interest in analyzing their performance in bending, buckling, and vibration (Ansari et al., 2016; Apuzzo et al., 2017; Malekzadeh & Zarei, n.d.; Sankar et al., 2016; Shahrabaki & Alibeigloo, n.d.; Tarfaoui et al., n.d.). Research conducted by Madenci et al. (Madenci et al., 2023) explored the impact of carbon nanotubes (CNTs) on the buckling behavior of FRP composites. Their findings showed a significant increase in load-carrying capacity for the clamped-clamped boundary condition in both CNT and NEAT samples. In fact, these samples exhibited an average load-carrying capacity that was 268% and 282% higher, respectively, compared to the simple-simple condition in carbon fiber reinforced polymer composite. Madenci (Madenci & Madenci, 2021) also conducted free vibration analysis of FG-CNT composite beams and estimated the effective material properties of nanobeams using the mixing rule. In another study, Qian et al. (Qian et al., 2002) demonstrated that adding just 1% by weight of CNT to the matrix material can increase the composite's hardness by 36-42% and its tensile strength by 25%. Zhu et al. (Zhu et al., 2004) analyzed the stress-strain curve of 1 and 4 wt% CNT-reinforced epoxy resin and discovered a 30-70% increase in the elastic modulus for these weight fractions. Tarfaoui et al. (Tarfaoui et al., 2016) studied the effect of CNT in CNT-reinforced composites with different volume fractions and found that an increase in the CNT volume fraction decreased the material properties by 0.5-2% after reaching a specific value.

In this study, the critical buckling load behaviors of 16-layer carbon/epoxy, glass/epoxy, and flax/epoxy composites were compared, and the effect of CNT weight content optimization on the critical buckling load of multiphase laminated nanocomposites was examined. Fiber angle orientation and CNT weight ratio in each layer were considered design parameters and aimed to obtain designs that would maximize the critical buckling load. In this process, a modified version of Differential Evolution, one of the stochastic optimization methods, was used. The results showed that The addition of CNT significantly improved the critical buckling load of carbon/epoxy, glass/epoxy, and flax/epoxy laminated composites.

THEORETICAL FORMULATION

Considered laminated composite has 16 layered symmetric-balanced stacking sequences, and each edge is simply supported. The non-dimensional buckling load was computed for the number of half waves $m=1$, $n=1$, and the compression ratio was $N_x/N_y=1$ (Figure 1). The thickness of each composite plate is $h=0.508\text{mm}$, while the length and width take values $a=508\text{mm}$ and $b=254\text{mm}$.

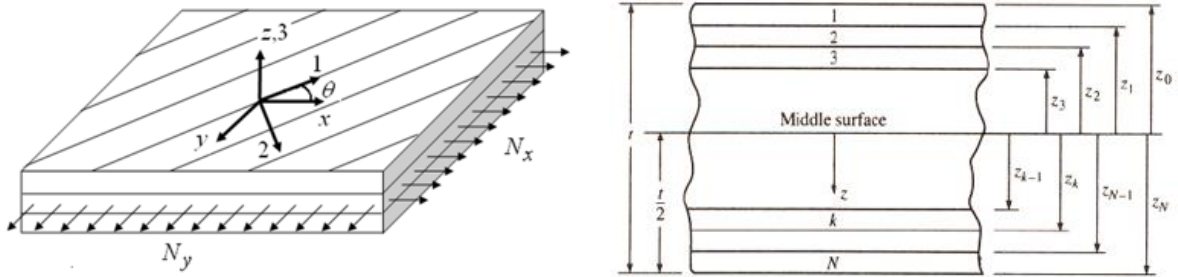


Figure 1. 16 layered symmetric-balanced laminated composite (Reddy, 2003)

The properties of carbon/ glass, flax fiber and epoxy matrix materials are given in Table 1.

Table 1. Material Properties of the CNT, matrix, flax carbon and glass fibers (Anashpaul et al., 2023; Megahed et al., 2020)

Material	E_{11} (GPa)	E_{22} (GPa)	G_{12} (GPa)	ν_{12}	Density (kg/m ³)
Matrix	3	3	1.119	0.34	1200
CarbonNanotube	640	640	251,96	0.27	1350
Carbon Fiber	263	19	27.60	0.20	1750
Flax Fiber	70	70	29.58	0.183	1400
Glass Fiber	72.4	72.4	30.66	0.20	2400

Young's moduli (E_{11}, E_{22}), shear moduli (G_{12}, G_{13}), poisson's ratio (ν_{12}, ν_{23}), and density (ρ) of the CNT-based fiber-reinforced composites are defined in the following form

$$E_{11} = E_{F11}V_F + E_{GM}(1 - V_F) \quad (1)$$

$$E_{22} = E_{GM} \left(\frac{E_{F22} + E_{GM} + (E_{F22} - E_{GM})V_F}{E_{F22} + E_{GM} - (E_{F22} - E_{GM})V_F} \right)$$

$$G_{12} = G_{13} = G_{GM} \left(\frac{G_{F22} + G_{GM} + (G_{F22} - G_{GM})V_F}{G_{F22} + G_{GM} - (G_{F22} - G_{GM})V_F} \right)$$

$$G_{23} = \frac{E_{22}}{2(1 + \nu_{23})}$$

$$\nu_{12} = \nu_{F12}V_F + \nu_{GM}(1 - V_F)$$



$$v_{23} = v_{F12}V_F + v_{GM}(1 - V_F) \left(\frac{1 + v_{GM} + v_{12}E_{GM}/E_{11}}{1 - v_{GM}^2 + v_{12}v_{GM}E_{GM}/E_{11}} \right)$$

$$\rho = \rho_F V_F + \rho_{GM}(1 - V_F)$$

Indications G_M and F refer to graphene-reinforced matrix and fibres, respectively. V_F and ρ_F symbolise the fibre volume content and the density of fibres. Reference studies can be consulted to calculate each parameter included in the formulas above (Akçair et al., 2019; Deveci et al., 2016; Kamarian et al., 2018; Peddavarapu & Jayendra Bharathi, 2018; Zhong et al., 2017).

Buckling load capacity of the laminated composite plates, which is subjected to biaxial in-plane loads per unit length N_x and N_y can be calculate by following formula (Savran & Aydin, 2023).

$$\lambda_b(m, n) = \frac{\pi^2 \left[D_{11} \left(\frac{m}{a} \right)^4 + 2(D_{12} + 2D_{66}) \left(\frac{m}{a} \right)^2 \left(\frac{n}{b} \right)^2 + D_{22} \left(\frac{n}{b} \right)^4 \right]}{N_x \left(\frac{m}{a} \right)^2 + N_y \left(\frac{n}{b} \right)^2 + N_{xy} \left(\frac{m}{a} \right) \left(\frac{n}{b} \right)} \quad (2)$$

where λ_b is the buckling load factor, and N_x and N_y are applied loads. Buckling loads are identified as $N_{xb} = N_x \lambda_b$ and $N_{yb} = N_y \lambda_b$. The smallest value of the buckling load factor is known as the Critical buckling load factor λ_{cb} .

RESULTS AND DISCUSSION

This study presents a comparative analysis of the optimal designs for achieving maximum critical buckling loads in 16-layer laminated composite plates of carbon/epoxy, glass/epoxy and flax/epoxy materials. The comparison of the maximum critical buckling loads and the weights is carried out for multi-phase composite plates with and without CNT nano-fillers. The non-dimensional buckling load was computed for the number of half waves $m=1$, $n=1$, and the compression ratio was $N_x/N_y=1$. Modified version of Differential Evolution stochastic optimization method is utilized to obtain elite and optimum designs.

Table 2. Comparison of critical buckling load capacity, stacking sequences and weight for 16 layered symmetric-balanced laminated composites.

Fibre Composition	Fiber Sequences	Critical Buckling Load	Weight (kg)	Optimal WGPL per layer	Optimum Sequence	Stacking
Carbon	[C/C/C/C]s	439807	1,36	[0/0/0/0]s	[±75/±60/±90/±60]s	
Flax	[F/F/F/F]s	149751	1,25	[0/0/0/0]s	[90 ₂ /±75/90 ₂ /±60]s	
Glass	[G/G/G/G]s	153666	1,61	[0/0/0/0]s	[90 ₂ /±75 ₂ /90 ₂]s	

Table 2 demonstrates the optimal critical buckling loads and the corresponding optimal stacking sequences of carbon/epoxy, glass/epoxy, and flax/epoxy laminated composites without CNTs. Table 2 also provides the weight values of the optimized laminated composites. According to the results, carbon/epoxy exhibited the highest critical buckling load of 439800, while glass/epoxy and flax/epoxy



had critical buckling loads of 153666 and 149751, respectively. The results revealed that the critical buckling load of carbon/epoxy is approximately three times that of glass/epoxy and flax/epoxy.

Also, it was observed that the obtained stacking sequences for maximum critical buckling load capacity in carbon/epoxy, glass/epoxy, and flax/epoxy laminated composites are different. When evaluated in terms of weight, it is seen that the flax/epoxy laminated composite is 9% and 28% lightweight compared to carbon/epoxy and glass/epoxy.

What is clear from the results is that it is more advantageous to use carbon/epoxy for maximum critical buckling load design among laminated composites without CNT material. Since the critical buckling loads in designs obtained using glass/epoxy and flax/epoxy materials are quite close to each other, and flax/epoxy is 28% lighter than glass/epoxy, it can be used as an alternative natural material.

Table 3. Comparison of critical buckling load capacity, stacking sequences and weight for 16 layered symmetric-balanced CNT added laminated composites.

Fibre Composition	Fiber Sequences	Critical Buckling Load	Weight (kg)	Optimal WGPL per layer	Optimum Stacking Sequence
Carbon CNT	with [C/C/C/C]s(CNT)	468819	1,36	[0.05/0 ₇]s	[-75/75/60 ₂ /90 ₄]s
Flax CNT	with [F/F/F/F]s(CNT)	178853	1,25	[0.05/0 ₇]s	[90 ₈]s
Glass CNT	with [G/G/G/G]s(CNT)	183119	1,61	[0.05/0 ₇]s	[90 ₈]s

Table 3 shows the optimum designs of carbon/epoxy-CNT, glass/epoxy-CNT, and flax/epoxy-CNT laminated composites regarding critical buckling load. Each layer's fiber orientation and CNT weight ratio were considered design parameters. When the results are examined, it can be seen that the obtained stacking sequences for the maximum critical buckling load are distinct. However, the optimum CNT ratio in each layer is the same, and adding 0.05 CNT only to the first layer is sufficient for optimum design.

Adding CNT to composites improved critical buckling load of 10%, 20%, and 24% compared to the carbon/epoxy, glass/epoxy, and flax/epoxy laminated composites without CNTs. This improvement was achieved without any increase in the weight of the composites. In this respect, it is seen that the addition of CNT has a remarkably positive effect on the critical buckling behavior of the layered composite. Another significant result is that flax, as a natural material, can be an alternative to glass material in critical buckling load problems. Although the critical buckling load of the flax/epoxy-CNT layered composite is 2% lower than glass/epoxy-CNT, it is also 28% lighter, making flax stand out as an alternative material to glass.

CONCLUSIONS

In this study, the critical buckling load behaviors of 16-layer carbon/epoxy, glass/epoxy, and flax/epoxy composites were compared, and the effect of CNT addition on the critical buckling load of multiphase laminated composites was examined. Fiber angle orientation and CNT weight ratio in each layer were considered design parameters and aimed to obtain designs that would maximize the critical buckling load. In this process, a modified version of Differential Evolution, one of the stochastic optimization methods, was used. The results showed that the highest critical buckling load was obtained using carbon/epoxy and carbon/epoxy- CNT laminated composites. The main focus here was to determine whether nano-reinforced natural materials can be used as an alternative to synthetic materials to optimize the critical buckling load behavior. The following inferences can be made about the study:



- 1.) For both natural and synthetic composite plates, the addition of CNT provided a remarkable increase in the critical buckling load.
- 2.) Considering only the critical buckling load as an objective, using multiphase carbon/epoxy and carbon/epoxy-CNT nanocomposites allows the highest critical buckling load.
- 3.) When weight is considered as a parameter in addition to the critical buckling load, it is more advantageous to use flax/epoxy composite instead of glass/epoxy composite and flax/epoxy-CNT instead of glass/epoxy-CNT.
- 4.) The addition of CNT improved the critical buckling load of carbon/epoxy, glass/epoxy, and flax/epoxy laminated composites by 10%, 20%, and 24%, respectively.

In line with all these results, it has been observed that natural composites with CNT addition do not have as high a critical buckling load as carbon fiber-reinforced laminated composites. Still, they can be an excellent alternative to glass fiber-reinforced laminated composites. As a further study, examining the critical buckling behavior of hybrid composites with CNT on this subject may be useful.

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YOĞURT ÜRETİMİNDE STARTER KÜLTÜR OLARAK KULLANILAN LAKTİK ASİT BAKTERİLERİ ÜZERİNE *Spirulina platensis*'in ETKİSİ

EFFECT OF *Spirulina platensis* ON LACTIC ACID BACTERIA USED AS STARTER CULTURE IN YOGURT PRODUCTION

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ÖZET

Süt, düşük asitli ve su aktivitesi yüksek bir gıda ürünüdür ve koruma önlemleri alınmadıkça hızla bozulmaktadır. Sütün raf ömrünü uzatmanın birçok yolu olup bunlardan birisi de yoğurt üretimidir. Yoğurt, *Streptococcus thermophilus* ve *Lactobacillus delbrueckii* subsp. *bulgaricus* starter kültürleriyle üretilen bir üründür. Protein, kalsiyum, potasyum, fosfor ve B₂ ve B₁₂ vitaminleri dahil olmak üzere çeşitli temel besin maddelerinin kaynağıdır. Ayrıca tatlandırıcılar, meyveler ve aromalarla kıvam ve aroma açısından zenginleştirilebilmektedir. İnsanlarda yoğurt tüketimi bağırsak mikrobiyotasının dengesinde ve metabolik aktivitesinde değişikliklere yol açabildiği için önem kazanmaktadır. Alglerin özellikle de *S. platensis*'in gıda endüstrisindeki uygulamalarından biri de biyoaktif bileşikler sağlamak için fermente süt ürünlerine eklenmesidir. Bu nedenle yoğurt gibi fermente ürünlerin zenginleştirilmesinde *S. platensis* kullanılması durumunda starter kültürlerle herhangi bir antimikrobiyal etkisinin olup olmadığı da sorgulanmaktadır. Bu çalışmada, laktik asit bakterilerinin gelişmesini teşvik edici yanını gösteren çalışmaların aksine *S. platensis*'in kuru ve metanol ekstraktlarının farklı konsantrasyonlarının (2.5 mg/ml, 5 mg/ml, 7.5 mg/ml ve 10 mg/ml) yoğurt üretiminde starter kültür olarak kullanılan laktik asit bakterileri (*Streptococcus thermophilus* ve *Lactobacillus delbrueckii* subsp. *bulgaricus*) üzerine herhangi bir antimikrobiyal etkisinin olup olmadığının araştırılması amaçlanmıştır. Bu çalışmada kullanılan *Spirulina platensis* Çukurova Üniversitesi Su Ürünleri fakültesinden kuru olarak sağlanırken, starter kültür olarak kullanılan *Streptococcus thermophilus*, *Lactobacillus delbrueckii* subsp. *bulgaricus* (YOFLEX M790) suşları Ch. Hansen's firmasından temin edilmiştir. *Spirulina platensis*'in yoğurt starter kültürleri üzerine antimikrobiyal etkisinin incelenmesinde Agar Difüzyon yöntemi kullanılmıştır. *In vitro* koşullarda 5 tekrarlı gerçekleştirilmiş bu çalışma sonucunda yoğurt starter bakterileri olan *Streptococcus thermophilus* ve *Lactobacillus delbrueckii* subsp. *bulgaricus* üzerine bir mikroalg olan *S. platensis*'in tüm çalışılan konsantrasyonlarında herhangi bir antibakteriyel etki tespit edilememiştir.

Anahtar kelimeler: Laktik asit bakterileri, *Spirulina platensis*, yoğurt, antimikrobiyal etki

ABSTRACT

Milk is a low-acid and high-moisture food product and spoils rapidly unless preservation measures are taken. There are many ways to extend the shelf life of milk, and one of them is yoghurt production.



Yogurt is a product produced with *Streptococcus thermophilus* and *Lactobacillus delbrueckii* subsp. *bulgaricus* starter cultures. It is a source of several essential nutrients, including protein, calcium, potassium, phosphorus and vitamins B₂ and B₁₂. In addition, it can be enriched in terms of consistency and aroma with sweeteners, fruits and aromas. Yogurt consumption in humans is gaining importance because it can lead to changes in the balance and metabolic activity of the intestinal microbiota. One of the applications of algae, especially *S. platensis*, in the food industry is the addition of algae to fermented dairy products to provide bioactive compounds. For this reason, it is also questioned whether *S. platensis* has any antimicrobial effect on starter cultures when used in the enrichment of fermented products such as yoghurt. In this study, it was aimed to investigate whether different concentrations (2.5 mg/ml, 5 mg/ml, 7.5 mg/ml ve 10 mg/ml) of dry and methanol extracts of *S. platensis* have any antimicrobial effects on lactic acid bacteria used as starter culture (*Streptococcus thermophilus* ve *Lactobacillus delbrueckii* subsp. *bulgaricus*) in yoghurt production, contrary to studies showing its ability to promote the growth of lactic acid bacteria. While *Spirulina platensis* used in this study was provided dry from Çukurova University Faculty of Fisheries, *Streptococcus thermophilus*, *Lactobacillus delbrueckii* subsp. *bulgaricus* (YOFLEX M790) strains used as starter cultures were obtained from Ch. Hansen's company. Agar Diffusion method was used to examine the antimicrobial effect of *Spirulina platensis* on *Streptococcus thermophilus* and *Lactobacillus delbrueckii* subsp. *bulgaricus*. As a result of this study, which was carried out with 5 replicates under in vitro conditions, no antibacterial effect could be detected at all studied concentrations of *S. platensis*, a microalgae, on the yoghurt starter bacteria *Streptococcus thermophilus* and *Lactobacillus delbrueckii* subsp. *bulgaricus*.

Key Words: Lactic acid bacteria, *Spirulina platensis*, yoghurt, antimicrobial effect

GİRİŞ

Süt, sağladığı önemli makro ve mikro besinler dolayısıyla dünya genelinde milyonlarca insanın beslenme gereksinimlerini karşılamak için yaygın olarak tüketilen bir gıdadır. Ayrıca, süt ve süt ürünleri, çeşitli gıda ürünlerinin üretiminde önemli bir bileşen olarak da kullanılır. Protein, kalsiyum, fosfor, B vitaminleri ve diğer önemli besin öğelerini içermesiyle bilinen (Park, 2009) sütün raf ömrünü uzatmak için üretilen krema gibi çeşitli süt ürünleri, tereyağı, yoğurt, kefir ve peynir gibi fermente süt ürünleri binlerce yıldır dünya çapında tüketilmektedir. Fermente süt ürünleri, sütte bulunan doğal bakterilerin ve mayaların fermantasyon süreciyle oluşmaktadır (Zamfira vd., 2006; Visioli ve Strata, 2014). Bu süreç, sütteki karbonhidratların (genellikle laktoz) bakteriler veya mayalar tarafından fermantasyonu ve sonuçta laktik asit gibi organik asitlerin oluşmasını içerir. Ortamda oluşan laktik asit, sütün pH'ını düşürerek asidik bir ortam oluşturur (Zamfira vd., 2006). Asidik ortam, zararlı mikroorganizmaların büyümesini engellerken, laktik asit üretimi ve düşük pH, sütün dayanıklılığını artırır ve böylece sütün bozulmasını önler. Fermantasyon sürecinde, laktik asit bakterilerinin metabolizması sonucu çeşitli aroma bileşenleri ve organik asitler de üretilir. Bu bileşenler, fermente süt ürünlerinin karakteristik tat, koku ve doku özelliklerini belirler. Ayrıca, bazı laktik asit bakterileri B vitaminleri gibi önemli besleyici bileşenleri de sentezleyebilirler (Panesar, 2011). Fermente sütlerde bulunan laktik asit bakterileri çeşitli türlerden oluşur ve genellikle *Lactobacillus*, *Lactococcus*, *Leuconostoc*, *Pediococcus*, *Streptococcus* ve *Bifidobacterium* cinslerine ait bakteriler içerir. Sütlerde bulunan laktik asit bakteri türlerinin her biri fermente süt ürünlerinin oluşumunda farklı roller üstlenir. Bu bakteriler, sütün besleyici değerini artırırken, ürünlerin tat, koku ve dokusunu da belirleyebilirler.

"Yoğurt" kelimesi Türkçe kökenli olup sütün bakteriyel fermantasyonu ile üretilen fermente bir süt ürünüdür. Yoğurt, kendine özgü tadı, üretiminin görece kolaylığı, sağlığa faydaları ve çok yönlülüğü ile tanınmaktadır. Yoğurt üretimi sırasında laktoz şekeri, bakterilerin ürettiği laktaz enzimi tarafından glikoz ve galaktoza parçalanır. Geleneksel olarak yoğurt, *Streptococcus thermophilus* ve *Lactobacillus delbrueckii* subsp. *bulgaricus* starter kültürleri kullanılarak üretilir. Bu ikisi yoğurdun fermantasyonu sırasında simbiyotik bir ilişki sergilemektedir. Besin profili açısından yoğurt, yapıldığı süte benzer bir bileşime sahiptir. Süt ile besinsel benzerliği, yoğurdun mükemmel bir protein, kalsiyum, fosfor, riboflavin (B₂ vitamini), tiamin (B₁ vitamini) ve B₁₂ vitamini kaynağı ve değerli bir folat, niasin,



magnezyum ve çinko kaynağı olmasını sağlamaktadır. (Mckinley, 2005). Ayrıca yoğurt, tatlandırıcılar, meyveler ve aromalar gibi bileşenlerle kıvam ve aroma açısından zenginleştirilebilen bir gıda ürünüdür. Meyveler, yoğurdun doğal tatlandırıcısı ve aroma kaynağı olarak sıklıkla tercih edilirken, aromalar da yoğurt ürünlerine istenilen tat ve koku profilini kazandırmak için yaygın olarak kullanılır. Bu bileşenlerin dikkatli bir şekilde seçilmesi ve dengeli bir şekilde kullanılması, sağlıklı ve lezzetli yoğurt ürünlerinin üretimini sağlayabilir (Günaydı ve Ayar, 2021)

Yoğurt fermantasyonu için kullanılan starter kültür bakterileri *Lactobacillus* ve *Streptococcus* cinslerine ait çeşitli türleri içerir. Bunlar arasında *S. salivarius* subsp. *thermophilus*, *Lb. helveticus*, *Lb. delbrueckii* subsp. *lactis* ve *Lb. delbrueckii* subsp. *bulgaricus* öne çıkmaktadır.

Lactobacillus cinsine ait türler, genellikle kısa zincirler oluşturan uzun çubuklar şeklinde bulunur. Bunlar, Gram pozitif özellik gösterirler ve katalaz negatiflerdir. Ayrıca, fakültatif anaerobik oldukları için hem oksijen varlığında hem de yokluğunda yaşayabilirler. Hareketsizdirler ve spor oluşturmazlar. Tipik olarak, pH seviyesi 5.5 ila 6.2 arasında ve optimum büyüme sıcaklığı 30 ila 42°C arasındadır. *Lactobacillus* cinsine ait bakteriler, büyümeleri için besin açısından zengin bir ortama ihtiyaç duyarlar ve genellikle ortamdaki %5 CO₂ varlığı büyümelerini artırır. Bu bakteriler, fermente gıdaların lezzetine katkıda bulunarak, diasetil, H₂S ve çeşitli aminler üreterek karakteristik lezzet profillerinin oluşumuna katkı sağlarlar. *Lactobacillus delbrueckii* subsp. *bulgaricus*, fruktoz, glikoz ve laktozu fermente edebildiği gibi, çok düşük konsantrasyonlarda bile asetaldehit, aseton, asetoin ve diasetil gibi yan ürünleri sentezleyebilir (Ivy ve Wiedmann, 2014). Bu bakterilerin yoğurt üretimindeki temel görevleri, laktozu laktik aside dönüştürerek asitlik oluşturmak, viskoz bir kıvam sağlamak için ekzopolisakkarit (EPS) üretmek ve tipik yoğurt aromasını oluşturmaktır (Akan vd., 2021).

Streptococcus cinsi, 2 µm'den daha küçük bir çapa sahip olan zincirler veya çiftler oluşturan bir bakteri türüdür. *Streptococcus thermophilus*, küresel veya oval hücreler şeklinde bulunan, Gram pozitif özellik gösteren, katalaz negatif, fakültatif anaerobik, hareketsiz ve spor oluşturmeyen bakterilerdir. Hücrelerinin çapı genellikle 0.7-0.9 µm arasında değişir ve bazıları çok uzun olabilen çiftler veya zincirler oluşturabilirler. *S. thermophilus*, optimum pH değeri 6.5 olan ve optimum sıcaklığı 35-46 °C arasında değişen bir bakteri türüdür. Starter kültürlerde bulunan bu cins, termofilik starter kültürler içinde yer alır ve mezofilik kültürlerle kıyasla daha yüksek sıcaklıklarda gelişir. Ayrıca laktik asit üretme kapasitesine sahiptir. *S. thermophilus*, termofilik starter kültürlerin içerisinde tek tür olarak tanımlanır. *S. thermophilus* çok işlevli starter kültür, geleneksel olarak yoğurt üretiminde, İsviçre, Fransız ve sert İtalyan peynirleri de dahil olmak üzere fermente süt ürünlerinin üretiminde kritik bir rol oynar. *S. thermophilus*'un kullanımı, ürünlerin lezzet, doku ve kalitesini iyileştirmek için önemli bir faktördür ve süt endüstrisinde yaygın olarak tercih edilmektedir. *S. thermophilus*, olgunlaşma sürecinde süütün asitleşmesine ve aroma profilinin oluşumuna katkıda bulunur. Ayrıca, bu bakteri hücre dışı polisakkaritlerin, bakteriyosinlerin ve vitaminlerin üretimi gibi çeşitli fonksiyonel aktivitelere de sahiptir. Ayrıca, *S. thermophilus*, laktik asit üretimi, aroma bileşikleri sentezi, EPS üretimi, galaktoz fermantasyonu, üreaz ve proteolitik aktivite gibi metabolik özellikleri sayesinde starter kültür olarak sıklıkla kullanılmaktadır. *S. thermophilus*'un probiyotik olma potansiyeli, sağlık üzerinde çeşitli etkileri ve geçici sağkalımı ile gastrointestinal kanala orta düzeyde tutunması ile desteklenmektedir. Bu özellikler, *S. thermophilus*'un sindirim sistemi sağlığını koruma, bağışıklık fonksiyonlarını güçlendirme ve genel sağlık üzerinde olumlu etkiler sağlama potansiyeline işaret etmektedir (Ivy ve Wiedmann, 2014; Beal vd., 1989).

Son dönemlerde bir mikro alg olan *Spirulina platensis* (*S. platensis*) diyet takviyesi olarak yaygın bir şekilde kullanılmaktadır (Kapoor ve Mehta, 1993). *S. platensis*, filamentli bir siyanobakteridir ve çok hücreli iplikli yapısı ile karakterizedir. Bu organizmanın özelliklerinden biri de art arda sıralanmış silindirik trikomların heliks şeklinde dizilmesidir. *S. platensis*, yüksek oranda vitamin, mineral ve diğer besin bileşenlerini sağlamaktadır. Bu organizma, insanlarda metabolik aktiviteyi artırıcı etkilerinin yanı sıra, yüksek oranda protein içeriğine sahip ve yapısındaki proteinlerin %95'i sindirilebilir özelliktedir ve özellikle lizin, valin ve izolösin gibi esansiyel amino asitleri içerir (Suna, 2020; Akça, 2020). *Spirulina*, toksisite riski taşımayan ve viral saldırılar, anemi, tümör büyümesi ve yetersiz beslenme gibi durumlara karşı yatıştırıcı özelliklere sahip olduğu kabul edilen mükemmel bir gıda kaynağı olarak



değerlendirilmektedir (Saranraj ve Sivasakthi, 2014). Son zamanlarda, *Spirulina*'nın terapötik etkileri daha fazla önem kazanmıştır. Özellikle ağır metallerin neden olduğu kolesterol ve nefrotoksisitenin azaltılması, antikanser özellikleri, radyasyona karşı koruma sağlama ve bağışıklık sisteminin güçlendirilmesi gibi yönler üzerinde araştırmalar yoğunlaşmıştır. Bununla birlikte, *Spirulina*'nın antiviral, antibakteriyel, antifungal ve antiparaziter aktiviteler gibi çeşitli biyolojik fonksiyonlara da sahip olduğu belirtilmektedir (El-Baz vd., 2013).

Fermente süt ürünlerine mikroalglerin eklenmesi, biyoaktif bileşiklerin sağlanmasını hedefleyen daha sağlıklı süt ürünleri oluşturmanın bir aracı olarak benimsenmektedir. Bu amaçla, *Arthrospira* (*Spirulina*) spp. ve *Chlorella vulgaris* gibi mikroalg türleri, fermente gıda takviyesi için yaygın olarak kullanılan iki ana türdür. *Spirulina platensis*'in gıda endüstrisindeki uygulamalarından biri olarak, biyoaktif bileşikler sağlamak amacıyla yoğurt gibi fermente ürünlerin zenginleştirilmesinde kullanılmasının olasılığıdır. Bu durumda starter kültürlerin *Spirulina platensis*'in antimikrobiyal etkisine karşın nasıl bir tavır gösterdikleri sorgulanması gereken bir husustur.

Bu çalışmada, laktik asit bakterilerinin (LAB) büyümesini teşvik eden etkilerinin aksine, *Spirulina platensis*'in kuru ve metanol ekstraktlarının farklı konsantrasyonlarının (2.5 mg/ml, 5 mg/ml, 7.5 mg/ml ve 10 mg/ml) yoğurt üretiminde kullanılan starter kültürler (*Streptococcus thermophilus* ve *Lactobacillus delbrueckii* ssp. *bulgaricus*) üzerindeki antimikrobiyal etkisinin araştırılması amaçlanmıştır.

MATERYAL VE YÖNTEM

Materyal: Bu çalışmada kullanılan *Spirulina platensis*, Çukurova Üniversitesi Su Ürünleri Fakültesi'nden kuru olarak sağlanırken, starter kültür olarak kullanılan *Streptococcus thermophilus*, *Lactobacillus delbrueckii* subsp. *bulgaricus* (YOFLEX M790) suşları Ch. Hansen's firmasından temin edilmiştir. Ayrıca, çalışmada pozitif kontrol olarak kullanılan antibakteriyel kanamisin Çukurova Üniversitesi Gıda Mühendisliği bölümü mikrobiyoloji laboratuvarından temin edilmiştir.

Yöntem: *Spirulina platensis*'in kuru formu ve metanol ekstraktının 4 farklı konsantrasyonu (2.5 mg/ml, 5 mg/ml, 7.5 mg/ml ve 10 mg/ml) *Streptococcus thermophilus* ve *Lactobacillus delbrueckii* subsp. *bulgaricus* üzerindeki antimikrobiyal etkisinin araştırılmasında kullanılmış ve kuyucuk agar difüzyon yöntemi ile çalışılmıştır. Bu çalışmada, 121°C'de 15 dakika sterilize edilmiş M17 Agar, 4mm kalınlığında ve 90mm çaplı steril plastik petrilere dökülmüş ve soğumaya bırakılmıştır. Daha sonra, aktifleştirilmiş *S. thermophilus* 0.5 McFarland'a ayarlanmış ve bu bakteri süspansiyonundan 100 µL alınarak petrilere yayma ekimi yapılmıştır. Test materyalleri olan *Spirulina platensis*, Kanamisin (pozitif kontrol) ve Steril Su (negatif kontrol)'dan 50 µl alınıp 6mm çapında açılan standart kuyucuklara steril mikropipet yardımıyla eklenmiştir. Ekim yapılan petrilere aerobik ortam koşullarında 37°C'de 48 saat boyunca inkübe edilmiştir. *Lactobacillus delbrueckii* subsp. *bulgaricus* için çalışma prosedürü *S. thermophilus* için uygulanan çalışma ile aynı olup, farklı olarak MRS Agar besiyeri kullanılmıştır ve 45 ° C'de 72 saat anaerobik inkübasyon koşullarında çalışılmıştır. Çalışma 5 tekerrür olarak uygulanmıştır.

Bulgular ve Tartışma

Araştırmada kullanılan *S. platensis* kuru ve metanol ekstrakt çözeltilerinin dört farklı (2.5 mg/ml, 5 mg/ml, 7.5 mg/ml ve 10 mg/ml) konsantrasyonda, test mikroorganizması olarak kullanılan laktik asit bakterileri (*S. thermophilus* ve *L. delbrueckii* subsp. *bulgaricus*) üzerine antimikrobiyal etkisi sonuçları Çizelge 1 ve 2'de verilmiştir. Çalışmanın *in vitro* koşullarda gerçekleştirilen 5 tekrarı sonucunda, *S. platensis*'in kuru formu ve metanol ekstraktının incelenen tüm konsantrasyonlarında yoğurt starter bakterileri üzerine herhangi bir antibakteriyel etkisi görülmemiştir.



Çizelge 1. *S. platensis*'in kuru formunun *S. thermophilus* ve *L. delbrueckii* subsp. *bulgaricus* üzerine etkisi (1-5 Çalışma)

1	inhibition zone (mm)					
Concentration	2.5mg/ml	5mg/5ml	7.5mg/ml	10mg/ml	Kanamycine (15mg/ml)	Water
<i>S. thermophilus</i>	--	--	--	--	6.00mm	--
<i>L. bulgaricus</i>	--	--	--	--	17.00mm	--

2	inhibition zone (mm)					
Concentration	2.5mg/ml	5mg/5ml	7.5mg/ml	10mg/ml	Kanamycine (15mg/ml)	Water
<i>S. thermophilus</i>	--	--	--	--	8.00mm	--
<i>L. bulgaricus</i>	--	--	--	--	15.00mm	--

3	inhibition zone (mm)					
Concentration	2.5mg/ml	5mg/5ml	7.5mg/ml	10mg/ml	Kanamycine (15mg/ml)	Water
<i>S. thermophilus</i>	--	--	--	--	7.00mm	--
<i>L. bulgaricus</i>	--	--	--	--	15.00mm	--



4	inhibition zone (mm)					
Concentration	2.5mg/ml	5mg/5ml	7.5mg/ml	10mg/ml	Kanamycine (15mg/ml)	Water
<i>S. thermophilus</i>	--	--	--	--	6.00mm	--
<i>L. bulgaricus</i>	--	--	--	--	15.00mm	--

5	inhibition zone (mm)					
Concentration	2.5mg/ml	5mg/5ml	7.5mg/ml	10mg/ml	Kanamycine (15mg/ml)	Water
<i>S. thermophilus</i>	--	--	--	--	8.00mm	--
<i>L. bulgaricus</i>	--	--	--	--	15.00mm	--

Çizelge 2. *S. platensis* metanol ekstraktının *S. thermophilus* ve *L. delbrueckii* subsp. *bulgaricus* üzerine etkisi (1-5 çalışma)

1	inhibition zone (mm)					
Concentration	2.5mg/ml	5mg/5ml	7.5mg/ml	10mg/ml	Kanamycine (15mg/ml)	Water
<i>S. thermophilus</i>	--	--	--	--	13.00mm	--
<i>L. bulgaricus</i>	--	--	--	--	18.00mm	--



2	inhibition zone (mm)					
Concentration	2.5mg/ml	5mg/5ml	7.5mg/ml	10mg/ml	Kanamycine (15mg/ml)	Water
<i>S. thermophilus</i>	--	--	--	--	11.00mm	--
<i>L. bulgaricus</i>	--	--	--	--	18.00mm	--

3	inhibition zone (mm)					
Concentration	2.5mg/ml	5mg/5ml	7.5mg/ml	10mg/ml	Kanamycine (15mg/ml)	Water
<i>S. thermophilus</i>	--	--	--	--	13.00mm	--
<i>L. bulgaricus</i>	--	--	--	--	20.00mm	--

4	inhibition zone (mm)					
Concentration	2.5mg/ml	5mg/5ml	7.5mg/ml	10mg/ml	Kanamycine (15mg/ml)	Water
<i>S. thermophilus</i>	--	--	--	--	10.00mm	--
<i>L. bulgaricus</i>	--	--	--	--	23.00mm	--



5	inhibition zone (mm)					
Concentration	2.5mg/ml	5mg/5ml	7.5mg/ml	10mg/ml	Kanamycine (15mg/ml)	Water
<i>S. thermophilus</i>	--	--	--	--	10.00mm	--
<i>L. bulgaricus</i>	--	--	--	--	21.00mm	--

Danielsen ve Wind (2003) *Lactobacillus* spp. türlerinin çeşitli antimikrobiyal ajanlara karşı duyarlılık düzeylerini belirlemek için yaptıkları çalışmada, bazı *Lactobacillus*'ların basitrasin, sefoksitin, siprofloksasin, fusidik asit, kanamisin, gentamisin, metronidazol, nitrofurantoin, norfloksasin, streptomisin, sülfadiazin, teikoplanin, trimetoprim/sülfametoksazol ve vankomisine karşı yüksek doğal dirence sahip olduğunu göstermişlerdir.

Güldaş ve İrkin (2010), *S. platensis*'in yoğurt bakterileri ve *L. acidophilus* üzerindeki etkisini araştırdıkları çalışmada, *S. thermophilus*, *L. delbrueckii* subsp.*bulgaricus* ve *L. acidophilus* bakterileri ile % 0; 0.5; 1.0 (w/w) oranlarında *S. platensis* tozunu içeren yoğurt üretmiş ve 4 °C'de 30 gün depolamışlardır. Depolama süresi sonunda LAB sayısının, alg içeren örneklerde daha fazla olduğunu belirlemişlerdir.

Kumar ve ark. (2011) yaptıkları çalışmada, *S. platensis*'in metanol ve aseton ekstraktlarının *Staphylococcus aureus* ve *Salmonella Typhimurium*'a karşı antibakteriyel etkisini inceledikleri çalışmada, farklı konsantrasyonlarda (250 ppm'den 7000 ppm'e kadar) ekstraktların bakterilerin üremesini inhibe ettiği gösterilmiştir. Ayrıca, *S. platensis* ekstraktlarının antibakteriyel ajan olarak kullanılabilir aktif maddeleri ve kimyasal bileşimini belirlemek amacıyla gaz kromatografi kütle spektrometresi (GC-MS) kullanarak yaptıkları analizlerde, mevcut maksimum bileşik miktarının %42.11'lik oranda Eikosan adlı bir yağ asidi olduğu belirlenmiş ve bu yağ asidinin de antibakteriyel aktiviteden sorumlu olduğu tespit edilmiştir.

Abd El-Monem ve ark. (2018) *S. platensis*'in antimikrobiyal aktivitesini belirlemek amacıyla, yaptıkları çalışmada, %70'lik alkol (metanol, etanol ve aseton) ve farklı pH değerlerinde (8.0, 9.0, 10.0, 11.0 ve 12.0) hazırlanan solüsyonların bazı patojen bakteriler üzerinde etkileri incelenmiştir. Sonuç olarak, en yüksek antibakteriyel aktivitenin maksimum inhibisyonun *S. aureus* NCTC-7447 (20.00mm) üzerine %70 aseton ekstresi ile pH 8.0 ve 10'da gözlemlendiğini belirtmişlerdir. Bu değerler *E. coli* NCTC-10418 için ise pH 8.0'da kaydedilmiştir. Metanol ekstresi *S. aureus* NCTC-7447 üzerine maksimum 20.0 mm inhibisyon gösterirken, pH 8.0'da etanol ekstresi ile 17.00 mm olarak rapor edilmiştir. *S. platensis*'in toplam fenolikleri ve flavonoidleri, için değerlere bakıldığında, en yüksek fenolik içeriği aseton ekstraktında (0.52 mg/g) bulunurken, en yüksek flavonoid içeriği pH 10.0'da etanol ekstraktında (7.6 mg/g) rapor edilmiştir.

Aydemir ve Öner (2020), farklı konsantrasyonda (0.25, 0.50, 0.75 ve %1) maviyeşil alg türü olan *S. platensis*'i yoğurda kattıkları araştırmalarında, 21 günlük depolama süresince *S. platensis*'in yoğurdun fiziksel, kimyasal, mikrobiyolojik ve duyuşal özellikleri incelenmiş ve mikrobiyolojik analiz sonuçlarına göre *S. platensis* ilavesi ile yoğurt bakterileri *Streptococcus thermophilus* ve *Lactobacillus delbrueckii* subsp.*bulgaricus* sayılarında istatistiksel olarak anlamlı bir artış bulunmamıştır.

SONUÇ

Yapılan çalışmalara bakıldığında; *S. platensis*'in farklı miktarlarda çeşitli alkol ekstraktları ve pH'larda patojen bazı bakteriler üzerine antibakteriyel etkileri gösterilmiş fakat starter kültür üzerine etkileri ya



kültür bakterilerini stimüle ettiği ya da herhangi bir pozitif ve negatif etkiyle karşılaşmadıkları şeklinde sonuçlarla karşılaşılmıştır.

Bu araştırmada, kuru formda *S. platensis* ile metanol ekstraktlarının çalışılan tüm konsantrasyonlarında test edilen yoğurt starterleri üzerinde etkili bir antibakteriyel aktivite göstermediği belirlenmiştir. Dolayısıyla, özellikle mikroalglerden biri olan *Spirulina platensis*'in, fermente süt ürünlerinde biyoaktif bileşikler sağlamak amacıyla kullanılabileceği görülmüştür.

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МЕДИАТЕКСТ КАК ДИСКРЕТНАЯ ЕДИНИЦА ДИСКУРСА МАСС-МЕДИА MEDIA TEXT AS A DISCRETE UNIT OF MASS MEDIA DISCOURSE

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РЕЗЮМЕ

Глобальные изменения, связанные с непрерывным развитием возможностей массовой коммуникации, влияют не только на условия жизни, образ мышления и систему восприятия информации современного человека, но и способствуют глобальным изменениям в современном информационном обществе. В данной статье осуществляется обзор существующих подходов к определению понятий «дискурс масс-медиа», «медiateкст», а также установить их взаимозависимость и описать сущностные характеристики. Дискурс масс-медиа является наиболее актуальным в современном медиапространстве, ведь отображает не только коммуникативно-информационные, но и политические, экономические, культурные настроения и тенденции современного социума. Дискретными единицами дискурса масс-медиа, разделяющими информационные потоки на отдельные фрагменты, выступают медiateксты. Именно поэтому изучение медиадискурса невозможно без анализа понятия медiateкста. Медiateкст – это интегративный, многоуровневый текст, объединяющий в единое коммуникативное целое разные семиотические коды (вербальные, невербальные, медийные), а также демонстрирует открытость на содержательном, композиционно-структурном и знаковом уровне. Сущность медiateкста как продукта массовой информационной деятельности и массовой коммуникации состоит в выражении конкретной информации с целью воздействия на общественное мнение и убеждение. Основными его характеристиками являются логическая законченность высказываний, прагматичная установка и коммуникативное намерение. Большинство медiateкстов предполагает присутствие журналиста как создателя и имеет такие универсальные черты, как слово, звук, визуальность, по которым их можно разделить на радио-, теле-, газетные и Интернет-тексты (по принадлежности к определенной медийной форме). Характерные признаки подобных медiateкстов обусловлены преимуществами Интернет-коммуникации, а именно ее гипертекстуальностью, интерактивностью, нелинейностью, использованием нарративных стратегий, ускорением времени и сжатием пространства, устранением барьеров физической дистанции и конвергенцией. Итак, ключевой особенностью данных текстов является взаимодействие автора, адресата, канала, кода, текста, контекста, шумов, обратная связь между ними, а также эффективность коммуникативного процесса. Основными информационно-структурными качествами традиционного медiateкста как объекта лингвистического исследования выступают: связность, целостность, логичность, точность, ясность, понятность, доступность. Важной характеристикой медiateкста является его языковое оформление, ведь язык средств массовой информации изменчив, отвечает требованиям времени и актуальна потребностям современности. Именно поэтому в медийной речи (в частности, в медiateкстах) зафиксировано много лексических инноваций, авторских неологизмов и фразеологических единиц, языковых клише.

Ключевые слова: медiateкст, дискурс масс-медиа, вербальный, невербальный, информационное общество



ABSTRACT

Global changes associated with the continuous development of mass communication capabilities affect not only the living conditions, way of thinking and information perception system of modern people, but also contribute to global changes in the modern information society. This article reviews existing approaches to defining the concepts of “mass media discourse” and “media text”, as well as to establish their interdependence and describe the essential characteristics. Mass media discourse is the most relevant in the modern media space, because it reflects not only communication and information, but also political, economic, cultural sentiments and trends of modern society. Media texts are discrete units of mass media discourse that divide information flows into separate fragments. That is why the study of media discourse is impossible without analyzing the concept of media text. A media text is an integrative, multi-level text that combines different semiotic codes (verbal, non-verbal, media) into a single communicative whole, and also demonstrates openness at the content, compositional, structural and symbolic level. The essence of a media text as a product of mass information activity and mass communication is the expression of specific information with the aim of influencing public opinion and persuasion. Its main characteristics are the logical completeness of statements, a pragmatic attitude and communicative intention. Most media texts presuppose the presence of a journalist as a creator and have such universal features as word, sound, visuality, according to which they can be divided into radio, television, newspaper and Internet texts (according to their belonging to a specific media form). The characteristic features of such media texts are due to the advantages of Internet communication, namely its hypertextuality, interactivity, nonlinearity, the use of narrative strategies, the acceleration of time and compression of space, the elimination of barriers of physical distance and convergence. Therefore, the key feature of these texts is the interaction of the author, addressee, channel, code, text, context, noise, feedback between them, as well as the effectiveness of the communication process. The main information-structural qualities of a traditional media text as an object of linguistic research are coherence; integrity; consistency; accuracy; clarity; understandability; availability. An important characteristic of a media text is its linguistic design, because the language of the media is changeable, meets the requirements of the time and is relevant to the needs of our time. That is why in media speech (in particular, in media texts) many lexical innovations, author’s neologisms and phraseological units, and linguistic clichés are recorded.

Key words: media text, mass media discourse, verbal, non-verbal, information society

Введение. Язык масс-медиа прогрессирует и развивается и занимает особое место в исследованиях современной лингвистики. Медиаисследования свидетельствуют о том, что информация выполняет функции сообщения и влияния на социальное мнение, а благодаря стремительному интересу социума к информации существует дискурс масс-медиа. Актуальность изучения вопросов, связанных с ним, обусловлена тем, что дискурс масс-медиа исследуется в определенный период своего существования, а учитывая, что масс-медиа не стоит на месте и быстро развивается, исследования того или иного периода будут нести различные выводы и утверждения. Как результат, исследование дискурса масс-медиа встает перед нами как вопрос проблематический и широкий. В современной лингвистике существует два подхода к определению понятия дискурс масс-медиа:

1) первый подход, основой выделения типов дискурса является функционирование языка в различных сферах человеческой деятельности, в частности в науке, образовании, политике, массовой коммуникации, в связи с чем медиадискурс определяется как конкретный тип речи и мыслительная деятельность, характерная только для сферы средств массовой информации, и соответственно различают политический, религиозный, научный и другие виды дискурса; 2) второй подход заключается в том, что любой тип дискурса, реализуемый в сфере массовой коммуникации, называется медиадискурсом, в связи с чем исследователи выделяют политический, религиозный и другие виды медиадискурса.



Дискретными единицами медиадискурса, разделяющими информационные потоки на отдельные фрагменты, являются медиатексты. Именно поэтому исследование медиадискурса невозможно без анализа понятия медиатекста.

Медиатексту присущи логическая завершенность высказывания, коммуникативное намерение и прагматичная установка. Большинство медиатекстов имеет такие универсальные черты, как слово, звук, визуальность, по которым их можно разделить на радио-, теле-, газетные и Интернет-тексты.

При стилистическом анализе медиатекста нельзя не учитывать особые условия его трансляции через каналы массовой коммуникации: любой текст в масс-медиа не существует изолированно, он связан с другими текстами в конкретном совокупном тексте газеты, журнала, радио- или телепрограммы, веб-сайта. Кроме того, всякий медиатекст занимает промежуточное положение в глобальной медиакommunikации, являясь ответом на предыдущий информационный запрос аудитории и последующую его интерпретацию. Так что стилистический анализ речевого жанра в массмедиа должен строиться с учетом его диалогической природы и взаимодействия в нем разных компонентов медиаречи – интратекста, паратекста и метатекста. 1) Паратекст – отражает взаимосвязь данного текста с другими внутри совокупности текстов газеты или журнала, 2) интратекст – передает пропозициональное содержание медиатекста, 3) метатекст – выражает промежуточное положение текста в медиа потоке сообщений. Последний, встраивая во все компоненты композиции медиатекста, выполняет функцию их скрепления в единое целое. [2]

Медиатекст отличается высокой информативностью. Существуют виды медиатекстов, посвященных одному и тому же событию, различающиеся по времени и месту, а также по автору. Медиатексты пишутся в разное время и имеют формы, являющиеся продолжением друг друга. В этом случае возможно повторение и изменение ранее данной в медиатексте информации в определенной степени в последующем тексте. Медиатекст может образовывать гипертекст. Гипертекст включает в себя различные тексты, печатаемые в средствах массовой информации, и дополнительные информационные материалы к этим текстам (изображения, графика, курсив, цвета, шрифты и т. д.) [1].

Анализ англоязычных медиатекстов показывает, что необходимо анализировать различные уровни языка в этих текстах, в том числе вопросы, связанные с грамматикой. Синтагматика занимает особое место при изучении медиатекстов с лингвопрагматического аспекта. Связь между синтагмами основана на линейном характере речи. Чтобы показать выразительность, авторы используют выразительные средства, более характерные для языка художественной литературы. Сюда входят олицетворения, сравнения, метафоры, эпитеты, фразеологические обороты и т. д.

Одной из главных синтаксических особенностей англоязычных медиатекстов является частое использование страдательного залога в текстах статей. Это явление особенно характерно для новостных сообщений. Безличные формы глаголов встречаются не только в заголовках, но и в статьях. Использование герундия, причастия настоящего времени и причастия прошедшего времени делает их более логичными и информативными. В газетных статьях широко распространено использование клише. Их можно найти в статьях на любую тему: политика, экономика, спорт, культура, экология и т.д.

Также для медиатекстов характерно использование пословиц, поговорок, разговорной лексики, сокращений и различных других тропов.

Англоязычные медиатексты классифицируют на: журналистские, которые в свою очередь делят на жанры печатных средств массовой информации (column, features, straight news stories и другие), радиожанры (например, radio documentary, radio drama, sports talk), тележанры (например, cookery, news, talk show), Интернет-жанры (например, electronic newsletters, weblogs); жанры сферы публичных рилейшнз, PR-жанры (backgrounder, press-kit, press release); — жанры рекламы (advertorial, commercial, public service, announcement). Такая классификация достаточно условна, поскольку в ней трудно придерживаться принципа единства критерия. Кроме того, для



современной англоязычной медиасферы характерно размывание жанровых, стилевых и дискурсивных границ, смешивание тем и форм, что привело, например, к появлению медиатекстов, сочетающих информационный и развлекательный компоненты (infotainment).

Результат. Итак, медиатекст представляет собой видовое понятие по отношению к медиадискурсу, поскольку именно концепция медиатекста позволяет упорядочить движение медиапотока в современном обществе. Медиатекст как дискретная единица медиадискурса является разновидностью текста, рассчитанного на массовую аудиторию, характеризующегося сочетанием вербальных и медийных единиц, а также прагматической направленности.

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INVESTIGATION OF BIODIESEL/TOLUENE BLENDS CHANGE ON ENGINE PERFORMANCE IN A DIESEL ENGINE

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ABSTRACT

Diesel engines use a variety of fuels other than diesel. The most important of them are biofuels, such as biodiesel. Biodiesel improves combustion in compression ignition engines (diesel engines) due to its high oxygen content. In addition, since biodiesels are renewable fuels, they have the potential to create an alternative to fossil fuels with limited resources. Despite all its advantages, biodiesel has some challenges to overcome, such as high viscosity and lower heating value. In the presented study, toluene was used to solve this disadvantage of biodiesel. Toluene is a fuel with low viscosity and high lower heating value. In the present study, B50 (50% diesel and 50% biodiesel) and toluene were blended volumetrically and used in a diesel engine. The experiments were carried out on a single-cylinder air-cooled diesel engine. The experimental engine was operated at 50% constant load and 2400 rpm. The toluene used in the study was blended with biodiesel at 10% volumetrically. The data from the tests were analysed for engine performance. According to these findings, it was determined that the IMEP value, which is an important parameter for the change in engine performance, decreased in the use of B50 compared to diesel, but increased with the addition of toluene and reached the diesel level. It has been evaluated that this information obtained will contribute to the development of renewable fuels and the use of biodiesel in diesel engines without a decrease in engine performance with the addition of toluene in high ratio biodiesel studies.

Keywords: Diesel, Biodiesel, Toluene, Renewable Energy, Alternative Fuel

INTRODUCTION

Compression ignition engines (diesel engines) are widely used all over the world and in different fields due to their high efficiency. Despite all their advantages, diminishing fossil fuel resources are one of the important parameters limiting the use of diesel engines. In recent years, a lot of research has been carried out to minimize the impact of diesel engines on diminishing fossil fuel resources. In most of these researches, it is seen that alcohol-based and biofuels that can form a homogeneous mixture with diesel fuel are used. There are many studies in which different parameters have been tested to ensure that there is no reduction in engine performance with the use of these alternative fuels [1, 2]. Among the alcohol-based and biofuels used in diesel engines, it is seen that biofuels expressed as biodiesel are mostly used. Biodiesel is one of the most suitable alternative fuels to diesel due to its advantages, such as high oxygen content, renewability and homogeneous blending with diesel. Biodiesels are also referred to as renewable fuels that can be produced from animal or vegetable oils [3-5]. Furthermore, it is an important advantage that biodiesel does not need any design for its use in diesel engines [6]. Due to these advantages, the performance of biodiesel in diesel engines has been examined by many researchers. One of these studies was conducted by Hoseini et al. In this study, Hoseini et al. investigated the effect of diesel-biodiesel blend on emissions from diesel engines. According to this study, it was emphasised that there was an increase in fuel consumption in biodiesel fuelled experiments at partial load. In addition, a certain decrease in engine power was detected in biodiesel fuelled experiments under full load conditions. It was reported that one of the reasons for this decrease may be the low lower heating value of biodiesel [7]. Doppalapudi et al. conducted a study to investigate advanced strategies to reduce harmful nitrogen oxide emissions from biodiesel fuelled engines. According to this study, it was



reported that the cetane number of the fuel is a property that directly affects engine performance and consequently emissions. It is also stated that ignition delay and combustion duration, which vary depending on the fuel mixture, are important for controlling combustion [8]. In their study, Tan et al. investigated the performance of a hydrogen/biodiesel fuelled diesel engine with water addition. In this study, it was emphasised that biodiesel is a suitable fuel for diesel engine by blending with diesel fuels and has the potential to reduce CO, HC and particulate matter (PM) emissions but increased NO_x emission [9]. Kathumbi et al. conducted a study in which they investigated the performance and emissions of a biodiesel fuelled diesel engine. In this study, it was emphasised that biodiesel has several advantages such as biodegradability, renewability and undesirable properties such as higher viscosity, density and lower heating value compared to diesel fuel. In addition, it was emphasised that increased NO_x emissions together with high BSFC and reduced brake power (BP) are disadvantages for the use of biodiesel in diesel engines [10]. In another study, it was mentioned that biodiesel has advantages such as improved engine performance, good fuel performance, a wide raw material source, being renewable, etc. However, some disadvantages of biodiesel such as higher viscosity, lower heating value and poorer stability at low temperatures were also mentioned. When all these findings are evaluated, it is seen that the use of biodiesel generally has challenges that need to be investigated and solved, such as unfavorable engine performance and pollutant emission formation (such as higher NO_x emissions) [11].

In the literature, it has been observed that biodiesel improves combustion due to its high oxygen content. Despite this improvement caused by the oxygen content, it has been determined that a high oxygen content may cause an increase in NO_x emissions. In addition, some thermophysical properties of biodiesel, such as high viscosity and low lower heating value, have been found to cause decreases in engine performance. In addition, it has been determined that changes in ignition delay and combustion duration in biodiesel fuelled studies cause changes in engine performance and as a result, emissions will be adversely affected. Considering all these data, the main motivation of this study was to improve the use of biodiesel, which is renewable and has limited negative effects on the environment, in diesel engines. In order to achieve this motivation, the first target was to improve the low lower heating value and high viscosity of biodiesel, which are among the negative features that reduce engine performance in the use of biodiesel. For this purpose, toluene, which can be homogeneously mixed with biodiesel, was preferred. In the study, it is aimed to reduce the effect of the high viscosity of biodiesel with the addition of toluene and to reduce the effect of the high lower heating value on decreasing engine performance. Considering all the data, it is aimed at preventing the disadvantageous properties of biodiesel and improving engine performance by using a biodiesel/toluene blend in a diesel engine

MATERIAL AND METHOD

The experimental investigation employed a single-cylinder, air-cooled diesel engine. To improve experimental control, the experimental engine's mechanical injection system was replaced with a common-rail injection system. Thus, the injection pressure and angle were adjusted based on the experimental conditions. Technical information of the experimental engine is given in Table 1 and the experimental schematic is given in Figure 1.

Table 1. Test engine technical specification.

<i>Engine type</i>	Air cooled, CRDI diesel engine
<i>Model</i>	Kipor KM 186 F Dizel Motor
<i>Power output @3000 rpm</i>	7.4 kW
<i>Engine Speed</i>	2400 (rpm)
<i>Compression Ratio</i>	18.1:1
<i>Cylinder Volume</i>	406 (cm ³)
<i>Number of Strokes</i>	4
<i>Number of Cylinder</i>	1
<i>Power @2400 rpm</i>	25.7 (Nm)
<i>Cylinder Diameter x Strok</i>	86 x 70 (mm)

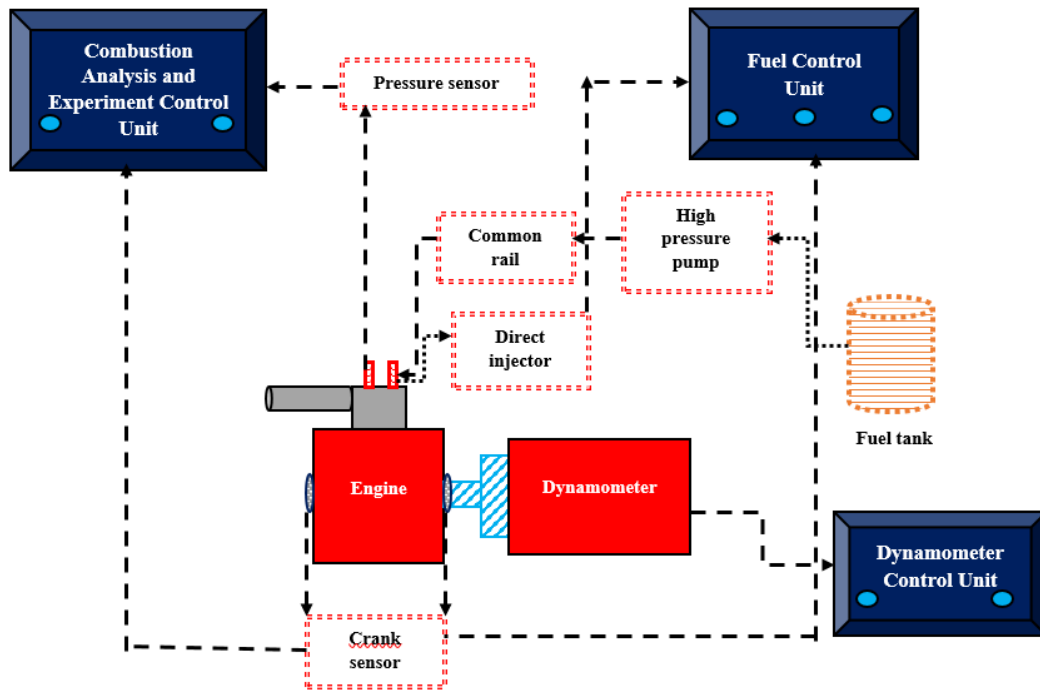


Figure 1. Schematic view of experimental setup

To effectively evaluate the study's findings, it was decided to conduct the trials in two stages. In the first stage of the engine experiments, the diesel engine experiments were carried out with only D100 (100% diesel) fuel at 50% engine load and 2400 rpm engine speed. In these experiments, diesel fuel was injected into the cylinder with a pressure of 30 MPa. In the experiments, the injection of diesel (SOI) was set to 21 CA (bTDC). After these experiments, experiments were carried out with B50 (50% diesel + 50% biodiesel) fuel under the same experimental conditions. In these two experiments, graphs were obtained to provide information about engine performance data (in-cylinder pressure, heat release rate (HRR), maximum pressure rise, IMEP and in-cylinder temperature value). In the second stage, 10% toluene by volume was added to B50 fuel. The fuels used in the study are referred to as D100, B50 and T10 (90% B50+10% Toluene) respectively. In the experiments with T10 fuel, the diesel engine was used as in the first stage of the experiments and the graphs were drawn after analysing the effects on engine performance. Information on the fuel ratios used in the study is given in Table 2.

Table 2. Test fuels specification [12-14].

Parameters	Diesel	Toluene	B100
Density (kg/m ³)	829.4	827	883.2
Boiling point (°C)	180-350	110	290-350
Flash point (°C)	67	9	180
Viscosity (mm ² /s)	2.889	0.6	5.027
Lower heat value (MJ/kg)	43.14	40.6	38.71
Latent heat of vaporization (kJ/kg)	358	-	712
Auto ignition temperature (°C)	210-250	-	399
Carbon (%)	80.13	-	73.18
Hydrogen (%)	12.86	-	11.39
Oxygen (%)	6.35	-	14.75
Cetan number	56	6	53
Octan number	-	116	-



The EN590 diesel used in this research is currently used as diesel in Turkey. It was also used to produce B50 fuel, which is used as a reference fuel in commercial biodiesel (B100) produced from waste cooking oil. The study used 99.8% toluene supplied by Sigma Aldrich. The properties of toluene are the technical specifications provided by this company and the literature. Additionally, Figure 2 shows the scheme showing the experimental stages, which will enable a better understanding of the experimental parameters.



Figure 2. Schematic view of injections of test

A program called Febris was used for engine performance data. With this program, data from inside the cylinder is recorded thanks to the pressure sensor placed in the cylinder. This sensor is placed on the cylinder head to measure the in-cylinder gas pressure and records information at 1 CA interval and an average of 200 cycles. In addition, the position of the crank angle was determined with a Kübler encoder with 360 signal frequencies and recorded together with the cylinder pressure data using a data acquisition system. It was then processed by NEL presto's Febris Software through an amplifier to calculate RoPR and RoHR to evaluate the combustion process.

RESULT AND DISCUSSIONS

Four graphs are presented in the following graphs: In these graphs, in-cylinder pressure and HRR, PRR, IMEP and in-cylinder temperature change data, which provide information about the change in engine performance, are shown. First, the graphs showing the change in in-cylinder pressure and HRR are analyzed. Figure 3 shows the effect of changing reference fuels on in-cylinder pressure and heat release rate. When the graph is analysed, it is seen that the highest pressure in the cylinder occurs in the experiment with T10 fuel and the lowest pressure occurs in the experiment with D100 fuel. A similar change is observed in the HRR data. As it is known, the oxygen content of fuels improves combustion at certain rates [15]. This situation was also valid in this study. B50 fuel initiated combustion at an early crank angle due to its higher oxygen content level compared to D100 and T10 fuel. In addition, T10 fuel delayed combustion due to its low viscosity and high octane content, which resulted in an increase in both pressure and HRR value at later crank angles. In summary, there was an increase in pressure and HRR value with T10 fuel compared to both D100 and B50 fuelled experiments. This result was considered to be significant.

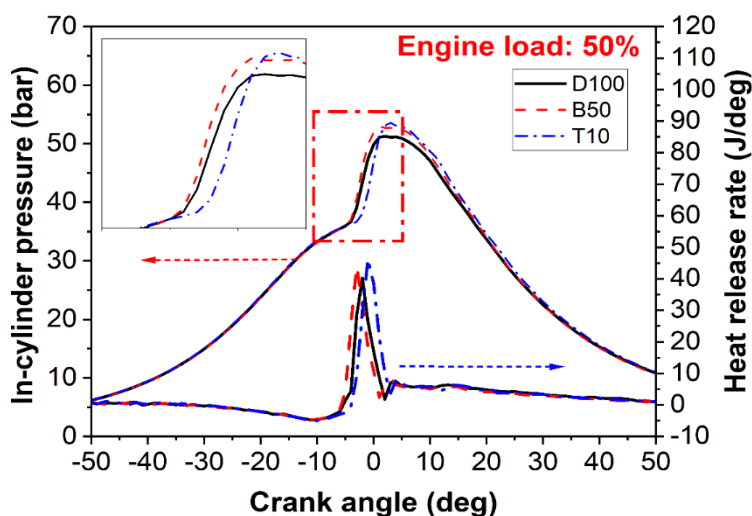


Figure 3. Variation of in-cylinder pressure and heat release rate (HRR) for D100, B50 and T10 fuels



Figure 4 shows the effect of fuel change on the maximum in-cylinder pressure rise ratio (PRR). According to the graph, the lowest PRR was obtained in the experiments with D100 fuel. Although the PRR in B50 and T10 fuelled experiments increased compared to D100, this increase rate was low and was below the value of 10 (bar/degree), which is accepted as the knock limit in the literature [16]. The PRR value is defined as the velocity of the pressure generated in the engine per crank angle. The increase in the PRR value in the experiments with B50 and T10 fuels is thought to be due to the oxygen content in the structure of these fuels, the octane number and accordingly the crank angles at which combustion is initiated. It is also stated in the literature that the knock intensity is caused by the rapid combustion that occurs [17]. In their study, Zheng et al. mentioned that the start of the combustion process before the TDC may cause high PRR [18]. In the findings, it is thought that although there is an increase in the experiments with T10 fuel compared to D100 fuel, the formation of PRR at a slightly lower level than the experiment with B50 fuel will provide a solution to the knocking problems of biodiesel fuels.

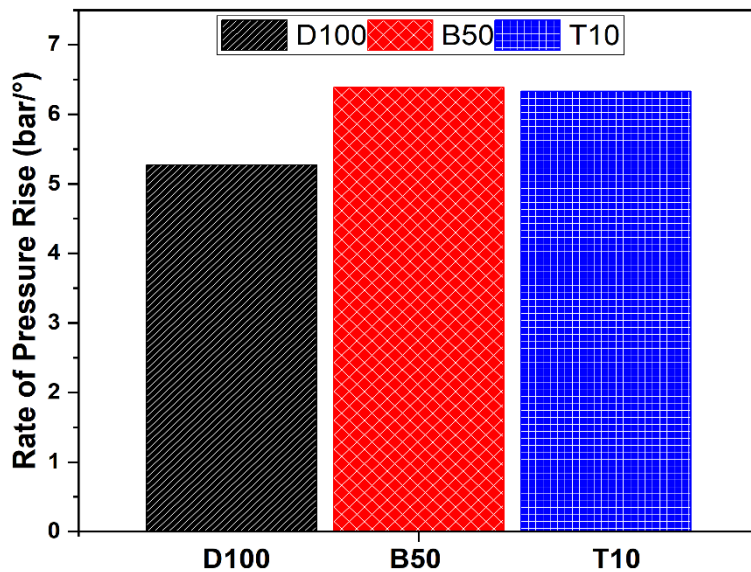


Figure 4. Variation of PRR value according to D100, B50 and T10 fuels

In diesel engines, the average indicated pressure expression (IMEP) is calculated as the ratio of the work produced per cycle to the stroke volume. For this reason, it can be said that the IMEP value varies depending on the crank angle at which combustion takes place. In other words, IMEP is a parameter that can give important information about the experimental engine. In the graph given in Figure 5, it is seen that B50 fuel causes a 2.5% decrease in IMEP value compared to the experiment with D100 fuel. On the other hand, the IMEP value increased by 5.5 % in the experiment with T10 fuel compared to the experiment with D100 fuel. It was previously stated that B50 fuel accelerates combustion with the oxygen content in its structure and provides rapid combustion before TDC. This caused a decrease in the network and therefore, a decrease in the IMEP value. In their study, Ning et al. emphasized that the amount of work is a magnitude that depends on the maximum in-cylinder pressure value and the crank angle at which this pressure occurs [19]. In the experiment using T10 fuel, the highest IMEP value was obtained. This was due to the low viscosity, high lower calorific value and octane number of toluene, which resulted in improved combustion and consequently increased network. This result was considered to be important for the use of biodiesel fuels.

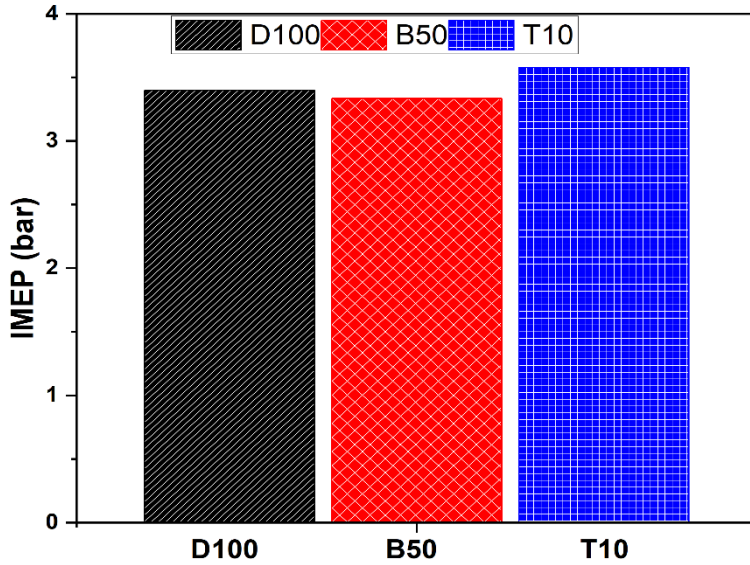


Figure 5. Variation of IMEP value according to D100, B50 and T10 fuels

The graphs in Figure 6 illustrate the in-cylinder temperature change achieved in tests with D100, B50, and T10 fuels in a diesel engine. This graph shows that the temperature values in B50 and T10 fuelled experiments have distinct impacts on each other than in the D100 fuelled experiment. B50 fuel was observed to enhance the temperature at earlier crank angles than both D100 and T10 fuelled tests. In the experiment with T10 fuel, it was determined that the temperature value started to increase at later crank angles compared to both B50 and D100 fuel experiments. With B50 fuel, combustion started earlier due to the increased oxygen content in the charge. In the study by Li et al., it was stated that biodiesel fuels have an effect on reducing the ignition delay [20]. When T10 fuel was used, high octane and low cetane number increased the ignition delay and accordingly, the temperature increased at later crank angles.

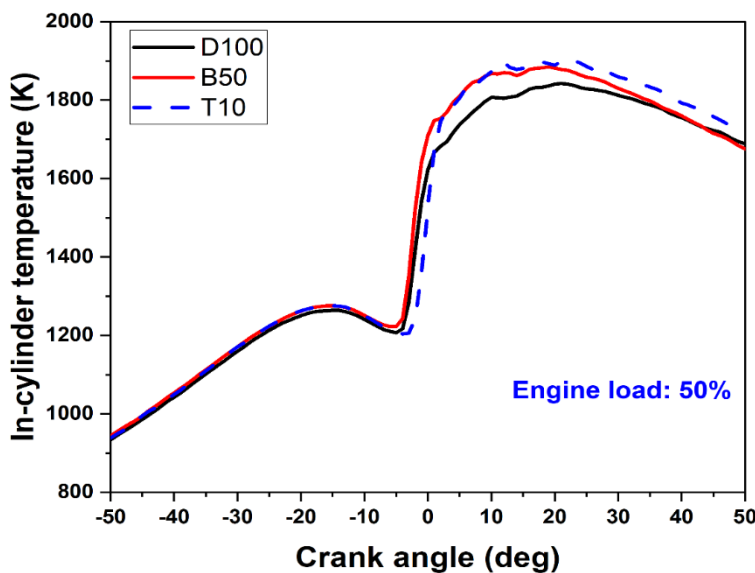


Figure 6. Variation of in-cylinder temperature value according to D100, B50 and T10 fuels

CONCLUSIONS

This study includes the results of experiments using D100, B50 and T10 fuels in a single cylinder diesel engine. The detailed results of the engine performance are presented above. Some of the prominent results of the study are presented below.

- D100, B50 and T10 fuels had different effects on in-cylinder pressure, HRR and in-cylinder temperature changes. In B50 fuelled experiments, pressure, HRR and temperature values started to



increase at early crank angles. In T10 fuelled experiments, started later. In addition, the highest values in all of these parameters were observed with the use of T10 fuel. The use of T10 fuel in the experiments resulted in more favorable PRR and IMEP values compared to B50. Although the PRR value increased with the use of T10 compared to D100, a decrease occurred compared to B50. In addition, the IMEP value reached the highest level in the use of T10.

When all the data are evaluated, it is predicted that the addition of toluene will produce positive results in engine performance values in high ratio biodiesel experiments. It is expected that this result will be further investigated and the use of toluene at different ratios will also contribute positively to engine emissions in biodiesel fuelled engines

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PROXIMATE AND ORGANOLEPTIC ANALYSIS OF PLANTAIN-BASED SNACK (PLANTAIN MOSA) AND PUFF-PUFF

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ABSTRACT

Ready to eat dry foods refrigerated meals, shelf stable food etc mixes like cake mixes are all examples of convenience foods in Nigeria. Organoleptic properties of food such as color, taste, flavor, aroma, and texture have distinct and influential effect on food acceptability and specifically influence the decision that a consumer makes regarding the preference of food substance. Despite being a rich source of complex carbs vitamins and minerals, plantains are quite simple to digest. It serves only as a replacement side dish and is often consumed with other foods. It has not yet been completely developed to create snack items in terms of vitamins and other nutrients. This study aimed at investigating the proximate and organoleptic analysis of plantain mosa and puff-puff and specifically compared the level of their acceptability. Proximate analysis of plantain mosa and puff-puff were carried out in the Laboratory to ascertain their level of composition of moisture content, protein, fat, ash, crude fibre and carbohydrate. One hundred samples of sensory evaluation forms were administered to respondents comprising of all kind of visitors at University of Ibadan Hotel under University of Ibadan ventures in its environ to assess the organoleptic properties of plantain mosa and puff-puff to determine most preferred sample. Random and convenience sampling were used to determine the respondents at the hotel. Data were analyzed using descriptive statistics (use of charts and percentage). The findings included variations in the proximate analysis value of Plantain mosa and puff-puff.

Keywords: Organoleptic analysis, plantain mosa, puff-puff

INTRODUCTION

Convenience Foods are foods bought that require little or no preparation before eating (SAN, 2011). Convenience foods include ready – to – eat dry products, frozen foods, and shelf – stable foods, mixes such as cake mix and snack food. Convenience indicates that they satisfy a consumer’s need: to speed up or even avoid preparation of meals altogether. It describes a variety of hot or cold foods and dishes that require little or no effort in preparation (SAN, 2011).

A snack is a portion of food often smaller than a regular meal, generally eaten between meals (Oluwalana, 2014). Snack foods are typically designed to be portable, quick and satisfying. Snack accompany social or simply nice moments. Snacks come in a variety of forms including packaged snack foods and other processed foods as well as items made from fresh ingredients at home. Snacks can be made out of variety of food items including wheat flour, plantain flour, among others. Plantain mosa is a plantain (*Paradisiaca*) based snack.

Plantain (*Musa Paradisiaca*) has its native origin to Southeast Asia but it is now cultivated extensively across both tropical and subtropical climates including Nigeria. Plant of *Musa Paradisiaca* combine characters of two parents, *M. acuminata* and *M. balbisiana*, the botching on the pseudo stem is pale or absent. A tropical plant, tree like producing the large, pulpy and starchy fruit (Plantain). The fruit, a pulp, differing from bananas in being starchy rather than sweet tasting, is a rich source of diverse nutrients and photochemicals (Benett et al. 2010, Oyeyinka and Afolayan, 2019). *Musa* are rich in Vitamin C, B6, minerals and dietary fiber. They are also rich energy source with carbohydrates accounting 22% and 32% of fruit weight. In terms of food security, Plantain has grown to strategically



become an important instrument for rural development, creation of employment as well as the generation of income for crop producing households (Sartori and Menegalli 2016). Plantain flour can be combined with wheat flour and plantain to produce plantain mosa (plantain puff-puff) a snack gradually gaining acceptance in parties especially in West Africa like Oyo State and Lagos State.

Plantain flour is delicious and all natural pure flour produced from green plantains which are grown across Asia, Columbia, Africa and more. The peels of each plantain is removed by hand and the plantains are washed in spring water before sun drying for the sweet sun kissed flavor after which it is killed into flour. There are no added preservatives, colorings or flavoring. It is a high energy food which is calorie dense with low fat and low sugar but high nutritive value and high dietary fiber which is good for cholesterol related ailments, helps reduce constipation , enhances respiratory system and improves digestive system (Sommer *et al.*, 2002).

Plantain mosa also known as plantain puffs, a deep fried product from plantain (flour). *Plantain mosa* are a relatively new snack food made from a combination of over ripe plantain - Eggs and pepper and selected spices Sthe combination of ingredients – onions, pepper and groundnut oil, makes it a complete, nutritious food. The snack food is gradually gaining acceptance in Nigeria as caterers are already making the products as small chops during celebration (Mary Ann Olaoye,2018). With the addition of plantain flour as a means of fortification to increase its nutritional benefits which include it being medicinal for some ailments like diabetes.

Puff-Puff is a traditional Nigerian snack made of fried dough. Other names for the food include (buffloaf or boflot) in Ghana. It is prepared using flour, yeast, sugar, butter, salt, water and eggs from which a stiff paste is made. It is then deep-fried in vegetable oil until golden brown. After frying, puff puffs can be rolled in sugar like the French beignet or in any other spice or flavoring such as cinnamon, vanilla and nutmeg. (Christine Serrano, 2019)

Proximate analysis consists of determination of ash content, moisture content, volatile matter, and fixed carbon on an as received basis. The quantitative analysis of macromolecules in food. A combination of different techniques, such as extraction, kjeldahl, NIR are used to determine protein, fat, moisture, ash and carbohydrates levels which are the five standard proximate (Parimelazhagan Thangaraj, 2015). According to (Udochuwu *et al.*, 2023), proximate analysis is a method which helps determines the macro nutrients values in food samples and are usually declared as nutritional facts display mostly on the final product's label. Like many processed foods, snacks are subjected to physical , chemical and microbial contamination by organisms like staphylococcal and moulds like *Rhizopus* (Annah-Prah et al.,2011)

Organoleptic analysis also known as sensory evaluation is defined as a scientific discipline used to evoke, measure, analyze and interpret those responses to products that are perceived by the senses of sight, smell, touch, taste and hearing (Milica Lukic et al., 2014) consisting of texture, color, aroma, taste and flavor. Organoleptic analysis is very important in food products because if it doesn't taste good, the nutritional value can't be analyzed as a result of no one eating it (Muflihatin and Purnasari,2019). Organoleptic properties are differentiated based on the purpose of Organoleptic assessment which include differentiation test (discriminative test), acceptance test (affective test) and description test (descriptive test) as stated by Lawless and Heymann, (2010) . Lawless and Heymann (2010) defined an expert as an individual acknowledged or self-ordained to act as a judge of sensory attributes, defects, or overall product quality based on experience and/or training; generally not used in a sensory evaluation". They must be capable of recognizing many different sensory characteristics of a product and must reach agreement on how these are perceived and should be labeled. The panel used for the study are the visitors (tourists) of University of Ibadan Hotel

As tourism development has greatly improved and increased to be one of the many stakeholders concerns, tourist however would need to take some meals in form of snacks as replenishment before meals. Local snacks are often sold by itinerant sellers from trays or boxes in their head , from stores in the market, at school or by roadside in small rural towns as well as large urban centers (Apata *et al.*, 2017). The hotels visitors were used as untrained panels in which the test is called an affective test



An affective test could also be basically referred to as customer acceptance tests and product success through sensory evaluation tests. In this type of product test, the quality of a prototype is tested subjectively by potential customers in order to make sure that product development efforts have moved the design and features towards customer requirements (Mian K. Sharif et al., 2017). Heldman (2004) stated that the acceptance of food as well as snack is dependent on whether it responds to consumer needs and as on the degree of satisfaction that it is able to provide. Plantain mosa which is made from plantain fortified with plantain flour however is not yet known as there is a little tweaking of its production and it is yet to gain public acceptance compared to other snack like (puff-puff, chin-chin etc) as even few who eats it doesn't know exact name of what they are eating and adding of plantain flour is a new healthy way of eating the snack. Based on the Literature review, previous similar work conducted in this exact field is not yet seen. Therefore, it was considered very important to undertake this study which will be developed further in the future. This study is aimed at investigating the proximate and organoleptic analysis of plantain mosa and puff-puff, comparing the acceptability level with each other among hotels visitors.

Objectives of the study

The general objective of this study was to investigate the proximate and organoleptic analysis of plantain mosa and puff-puff among University of Ibadan Hotel visitors. Specifically, the study determined:

1. Proximate analysis of plantain mosa and puff-puff
2. Organoleptic analysis of plantain mosa and puff-puff
3. Comparison level of plantain mosa and puff-puff

Materials and Methods

Design of study: It is an experimental study. It involved the use of primary and secondary data to gather information as relating to the study. The primary data involved the use of questionnaire, sensory evaluation forms and Laboratory experiment

Materials: Plantain (*Musa x Paradisiaca*) and the packaging materials were purchased from Bodija market, Ibadan, Oyo state and was kept in a tight jar for 3 days to show black spots which is the sign of being over-ripe, as well as other ingredients such as scotch bonnet (ata rodo), cayenne pepper, onions, oil, seasoning cube, salt, yeast, milk, flavor, butter, baking powder and Plantain flour.

Preparation of *Plantain mosa*

Recipe

- 5 medium sized Over-ripe plantain
- 50tbsp. Plantain flour
- 200g of scotch bonnet, diced
- 10 tbsp. Bakers yeast
- Salt to taste
- 6 pieces of seasoning cube
- 5 cups of warm water (adjust to mixture)
- Oil for deep-frying (half of frying pan)

Procedure for preparation: Plantains were sliced and pieces were put along with diced pepper into a blender with a little bit of water for some minutes until the mixture looked smooth. The plantain flour and salt was then poured and blended again to make sure the mixture texture isn't too thick and smooth. The batter was then covered for some minutes between 15-20 minutes to allow rest and rise. While the batter was rising, the frying pan was put on gas stove to heatup and then oil was poured into hot frying



pan. The mixture was scooped with hand and extrude into the hot oil and the mosa were deep fried until golden brown. It was then removed, drained and cooled. After cooling, the mosa were properly packaged in a small rectangular foil plate.

Chemical/Proximate Analysis: Analytically, four of the constituents Fat, Protein, moisture and crude ash) are obtained via chemical reactions and experiments i.e. determined by the method of Association of official Analytical Chemists (1996). The constituents, carbohydrate was obtained based on the determination of the four others (Udochukwu *et al*, 2023) In other words, carbohydrate was determined by difference.

Sensory Evaluation: This involves;

Selection of panel of judges: The respondents include panel of 100 untrained judges made up of Hotel guests and staff of the University of Ibadan hotel, Ibadan, Oyo-State. 100 copies of semi-structured questionnaire were administered to the respondents that were randomly selected within the hotel using convenience sampling technique in order to rate the food items whether they meet food standard and requirements

Instrument for data collection: Questionnaire and Sensory evaluation form were used for data collection in which the questionnaire assessed the demographic characteristics of respondents and Sensory evaluation form addressed the organoleptic evaluation of both samples and the acceptability of plantain mosa in comparison with Puff-puff. The organoleptic evaluation involves the use of respondents' sense organs to assess the color, taste, flavor, aroma and texture of both samples using the 7-point hedonic scale of measure to rate the samples

Data collection method/procedure: The sensory attributes of plantain mosa and puff-puff were determined using the simple hedonic scale test Each panelist was asked to score each attribute on a 7-point hedonic scale which is (1 = dislike strongly, 2 = dislike moderately, 3 = dislike slightly, 4 = indifferent, 5 = like slightly, 6 = like moderately, 7 = like extremely) The sensory attributes evaluated were color, taste, flavor, aroma, texture, and overall acceptability

Data analysis: Data was analyzed using descriptive statistics in form of charts and percentages charts and percentage distributing of some variable related to the research work

Result of the study

Proximate analysis

The chemical composition of the samples checked include carbohydrate, moisture content, protein, ether extract (fat), ash and crude fibre, Ascorbic acid, Thiamin, Riboflavin and Niacin. This chemical analysis was carried out to know the amount of nutrients that can be derived from the samples.

Table 1: Proximate analysis of *plantain mosa* and *puff-puff*

Parameter	Regular puff puff	Plantain mosa
Moisture content %	19.3	21.2
	19.5	21.5
	19.6	21.4
Protein %	12.2	14.1
	11.9	14.4
	12.3	14.3
Ether Extract %	16.7	19.0
	16.8	19.3
	16.5	19.4
Ash %	2.1	2.3
	2.0	2.4
	2.1	2.2
Crude Fibre	0.4	0.6



	0.3	0.7
	0.3	0.6
Carbohydrate/NFE (By difference) %	49.3	42.8
	49.5	41.7
Ascorbic Acid (mg/100g)	49.2	42.1
	2.2	7.8
	2.1	7.5
	2.2	7.6
Thiamin (mg/100g)	0.16	0.22
	0.18	0.24
	0.19	0.25
Riboflavin (mg/100g)	0.12	0.17
	0.11	0.19
	0.13	0.16
Niacin (mg/100g)	2.10	2.87
	2.15	2.89
	2.14	2.79

Source: field survey, 2023

Data analysis shows that respondents' purpose of stay in the University of Ibadan Hotel reveals 45% of the respondents' was work, 29% was leisure, and 26% of the respondents gave other reasons

Figure 1: Percentage distribution of respondents' level of preference for samples t₁ and t₂

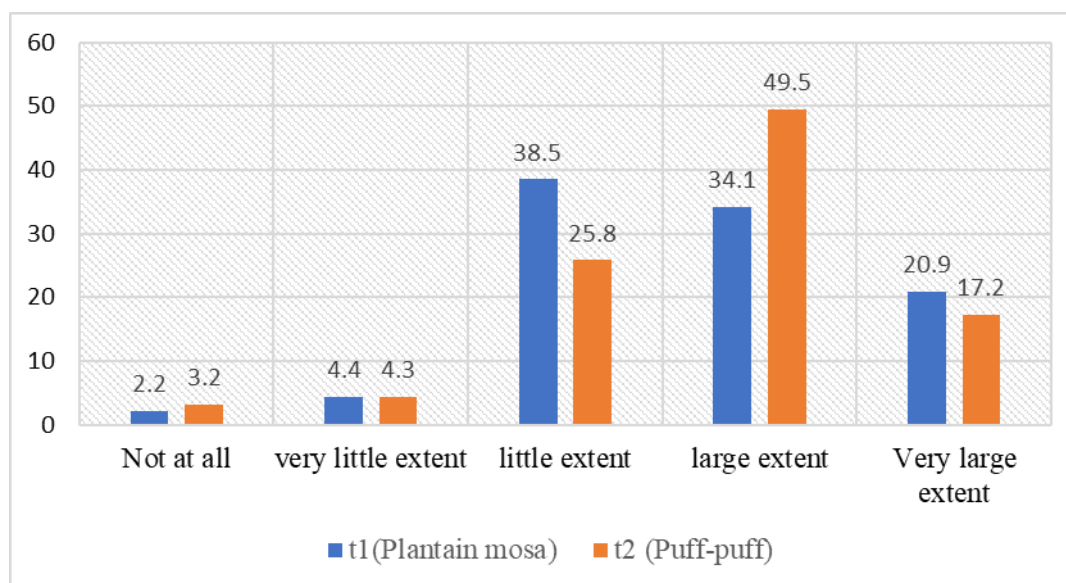


Figure 1: shows the percentage distribution by respondents' level of preference for samples t₁ (plantain mosa) and t₂ (puff-puff). For sample t₁, 20.9% of the respondents prefer it to a very large extent, 34.5% prefers it to a large extent, 38.5% prefer it to a little extent, 4.4% prefers it to a very little extent and 2.2% do not prefer it at all. For sample t₂, 17.2% of the respondents prefer it to a very large extent, 49.5% prefer it to a large extent, 25.8% prefer it to a little extent, 4.3% prefer it to a very little extent and 3.2% do not prefer it at all. Given 20.9% of the respondents prefer t₁ (plantain mosa) to a very large extent while 17.2% of the respondents prefer t₂ (puff-puff) to a very large extent. It could be said that t₁ was well received and liked



Table 2: Organoleptic sampling of t1 (plantain mosa) in preference to t2 (puff-puff)

Respondents' organoleptic sampling of plantain mosa (t1) and puff-puff (t2)

Source: Field Survey, 2023

Variable	Dislike strongly	Dislike moderately	Dislike Slightly	Indifferent	Like slightly	Like moderately	Like extremely
Color							
t ₁	4 (4.1%)	11 (11.2%)	17 (17.3%)	21 (21.4%)	15 (15.3%)	18 (18.4%)	12 (12.2%)
t ₂	0 (0.0%)	1 (1.0%)	0 (0.0%)	9 (9.0%)	26 (26.0%)	40 (40.0%)	24 (24%)
Taste							
t ₁	1 (1.0%)	1 (1.0%)	2 (2.0%)	9 (9.2%)	18 (18.4%)	30 (30.6%)	37 (37.8%)
t ₂	0 (0.0%)	1 (1.0%)	2 (2.0%)	4 (4.0%)	25 (25.3%)	44 (44.4%)	23 (23.2%)
Flavour							
t ₁	0 (0.0%)	1 (1.0%)	6 (6.1%)	9 (9.2%)	20 (20.4%)	29 (29.6%)	33 (33.7%)
t ₂	0 (0.0%)	0 (0.0%)	1 (1.0%)	6 (6.0%)	29 (29.0%)	39 (39.0%)	25 (25.0%)
Aroma							
t ₁	0 (0.0%)	1 (1.0%)	5 (5.1%)	8 (8.2%)	31 (31.6%)	27 (27.6%)	26 (26.5%)
t ₂	2 (2%)	0 (0.0%)	2 (2.0%)	11 (11.0%)	28 (28.0%)	39 (39.0%)	18 (18.0%)
Texture							
t ₁	2 (2.1%)	2 (2.1%)	5 (5.2%)	15 (15.5%)	16 (16.5%)	29 (29.9%)	28 (28.9%)
t ₂	0 (0.0%)	1 (1.0%)	2 (2.0%)	4 (4.0%)	26 (26.0%)	40 (40.0%)	27 (27.0%)
Overall acceptability							
t ₁	0 (0%)	0 (0%)	4 (4.3%)	6 (6.5%)	22 (23.9%)	31 (33.7%)	29 (31.5%)
t ₂	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (4.4%)	23 (23.3%)	41 (45.1%)	23 (25.3%)

Discussion

As Plantains, one of the main ingredients in plantain mosa are nutritious food item with many potential health benefits such as being a source of vitamins, fiber, potassium and antioxidants and are a low fat source of starchy carbohydrates and fiber. They also contain good amounts of vitamins and minerals, including vitamin C and potassium.

Therefore from the result of the proximate analysis conducted on the snack showed in Table 1, it was observed that plantain mosa contained moisture content (21.2%), Protein (14.1%), Ether extract(fat)(19.0%), Ash content (2.3%), Crude Fibre (0.6%), Carbohydrate/NFE (42.8%), Ascorbic acid (7.8%), Thiamin (0.22%),Riboflavin(0.17%), Niacin(2.87%); an increase in all nutritional



component tested against puff-puff which contained . However, variations were observed in the result of the proximate analysis of the snack as there were slight decrease in carbohydrates content (from 49.3% - 42.8%) , while all other cases recorded increase especially a rapid increase in Ascorbic Acid (Vitamin C) (from 2.2% - 7.8%), in protein (12.2% – 14.1%), fat (16.7% – 19.0%) and Niacin(2.10% - 2.87%). Hence, affirming the health benefits plantain and other derived food source from it gives the body

According to the analysis, the carbohydrates content in puff-puff was higher compared to plantain mosa. According Ludwig et al.,(2018) to having a high level of carbohydrates could type for risk of chronic diseases such as type 2 diabetes, coronary heart diseases and perhaps obesity when the carbohydrates affect postprandial hyperglycaemia and hyperinsulinaemia.

The protein content in plantain mosa was higher in comparison with Puff-puff. A high protein diet has major benefits for weight loss and metabolic health such that it could serve as muscle building block, growth control, and mostly reduces appetite and hunger level resulting in maintaining body wealth that could control obesity (Ortinou LC *et al.*,2014).

The moisture content of plantain mosa was higher than that of puff-puff according to the analysis. The moisture content shows information about the Shelf-life (storage) and microorganisms viability. Excess water (High moisture content) in food product can cause an increase in the rate of microbial growth which cannot only spoil a product before it reaches the shelves but could also decrease the length of time it can stay fresh for (IvyPanda,2022) which shows the Shelf-life of plantain mosa being extremely small

The ether extract content of plantain mosa was higher than puff-puff. Ether extract (fat) contributes to energy and essential fatty acid provision; however it being in excess can contribute to increasing problem of obesity and overweight (Geeth G. *et al.*,2020)

The Ascorbic Acid content of plantain mosa was extremely higher compared to that of puff-puff. According to Pullar JM *et al.*, (2017), Ascorbic Acid (vitamin c) contributes to many major body functions including formation of collagen, absorption of iron, the proper functioning of immune system and an important water soluble vitamin for wound healing.

The crude fibre content reported for plantain mosa was higher to that of puff-puff .However both have a relatively low crude fibre content. Crude fibre stimulates digestion and also encourages the production of important intestinal bacteria (Dhingra D. *et al.*,2011)

Table2, shows the results of the organoleptic sampling of plantain mosa and puff-puff which includes the sensory attributes carried out by the respondents on color, taste, flavor, aroma, texture, and the overall acceptability of the both products. The assessment was done using the 7-point hedonic scale. The result shows that a large percentage of the respondents like the color of t2 compared to t1. Specifically, 40% like moderately the color of t2, while 18.4% like moderately the color of t1. However, 17.3% dislike slightly the color of t1, while zero percent dislike slightly the color of t2. More so, the majority of the respondents liked the taste of the two products. 37.8% extremely like the taste of t1, and 44.4% moderately like the taste of t2. The result further shows that 33.7% extremely like the flavor of plantain mosa while 6.1% slightly dislike the flavor of plantain mosa. About 28.9% and 26.5% of the respondents extremely like the texture and aroma of plantain mosa respectively. Finally, in terms of overall acceptability, the table shows that 31.5% extremely like plantain mosa, 33.7% moderately like, 23.9% slightly like, 6.5% were indifferent, and 4.3% slightly dislike plantain mosa.

Color is the first organoleptic attributes seen by respondents when analyzing the sensory characteristics and it plays an important role in choice making of food to consumed as it influences the perception of food consumption as it is said “eat with your eyes” (Huang *et al.*,2015)

The average respondent’s assessment of the taste of the samples ranked high from 5-7 on the hedonic scale for the like slightly: 18.4% - plantain mosa, 25.3% - puff-puff; like moderately: 30.6% - plantain mosa, 44.4% - puff-puff; like extremely: 37.8% - plantain mosa, 23.2% - puff-puff respectively. The



contribution of different sensation to food choice is imperative as that consumers choose snacks according to their preference (Duerlund M *et al.*, 2020)

Flavor is an organoleptic parameter for denoting the odour, taste and mouthfeel sensations. Flavoring snacks precedes the taste choice of any consumer and they are aromatic compounds with the combination of odour and taste perceived by the mouth and nose (Sorenson LB *et al.*, 2003). The respondents ranked flavor the highest from 5-7 on the hedonic scale scale for the like slightly: 20.4% - plantain mosa, 29.0% - puff-puff; like moderately: 29.6% - plantain mosa, 39.0% - puff-puff; like extremely: 33.7% - plantain mosa, 25.0% - puff-puff respectively. It can be concluded that plantain mosa was rated slightly higher than puff-puff in terms of flavor.

According to the analysis of the study, aroma of the two samples was rated highest from 5-7 on the hedonic scale scale for the like slightly: 31.6% - plantain mosa, 28.0% - puff-puff; like moderately: 27.6% - plantain mosa, 39.0% - puff-puff; like extremely: 26.5% - plantain mosa, 18.0% - puff-puff respectively. The combination of aroma and taste induced great satiation as Aroma is referred to as volatile compounds perceived by the odour receptors of olfactory tissues and muscles of the nose (Yin *et al.*, 2017)

According to the study, texture of the two samples was rated highest from 5-7 on the hedonic scale scale for the like slightly: 16.5% - plantain mosa, 26.0% - puff-puff; like moderately: 29.9% - plantain mosa, 40.0% - puff-puff; like extremely: 28.9% - plantain mosa, 27.0% - puff-puff respectively. Sensory texture characteristics of snacks could be departmentalized into various ways such as its crispness, fracturability, thickness, creaminess, smoothness is a strong indicator of food quality and affects food acceptability (Kumar R *et al.*, 2021) Food texture influences food intake via oral processing depending on the factors listed earlier (Dieuwerke P *et al.*, 2020)

Overall acceptability comprises of all the organoleptic properties – color, taste, flavor, aroma, and texture of the two samples studied. In the study carried out, it was found out that the plantain mosa snack was well accepted by tasters. In which the taste of the snack was rated 37.8% in being liked very much by respondents, though there were variations in its likeness (like slightly – 18.4%, like moderately – 30.6%, like extremely - 37.8%). Also the variation in its being accepted by the color was that 15.3% of the respondents liked it slightly, 18.4 of the respondents liked it moderately and 12.2% liked extremely. In terms of its texture, 16.5% of the respondents liked it slightly, 29.9% liked it moderately while 28.9% liked it very much. On the basis of its aroma, there were variations for being liked slightly, like moderately, and like extremely with percentage variations of 31.6%, 27.6%, and 26.5% respectively. It was observed from the study that most of the respondents liked the taste more because of plantain present in it. The organoleptic properties of food have distinct effects on food acceptability because they are the main determining agents of food acceptability either the consumer would like the food or not (Martinez S *et al.*, 2021). Therefore, it can be concluded that plantain mosa was highly accepted by the respondents compared to puff-puff according to the study

Conclusion

The findings of the study concluded that dominant components of plantain mosa and puff-puff in high content are carbohydrate, protein, moisture content and fat. However plantain mosa has extremely high content than puff-puff in Ascorbic Acid, Riboflavin, Niacin and Thiamin. On the other hand, ash and crude fibre contents were relatively low. The results indicated variations in the proximate values of plantain mosa and puff-puff. It was observed that plantain mosa had higher contents of protein, moisture content, ether extract fat), as, crude fibre and vitamins like Ascorbic acid in Comparison with puff-puff. On the other hand, puff-puff contained a higher proportion of carbohydrate compared to plantain mosa organoleptic properties of food such as color, taste, flavor, aroma and texture have influential and certain effects on food acceptability and influences consumer preference



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A NEW APPROACH TO ENERGY EFFICIENT CONTROL TECHNIQUE SELECTION IN KINEMATICALLY REDUNDANT ROBOTS WITH VARIABLE MASS MOMENT OF INERTIA

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ABSTRACT

In this research, our focus was on identifying optimal control techniques for minimizing energy consumption in kinematically redundant robots with varying mass moment of inertia ratios. We conducted simulations and proposed recommendations, comparing the energy consumption of trajectories derived from Jacobian transpose-based inverse kinematics analysis against those obtained through impedance control in kinematically redundant robots. The Jacobian transpose-based method involved acquiring intermediate positions using a time-based cubic polynomial function. Both methods considered the mass moment of inertia of the linkages as variables in four distinct cases. Our study centred on a planar 4-degree-of-freedom (DOF) manipulator, and we performed co-simulations utilizing MATLAB Simulink and Adams software. The results of our investigation provide valuable insights into the choice of inverse kinematics methods based on energy consumption relative to the mass moment of inertia ratios of the linkages. Notably, as the mass moment of inertia ratios of the linkages increased, impedance control demonstrated lower energy consumption. Conversely, when these ratios approached parity, the Jacobian transpose-based inverse kinematics method exhibited superior energy efficiency. Remarkably, in instances favouring impedance control, we observed up to a 34% reduction in energy consumption compared to the Jacobian transpose-based method. This study contributes to the field by offering guidance on selecting the most suitable inverse kinematics approach for kinematically redundant robots, taking into account varying mass moment of inertia ratios. The findings pave the way for more energy-efficient control strategies in robotic systems, contributing to advancements in the broader domain of robotics and automation.

Keywords: Energy consumption, inverse kinematics problem, impedance control, Jacobian transpose-based method, redundant robots, trajectory planning.

1. INTRODUCTION

Inverse kinematics computation has a very important place in robotics. The most important feature that makes a robot functional is that the end-effector can be brought to the desired position in the workspace. In order to take the robot's end-effector to any point in the workspace, the angles of each degree of freedom are calculated with inverse kinematics. Analytical methods are traditionally used for this. In non-redundant robots, when the inverse kinematics analysis is calculated analytically, there are a finite number of solutions. Among these solutions, the suitable one for the structure of the robot is selected and applied [1].

With an increase in complex paths i.e., navigating around obstacles in industrial needs, the degrees of freedom of robots have also increased to cope with challenging obstacles. As a result, kinematically redundant robots have emerged. In the analysis of redundant robots, traditional inverse kinematic



methods are not applicable due to the infinite number of solutions in these analytical methods.

Many iterative methods have been developed to find inverse kinematic solutions for redundant robots. Inverse kinematics analysis with optimization techniques is one of these methods. Optimization algorithms optimize all joint space inputs, with the objective function being the position error. Some of these algorithms are: The Cyclic Coordinate Descent Method [2], Genetic Algorithm [3], Gradient Descent Algorithm [4], Particle swarm optimization algorithm [5] and the Differential Evolution Algorithm [6] and the Bees Algorithm [7-9]. Machine learning techniques are also used for inverse kinematics problems [10].

Another inverse kinematic analysis method is Jacobian matrix-based methods. These methods try to reach the result by using the Jacobian matrix iteratively. Some of these are the Jacobian transpose-based method and the Jacobian pseudo-inverse method [11-14].

In the literature, some studies are available on the energy consumption of iterative inverse kinematics algorithms. There is no work available however, which compares the energy consumption of iterative inverse kinematics algorithms and impedance control. In this study the energy consumption of both the Jacobian transpose-based method and the impedance control method is determined for a 4 DOF redundant robotic arm and the energy consumption of both methods are also compared.

In this study, results were obtained on which control technique should be used, especially depending on the mass moment of inertia ratios of the linkages in kinematically redundant robots. This will provide researchers insight into which control method will be most energy efficient for a given robotic manipulator and can lead to significant reduction in energy consumption up to 34% by choosing the right control strategy.

2. THEORETICAL BACKGROUND

The Jacobian transpose-based inverse kinematics calculation iteratively recalculates each input angle additively. When the angles obtained as a result of these iterations are applied to the robot, the end-effector of the robot is at the desired target point.

$$\Delta\theta = \alpha J^T \vec{e} \quad (1)$$

When applying Jacobian-based inverse kinematics computation in Equation (1), \vec{e} is the (2×1) vector of the end-effector positional error for 2 dimensional space, J is the (4×2) Jacobian matrix of the robot for 4 DOF joint and 2 dimensional space, and α denotes a constant coefficient, $\Delta\theta$ is the (4×1) increment vector to be summed with θ joint angles for 4 DOF. As can be understood from this equation, the Jacobian transpose-based method does not deal with the robot's mass moments of inertia of the linkages. As a result, no matter how the mass moments of inertia of the linkages change, the Jacobian transpose-based method always finds the same geometric result at the same initial conditions.

Another method for the robot's end-effector to reach the target point is impedance control [15-22]. In impedance control, the position error vector is multiplied by the spring coefficient and the damping coefficient and converted into a virtual force vector. (2).

$$\vec{\tau}_v = J^T \vec{F}_v \quad (2)$$

In Equation (2), \vec{F}_v is the denotes the (2×1) virtual force vector for 2-dimensional space and $\vec{\tau}_v$ is the (4×1) vector of 4 DOF joint torques for due to the virtual force. The virtual force equation is given by Equation (3).

$$F_v = \begin{bmatrix} k_{11} & k_{12} \\ k_{21} & k_{22} \end{bmatrix} \begin{bmatrix} e_x \\ e_y \end{bmatrix} + \begin{bmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{bmatrix} \begin{bmatrix} \dot{e}_x \\ \dot{e}_y \end{bmatrix} \quad (3)$$

While creating the virtual forces (2x1) in Equation (3), the position error vector e is multiplied by the



(2×2) k matrix and the velocity error vector \dot{e} is multiplied by the (2×2) b matrix. The k and b matrices are obtained by optimizing according to the type and the mass moments of inertia of the robot. The generalized torque equation applied to the degrees of freedom of a robot is shown in Equation (4) [23, 24].

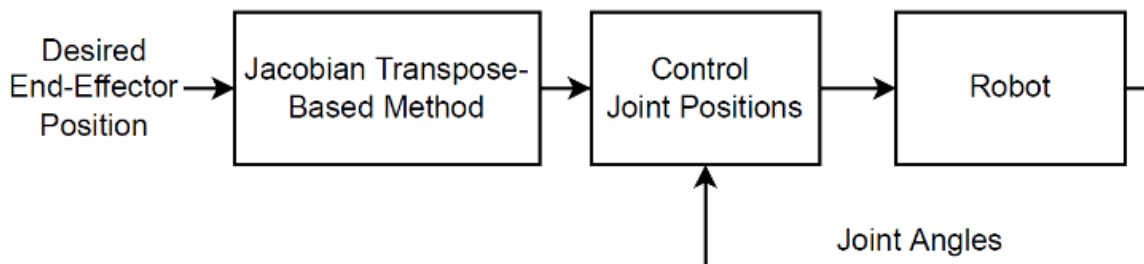
$$M(q)\ddot{q} = C(q, \dot{q})\dot{q} + G(q) = \tau \quad (4)$$

In Equation (4), M represents the inertia matrix, C represents the centrifugal and Coriolis matrix, while G represents the gravity vector. When the generalized torque equation in Equation (4) and the virtual torques in Equation (2) are added together, the torque equation required for impedance control is given by Equation (5) [25-27].

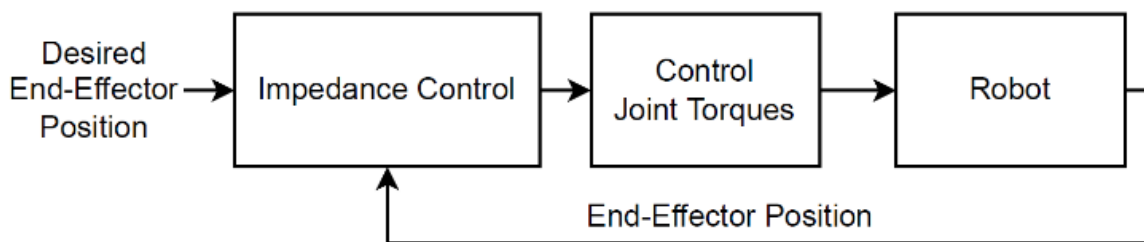
$$M(q)\ddot{q} = C(q, \dot{q})\dot{q} + G(q) = \tau + J^T F_v \quad (5)$$

Jacobian transpose- based method strategy is shown in Figure 1.a. The desired end-effector position is an input for the Jacobian transpose-based method algorithm. This algorithm finds the target angles for each joint. These angles are sent to the position controller. After this stage, the control loop starts, and the Jacobian transpose-based method is not in this loop.

The impedance control strategy is shown in Figure 1.b [28]. Unlike the Jacobian transpose-based method, the impedance control method employs torque control at the joints. The desired end-effector position is also the input for impedance control. The impedance control calculates the torques required for each joint according to Equation (5). After the torques are applied to the robot, the current end-effector position feeds back into the impedance control, after which the loop is repeated. It follows that the impedance control algorithm is always a part of the control loop.



(a) Jacobian Transpose Based Method



(b) Impedance Control

Figure 1. a) The Jacobian transpose-based method control strategy. b) Impedance control strategy.

3. ROBOT KINEMATIC MODEL

In this article, a 4 DOF planar manipulator is discussed as a redundant system (Figure 2). In this system, end effector location is written in Equation (6) and Equation (7). There are 2 equations with 4 parameters, so the number of analytical solutions of inverse kinematics is infinity.



$$x_f = L_1 C_1 + L_2 C_{12} + L_3 C_{123} + L_4 C_{1234} \quad (6)$$

$$y_f = L_1 S_1 + L_2 S_{12} + L_3 S_{123} + L_4 S_{1234} \quad (7)$$

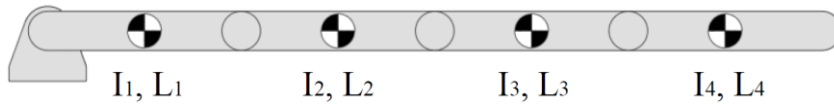


Figure 2. 4 DOF planar manipulator

In Equations (6) and (7), C is cos function and S is sin function. S_{123} format equals $\sin(\theta_1 + \theta_2 + \theta_3)$. Lengths of L_1, L_2, L_3 and L_4 are taken as 0.4 m . The mass moment of inertia of linkage 1 is given in Table 1 and the mass moments of inertia of linkages between 2 and 4 are 0.042824 kg m^2 .

Table 1. The 1st linkage mass moment of inertia I_1 change according to the experiments

Case	I_1 [kg m^2]	Moment of Inertia Ratio
1	0.042824	1 x
2	0.42824	10 x
3	4.2824	100 x
4	42.824	1000 x

4. ENERGY CONSUMPTION MODELLING

The energy expended during the movement of a robot is the time integral of the power [29]. Since the power consumed by acceleration and by braking are of opposite sign, the absolute value of each term is taken according to Equation (8) in order to prevent the terms to cancel each other out.

$$E_i = \int_0^{t_1} |P_i(t)| dt = \int_0^{t_1} |\tau_i(t) \dot{\theta}_i(t)| dt \quad (8)$$

In Equation (8), i is the joint number, P_i the power dissipated by i^{th} joint over time, τ_i the applied torque, $\dot{\theta}_i$ the angular velocity and t_1 the end time of the motion. The discrete representation of the continuous system is given by Equation (9).

$$E_i \cong \sum_{j=0}^n |\tau_i[k] \dot{\theta}_i[k]| \Delta t \quad (9)$$

The data number received at each discrete time in Equation (9) is given by j , the time difference between each discrete step is given as Δt , while the total upper limit during discrete conversion is given as n . Expressions are given in Equation (10) and the total energy consumed in the robot is given by Equation (11).

$$n = \frac{t_1}{\Delta t} \quad (10)$$

$$E_{total} = \sum_i E_i \quad (11)$$



4. TRAJECTORY FUNCTION

The Jacobian transpose-based method only finds results in terms of the end position and does not find the intermediate trajectory. Therefore, a time dependent motion function must be added to track the trajectory of each linkage in terms of their respective angles.

There are many functions that can be used for this purpose. The most widely used of these are polynomial functions. Third-order polynomial functions were used to evaluate the Jacobian transpose-based method results.

In impedance control-based inverse kinematics, on the other hand, all results are obtained at the moment of motion, since the inputs are torque, not angle. Therefore, the trajectory function is not used in the impedance control.

The third-order polynomial equation to be used when applying the Jacobian transpose-based method is given by Equation (12) and Figure 3.

$$y = -2x^3 + 3x^2 \quad (12)$$

$$x = \frac{t}{t_{last}} \quad (13)$$

$$\theta_i = \theta_{i,last} \left[-2 \left(\frac{t}{t_{last}} \right)^3 + 3 \left(\frac{t}{t_{last}} \right)^2 \right] \quad (14)$$

The angle of the linkage is θ , while x represents the time scaled variable. When the variable t in Equation (13) reaches t_{last} , the polynomial function result in Equation (12) reaches to 1. In this way, the desired θ_{last} angle in Equation (14) is obtained when time $t \in [0, t_{last}]$ reaches t_{last} . In all cases from 1 to 4, the t_{last} is 4 seconds.

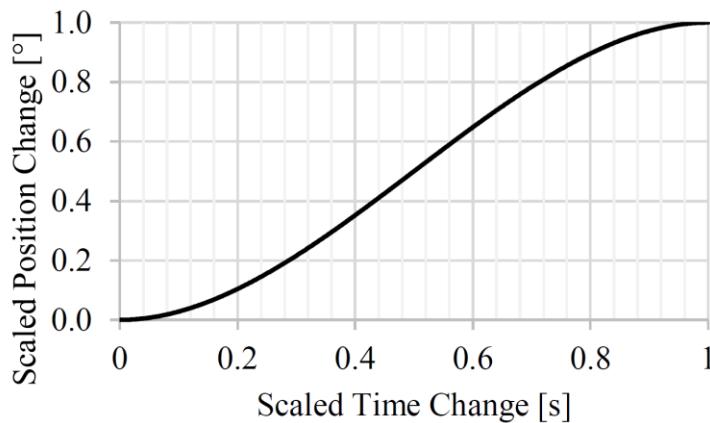


Figure 3. 3rd order motion function to which the Jacobian transpose-based method result is applied

The k and b matrices used in impedance control are given in Table 2. These matrices are optimized according to the mass moments of inertia of the relevant case. Such an optimization is not possible for the Jacobian transpose-based method; by its nature the Jacobian transpose-based method is not related to mass moment of inertia of the linkages.



Table 2. The k [N/m] and b [Ns/m] matrices used in impedance control

Case	k_{11}	k_{12}	b_{11}	b_{12}
1	2.29099	-0.27778	2.42740	-0.45419
2	2.11912	-0.55903	2.92740	-0.38388
3	2.05662	-0.55903	2.92838	-0.38424
4	2.05564	-0.55903	2.92863	-0.39218

5. RESULTS AND DISCUSSION

Simulations were made with Adams – MATLAB Simulink Co-Simulation. The final angle values of the linkages as a result of the Jacobian transpose-based inverse kinematics calculation and impedance control are shown in Table 3.

Table 3. Final joint angles as a result of the Jacobian transpose-based method and impedance control (A: Jacobian Transpose-Based Method, B: Impedance Control)

Method	Case	θ_1 [°]	θ_2 [°]	θ_3 [°]	θ_4 [°]
A	1 – 4	-9.70	40.92	63.61	44.34
B	1	-11.6	56.23	103.85	-67.65
B	2	-2.26	32.64	116.82	-55.41
B	3	-0.24	26.84	119.33	-51.47
B	4	-0.02	26.15	118.78	-50.42

The angles seen in Table 3 are applied to the linkages on the robot using the 3rd order polynomial function in Equation (12).

Figure 4 shows the time dependent motion of the Jacobian transpose-based inverse kinematics results according to cases 1 – 4 using the polynomial equation of motion given by Equation (12). By its very nature, the Jacobian transpose-based inverse kinematics calculation does not deal with mass moments of inertia, therefore the same geometric results are obtained in all cases from 1 to 4.

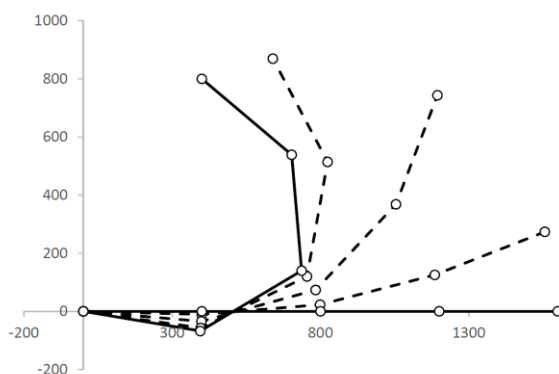


Figure 4. Motion obtained as a result of the Jacobian transpose-based inverse kinematics (same geometric results in all cases from 1 to 4).



Figure 5 and Figure 6 show the movements of the impedance control according to all cases from 1 to 4.

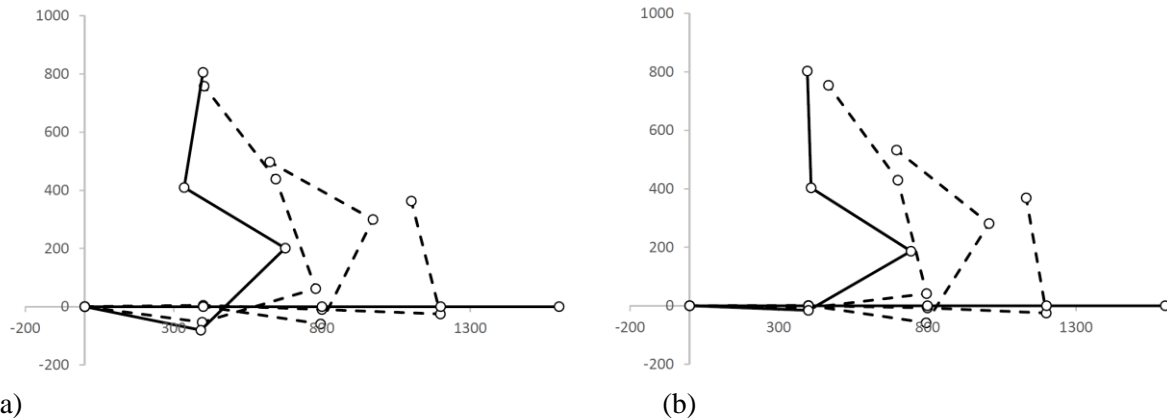


Figure 5. Movement of the impedance control in case 1 (a) and case 2 (b).

When studying case 1 as seen in Figure 4 and Figure 5.a, linkages 1 and 2 move in a similar way for both the Jacobian transpose-based method and the impedance control-based system, while the other linkages do not show any similarities in their behavior.

When the mass moment of inertia of the 1st linkage is increased 10 times however, in case 2 (Figure 5.b), the big difference between the Jacobian transpose-based method and impedance control, it is seen that the movement of linkage 1 is reduced considerably.

In cases 3 and 4, linkage 1 no longer moves in impedance control because the mass moment of inertia of linkage 1 has increased significantly.

While an increasing mass moment of inertia has a notable influence on the impedance control-based system, Figure 5 and Figure 6, the Jacobian transpose-based method trajectory is not affected at all by the increase in the mass moment of inertia and gives the same geometric results in all cases from 1 to 4 as seen in Figure 4. So, this will cost too much energy consumption according to Equation (9).

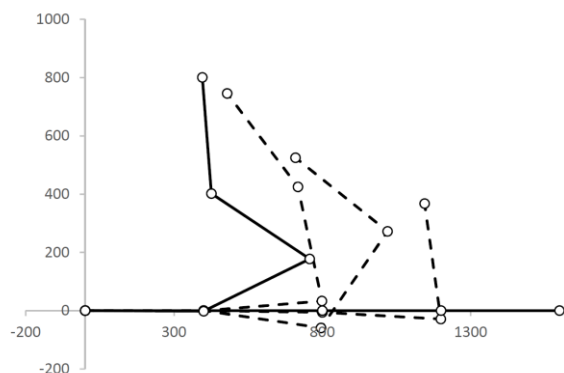


Figure 6. Movement of the impedance control in case 3 and 4.

In Figure 6 and Table 3, the geometric results in cases 3 and 4 are almost the same. That is, when the mass moment of inertia ratio exceeds 100, impedance control automatically produces almost the same geometric results.

Considering the energy consumption, it can be noted that the movement of linkages with high mass moment of inertia increases the energy consumption in the Jacobian transpose-based method. The time dependent energy consumption is shown in Figure 7 – 11 in all cases from 1 to 4.

In Figure 7, the energy consumption of impedance control is 17% higher than the Jacobian transpose-based method in case 1.



In Figure 8, contrary to case 1, the energy consumption of impedance control is 12% lower than the Jacobian transpose-based method in case 2.

In Figure 9, the energy consumption of impedance control is 15% lower than the Jacobian transpose-based method in case 3. As the mass moment of inertia increases, the energy consumption of the impedance control remains almost the same, while the Jacobian transpose-based method starts to consume more energy. In Figure 10, the energy consumption of impedance control is 36% lower than the Jacobian transpose-based method in case 4.

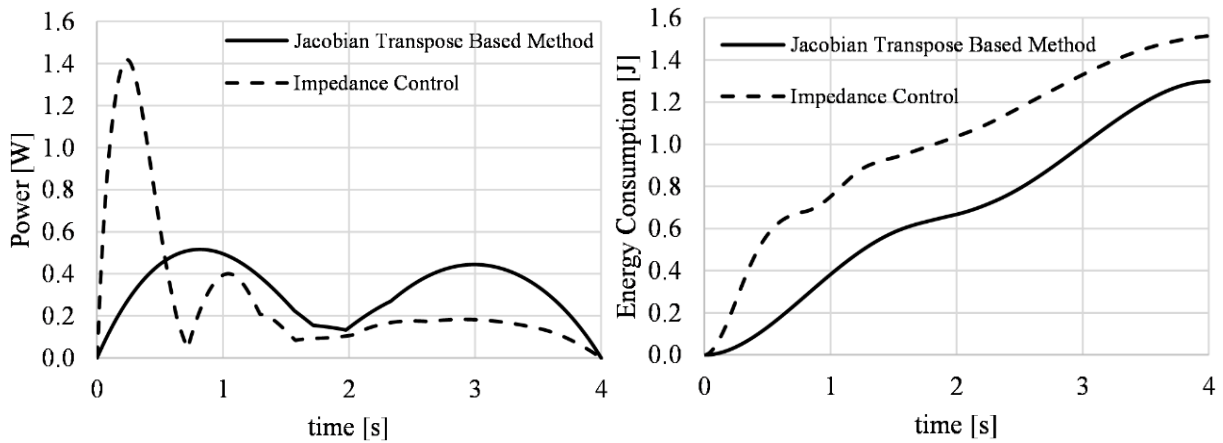


Figure 7. Impedance control and the Jacobian transpose-based inverse kinematics energy consumption in case 1.

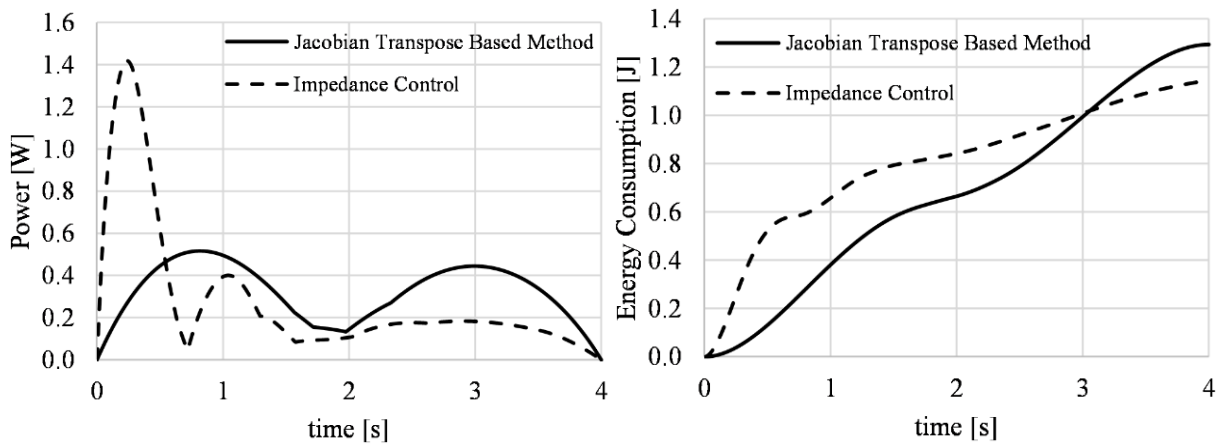


Figure 8. Impedance control and the Jacobian transpose-based method energy consumption in case 2.

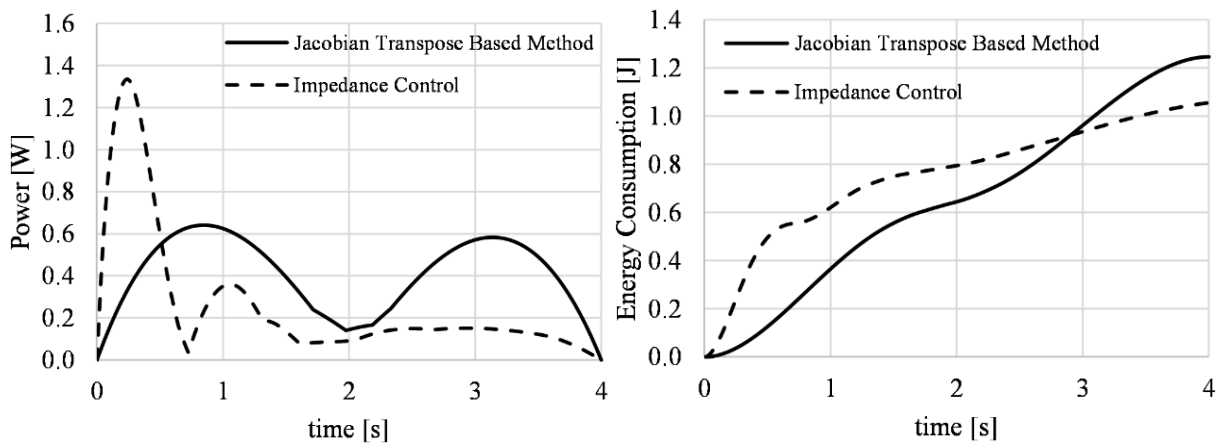


Figure 9. Impedance control and the Jacobian transpose-based method energy consumption in case 3.

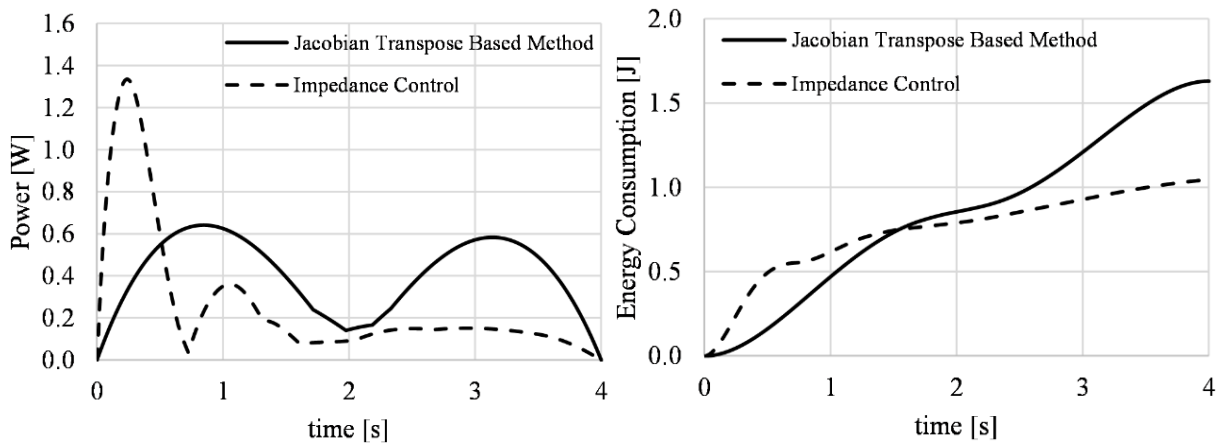


Figure 10. Impedance control and the Jacobian transpose-based method power and energy consumption in case 4.

When all linkages have the same moment of inertia (case 1) as given in Figure 7, it is seen that the trajectory obtained with the Jacobian transpose-based method consumes less energy than the impedance control-based trajectory. However, it can be seen from Figure 8 – 11, that impedance control, from case 2 onward consumes less energy than the Jacobian transpose-based method.

In Table 4 and Figure 11, the energy consumption of both Jacobian-based inverse kinematics and Impedance control in all cases are compared. While the Jacobian transpose-based inverse kinematics consumes less energy in case 1, it is seen that Impedance control consumes less energy in all other cases. Especially in case 4, the difference in energy consumption increases up to 34%.

Table 4. Energy consumption comparison

Case	Moment of Inertia Ratio	Jacobian Transpose-Based Method Energy Consumption [J]	Impedance Control Energy Consumption [J]
1	1	1.30	1.60
2	10	1.29	1.29
3	100	1.25	1.09
4	1 000	1.63	1.08

It is seen in Figure 11 that the Jacobian transpose-based method consumes more energy than the impedance control in a robotic structure consisting of extremely different mass moments of inertia as in the case 4.

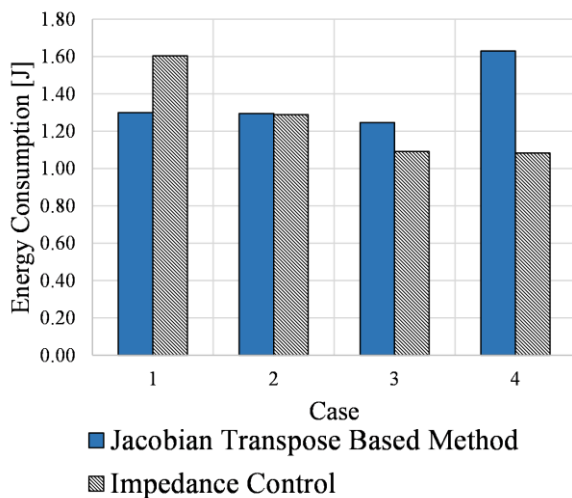


Figure 11. Energy consumption comparison

DISCUSSION AND CONCLUSION

The motion and energy consumption of a planar 4 DOF kinematically redundant robot, with their trajectories obtained by the Jacobian transpose-based inverse kinematics analysis and impedance control are compared. In both methods, the mass moment of inertia of the linkages are defined as variables in all cases. The results in terms of energy consumption depending on the mass moment of inertia ratio of the linkages to each other are found and the findings can be summarized as follows.

- An increase in the mass moment of inertia of the linkages does not cause any change on the geometric result obtained by the Jacobian transpose-based inverse kinematics method. As a result, as the mass moments of inertia increases in this method, the energy consumption gradually increases.
- The mass moment of inertia of the linkages does have a considerable impact on the trajectories obtained by the impedance control method, since the input of this method is torque instead of angle. This leads to a noticeable reduction up to 34% in energy consumption in cases with high mass moment of inertia ratios.

For the selection of a positioning strategy for a redundant robot, the following remarks can be made.

- If the mass moment of inertia ratios of the linkages is close to each other, then the Jacobian transpose-based inverse kinematics method is very suitable since the inverse kinematic calculations are practical and the energy consumption is low.
- However, if the mass moment of inertia ratio of the linkages exceeds 10, then impedance control becomes the preferred method, since the energy consumption becomes significantly lower than the Jacobian transpose-based method.

A hybrid controller system based on both the Jacobian transpose-based inverse kinematics and impedance control can be designed to utilize the advantages of both methods in future studies.

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TIPOLOGÍAS DE PROBLEMAS DE MODELADO, PARA LA CONFIGURACIÓN DE CADENAS DE SUMINISTRO HORTÍCOLAS

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RESUMEN

La cadena de suministro agroalimentaria y en general las cadenas de productos perecederos y mucho más específico las cadenas de hortalizas merecen un tratamiento especial debido a la naturaleza de caducidad y ciclo de vida corto de sus productos. Tomando como revisión de referencia la realizada por Ahumada & Villalobos (1) y agregando otros 43 artículos referentes a la planificación de la cadena de suministro de productos perecederos, se presenta una taxonomía que describe desde que punto de vista los distintos autores se aproximan a modelar los distintos problemas que aquejan a las cadenas de suministro de productos perecederos, se propone como aporte de la revisión una metodología que permite identificar categorías de problemas a resolver y qué autores son los que dan respuesta a dichas problemáticas. La metodología utilizada, permite en su primera etapa clasificar el problema en estudio, reconociendo en cuál etapa del ciclo de vida de la hortaliza se sitúa el problema a resolver. Esta puede afectar a alguna de las variables de decisión: plantar (P), cosechar (H), distribuir (D) y almacenar (I) e identificando luego el alcance del problema resuelto, el que puede ser estratégico (S), táctico (T) y operativo (O). En la segunda etapa se describe brevemente el problema en estudio y los aspectos presentes en el problema a resolver o características propias que resuelve el artículo, buscando homogeneizar la problemática. En la tercera etapa, la metodología permite identificar la aproximación de modelado, la que puede ser programación lineal (LP), programación estocástica (SP), programación dinámica (DP), programación dinámica estocástica (SDP) o programación entera mixta (MIP). Finalmente, en la cuarta etapa la metodología permite asociar los autores que presentan alguna solución al problema planteado, facilitando estudios y revisiones futuras al clasificar los distintos problemas a resolver y asociarle un autor o grupo de autores que dan respuesta.

Palabras clave: Cadena de suministro, modelo matemático, cadenas agroalimentarias

INTRODUCCIÓN

“La Agenda 2030 de las Naciones Unidas (ONU) fija objetivos ambiciosos para que el mundo preserve los recursos naturales y alcance la neutralidad climática para 2050. Dentro de esta visión, el sector agrícola asume un papel clave en el cumplimiento de los Objetivos de Desarrollo Sostenible (ODS) para garantizar el acceso a alimentos nutritivos y saludables, crear sistemas agrícolas circulares y reducir el desperdicio en la cadena de suministro” (2)

Una de las grandes preocupaciones para la FAO, es dar respuesta a la pregunta ¿cómo alimentar a toda la población, sin sobreexplotar los recursos disponibles? Tal vez, no tengamos la respuesta, pero sin duda desde la academia y la investigación se puede aportar modelando y simulando los distintos problemas relacionados a la producción, gestión y configuración de las CdS relacionadas.



Algunos datos de contexto, aparecen en el último reporte de la FAO¹:

Durante las últimas dos décadas, los volúmenes de producción agrícola mundial de cultivos primarios mostraron una tendencia ascendente constante para satisfacer la creciente demanda mundial. La tasa de crecimiento registrada del 56 por ciento entre 2000 y 2022 fue facilitada por la mejora de las tecnologías de producción y la intensificación de las actividades agrícolas, en particular con un mayor uso de riego, pesticidas, fertilizantes y variedades de cultivos de alto rendimiento, y la expansión de las tierras de cultivo, al tiempo que se enfrentan los efectos adversos del cambio climático. Desde 2000, la tasa de cambio anual de la producción agrícola experimentó varios altibajos, con picos del 4 al 6 por ciento. Dependiendo del año, los grupos de productos básicos que impulsaron cada repunte variaron, desde cereales hasta cultivos oleaginosos. Después de 2013, la magnitud de las tasas de crecimiento disminuyó progresivamente y varió entre -0,1 por ciento en 2020 y 2,3 por ciento en 2017. En 2022, el crecimiento de la producción agrícola fue del +0,7 por ciento, como resultado de una holgura generalizada probablemente debido a los efectos del mercado tras el inicio de la guerra en Ucrania y a la alta inflación (2)

Las cadenas de suministro (CdS) hortícolas se encuentran inmersas en el sector agroalimentario y se ven afectadas, entre otras variables, por los cambios globales que ocurren diariamente ya descritos en el párrafo anterior. En particular, este sector productivo es el sector manufacturero más grande de Europa y tal como señalan (3), emplea a más de cuatro millones de personas y produce unos ingresos de más de un billón de euros. Por otro lado, la cantidad de desperdicio de alimentos alcanza aproximadamente el 20% de la producción (4), por lo tanto, dada la importancia del sector el estudio de las CdS, las propuestas de mejora que puedan surgir y permitan asegurar la sostenibilidad tendrá un impacto positivo en la calidad de vida de las personas (3).

En general, una CdS agroalimentaria se compone de un conjunto de actividades en secuencia, desde "la granja al tenedor", incluyendo la agricultura (es decir, el cultivo de la tierra y la producción de cultivos), procesamiento / producción, los ensayos, envasado, almacenamiento, transporte, distribución y comercialización (5). Estos escalones operativos son apoyados por actividades logísticas, servicios financieros y técnicos, mientras que sobre ellos mismos circulan cinco tipos de flujo: el material físico y los flujos de productos; los flujos financieros; los flujos de información; flujos de proceso y la energía y los flujos de recursos naturales.

Además, las CdS agroalimentarias presentan un conjunto de características únicas que las distingue de las clásicas redes de suministro (6,7), distinguen las siguientes:

- Naturaleza única de los productos, en la mayoría de los casos se refieren a los bienes del ciclo de vida corto.
- Diferenciación de productos de alta estacionalidad en las operaciones de cosecha y de producción.
- Variabilidad de la calidad y cantidad de los insumos agrícolas y los rendimientos de procesamiento.
- Requisitos específicos en materia de transporte, condiciones de almacenamiento, y reciclaje.
- Debe cumplir con la legislación nacional/internacional, reglamentos y directivas en materia de seguridad alimentaria y la salud pública, así como las cuestiones ambientales (por ejemplo, carbono y huellas hídrica).
- Operaciones complejas y limitaciones de capacidad.

A las que Ahumada y Villalobos (1), agregan:

- Representa un alto consumo a nivel mundial, lo que se refleja en el aporte al PIB.

¹ Agricultural production statistics 2000–2022. FAOSTAT Analytical Briefs, No. 79



- Mantiene un crecimiento constante y cada vez los países consumen y demandan mayor cantidad de alimentos frescos.
- El sector de los productos frescos (agroalimenticios) es uno de los más dinámicos.
- A raíz del aumento de la demanda y la búsqueda por abastecer todo el año se busca expandir las cadenas de suministro para incluir proveedores desde el otro hemisferio (estacionalidad) y así poder abastecer.
- Dados estos cambios en los patrones de demanda y distribución es necesario buscar mejorar las prácticas a lo largo de la cadena.
- Se debe tener en cuenta los desafíos que impone un mercado global, con regulaciones estrictas y una cadena de suministro totalmente dinámica.
- Los productores se enfrentan a incertidumbres relacionadas a la demanda, plazos más cortos, tiempo de vida del producto, entre otros. Es por estas razones que se hace necesario formular modelos de planificación específicos que incorporen los ámbitos de canales de comercialización, políticas de aprovechamiento, actividades logísticas, coordinación vertical y la gestión de riesgos.

Las CdS agroalimentarias evolucionan rápidamente en el tiempo, con el fin de seguir los cambios agroalimentarios. Ya hace diez años, (8) identificó desafíos como la rápida urbanización, el crecimiento de los mercados, la financiación del sector, las preocupaciones por obtener alimentos de alta calidad y seguridad alimentaria, las poblaciones rurales regionales que no cumplen con los requisitos planteados por las empresas dominantes del sector, los efectos del cambio climático en la agricultura y el establecimiento de responsabilidad social empresarial (RSE) y ya señalaba la importancia de reconocer los problemas críticos, que deben ser abordados por los interesados en las CdS agroalimentaria, como un requisito previo para la gestión de tales cadenas, a todo nivel, y así garantizar su eficiencia y sostenibilidad en general (8). Actualmente, debido al rol que juega el sector agroalimentario en el desarrollo económico de los países, enfrentan desafíos aún más complejos. Según (9), los sistemas modernos de agricultura y producción de alimentos enfrentan una presión cada vez mayor debido al cambio climático, la disponibilidad de tierra y agua y, más recientemente, la pandemia de COVID-19, por lo que construir sistemas agrícolas resilientes y sostenibles es el objetivo final del sistema de producción agroalimentaria.

Una forma de avanzar en lo planteado por (9), es observar cómo se comporta la cadena en general y no solamente el eslabón de producción. Para ello tomando como referencia la definición de (10), en la que se entiende por cadena agroalimentaria a toda cadena vertical de actividades, desde la producción en el establecimiento agropecuario, pasando por la etapa de procesamiento y por la distribución mayorista y minorista, sin importar cómo se organiza o cómo funciona la cadena. En la literatura existe una amplia gama de modelos matemáticos que apoyan la toma de decisión en distintos ámbitos de acción, como puede ser planificación de la producción, estimación de la demanda, localización de almacenes etc., sin embargo, al revisarlos el resultado da cuenta que la mayoría de los estudios se hacen sobre cadenas de productos no perecederos, por lo que revisar particularmente modelos matemáticos que operen sobre cadenas de suministro de productos perecederos es un real aporte. La metodología, que se presenta en este artículo, permite analizar las CdS desde tres perspectivas: La primera de ellas desde la variable de decisión: plantar (P), cosechar (H), distribuir (D) y almacenar (I); Luego el alcance del problema a resolver, el que puede ser estratégico (S), táctico (T) y operativo (O); Finalmente la aproximación de modelado, la que puede ser programación lineal (LP), programación estocástica (SP), programación dinámica (DP), programación dinámica estocástica (SDP) o programación entera mixta (MIP). Como resultado de esta revisión, se genera una taxonomía y a partir de ella la metodología que permite la categorización de problemas.

OTROS TRABAJOS RELACIONADOS



Una de las técnicas analíticas para el modelado de la planificación de la producción y el transporte dentro de la cadena de suministro es la programación matemática de carácter determinista. Se trata de una técnica de optimización, cuya modalidad más extendida es la programación lineal y programación lineal entera mixta (11). También existen modelos respecto de distintas dimensiones: enfoque de modelado (determinista o estocásticos híbridos); ámbito físico de modelado (unietapa, bietapa, multietapa) o por capas o niveles (planificación jerárquica) y respecto de la integración espacial (centralizado, descentralizado). En Latinoamérica se han llevado a cabo diversos estudios respecto al proceso de comercialización y el manejo de la cadena de abastecimiento en producción hortícola (12), al mismo tiempo, una mirada global al sector agropecuario la entrega el Instituto Interamericano de Cooperación para la Agricultura (IICA) donde identifica las principales tendencias en el desarrollo regional: “La importancia de vincular a los pequeños productores-campesinos a las cadenas de valor; El surgimiento de nuevos modelos de negocios; El resurgimiento de la discusión sobre abastecimiento local vs abastecimiento mundial; La inocuidad como eje central para la competitividad; El regreso a la producción de cultivos tradicionales” (13). Autores como (14); (15); (16); (17); (18), han propuesto distintos tipos de configuraciones de cadenas a través de técnicas de modelado, las que se resumen, en gran parte, en el artículo de (1), utilizado como referencia en esta investigación.

MATERIALES Y MÉTODOS

La búsqueda se realizó durante el periodo comprendido entre los años 2017 y 2021, en bases de datos de revistas electrónicas y en buscadores de revistas especializadas, lo que incluye publicaciones en portales como: Elsevier (www.sciencedirect.com), Emerald (www.emeraldinsight.com), Springer (www.springerlink.com), Academic Journals (<http://www.academicjournals.org>), Ebsco (<http://www.ebscohost.com>), AgEcon (<http://ageconsearch.umn.edu>), Scielo Brasil (<http://www.scielo.br>); Además de página de revista como Dirección y Organización (<http://www.revistadyo.com/index.php/dyo>) y un portal propio de autor (<http://myweb.whitman.syr.edu/bkazaz/index.html>). Respecto a los criterios de búsqueda se utilizaron aquellos relacionados a industria agroalimentaria, cadena de suministro agrícola, gestión de la incertidumbre en cadenas agroalimentarias, gestión de la cadena de suministro, planificación de la cadena de suministro, modelos de referencia, planificación de la producción y la distribución en cadenas agroalimentarias, programación matemática de cadenas de suministro, productos perecederos, planificación de la capacidad, productos frescos y gestión de la logística alimentaria. Como resultado de la búsqueda, finalmente, se seleccionaron aquellos que cumplen con el requisito de modelar cadenas de productos perecederos, haber sido publicados desde el 2009 en adelante, presentan un modelo matemático sobre alguna entidad de la cadena y algunos artículos de revisión relacionados, generando 43 nuevos artículos que se suman a los 20 propuestos en (1) completando de esta manera una base de análisis de 63 artículos.

El total de referencias incluidas se distribuyen a lo largo del tiempo en un periodo de 30 años (1991 - 2021) y fueron obtenidas en su mayoría de revistas científicas (88,9%), libros (4,8%), reportes (4,8%) y documentos de trabajo (1,6%). Un grupo de 12 revistas representan el 55,6% de los artículos considerados en este trabajo (European Journal of Operational Research; International Journal of Production Economics, Manufacturing & Service Operations Management, Agricultural Systems, Computers and Electronics in Agriculture, African Journal of Agricultural Research, Annals of Operations Research, Biosystems Engineering, International Journal of Production Research, Journal of the Operational Research Society, Omega, Simulation Modelling Practice and Theory).

Como una forma de organizar la revisión que permita avanzar hacia una categorización de problemas de modelado para cadenas de suministro de productos perecederos, se tomó como referencia la estructura propuesta por Ahumada y Villalobos (1), con algunas adaptaciones, lo que se refleja en la Figura 1.

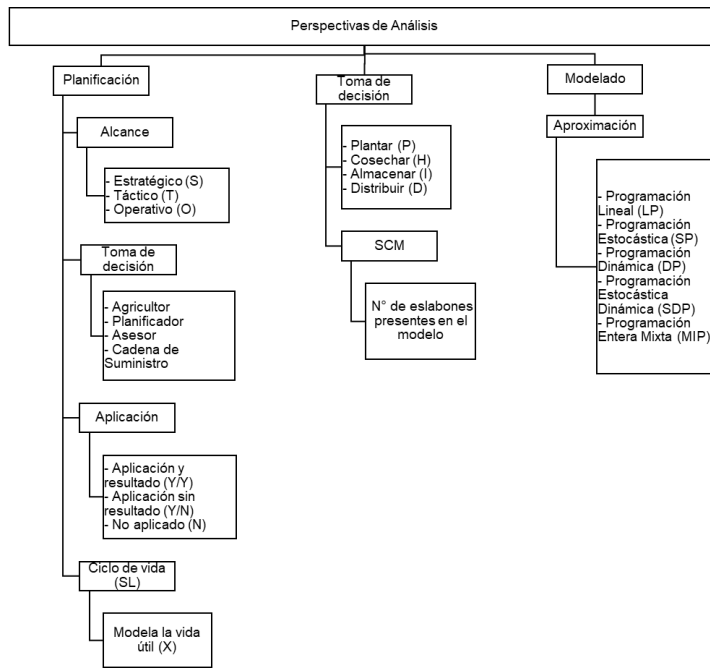


Figura 1. Perspectivas de análisis, adaptado de Ahumad y Villalobos (1)

En la tabla siguiente se muestra el listado de los artículos revisados y el objetivo principal del artículo, sus autores y año de publicación.

Tabla 1. Listado de artículos revisados, por autor y año

Autor (año)	Objetivo principal del trabajo
(19) Tordecilla et al 2021	Este artículo revisa la literatura existente sobre el uso de métodos de simulación-optimización de simulación en el diseño de redes de cadenas de suministro (SCNs) resistentes.
(20) Tirkolae et al. 2021	Se propone un método para la toma de decisiones multicriterio (MCDM) basada en el proceso de jerarquía analítica (AHP) y de preferencia por similitud con la solución ideal (TOPSIS) para evaluar y calificar a los proveedores.
(21) Li et al., 2020)	Estudiamos el problema de configuración de la cadena de suministro de alimentos para optimizar a nivel táctico las decisiones de posicionamiento de inventarios para una cadena de suministro de alimentos general de varios niveles.
(22) Rohmer et al., 2019	Este artículo presenta una novedosa aplicación de un problema de diseño de redes que aborda cuestiones de sostenibilidad en el contexto del sistema alimentario mundial. Teniendo en cuenta varios escalones e interconexiones entre diferentes cadenas de suministro de alimentos, el documento amplía el alcance de la red considerada e incorpora las decisiones de abastecimiento, procesamiento y transporte dentro de un marco común.
(23) Onggo et al., 2019	Propone un modelo entero mixto y un algoritmo simheurístico, que integra la simulación de Monte Carlo dentro de una búsqueda local iterada, para una cadena de suministro agroalimentaria con un único



Autor (año)	Objetivo principal del trabajo
	proveedor de alimentos frescos, que posee un almacén central que sirve a varios centros de venta al por menor.
(24) Mogale et al., 2019	Desarrollar un modelo de apoyo a la toma de decisiones bi-objetivo para la cadena de suministro de alimentos sostenibles considerando una toda una red de centros de aprovisionamiento, almacenes a nivel central, estatal y de distrito, y tiendas de precio justo.
(25) Jonkman et al., 2019	Este artículo explora el diseño de cadenas de suministro de biomasa ecoeficientes y la asignación de beneficios económicos entre los socios de la cadena de suministro. Se desarrolla un estudio de caso para la cadena de transformación de la remolacha azucarera en los Países Bajos.
(26) Jerić & Šorić, 2019	Presenta un modelo de optimización y un método de resolución para el problema de una región croata con 25 productores de aceite de oliva y unos 5.000 agricultores, en su mayoría pequeños, que cultivan y cosechan aceitunas.
(27) Hosseini-Motlagh et al., 2019	Este documento aborda un estudio de caso real de la cadena de suministro de trigo en Irán, así como de las entidades implicadas en ella. Presentando un nuevo modelo matemático, se optimiza el coste total de la cadena de suministro de trigo de la cadena de suministro de trigo se optimiza.
(28) Cruz et al., 2019	Este trabajo desarrolla una formulación de programación lineal mixta entera (MILP) para apoyar el diseño y la planificación de las cadenas de suministro agroalimentarias (CAE).
(29) Behzadi et al., 2018	Realiza una revisión exhaustiva de la literatura relativamente limitada sobre los modelos cuantitativos de gestión de riesgos para las cadenas de suministro agrícolas.
(30) Allaoui et al., 2018	Este artículo presenta una revisión bibliográfica crítica de los métodos de investigación operativa para el diseño de cadenas de suministro sostenibles. Se propone una novedosa metodología de solución híbrida en dos etapas.
(31) Soto-Silva et al., 2017	Propone un modelo de apoyo a la toma de decisiones en una planta de procesamiento de manzanas frescas con el fin de garantizar su suministro anual.
(32) Ghezavati et al., 2017	Presenta un modelo matemático de planificación periódica para la distribución de productos agroalimentarios frescos (un caso de estudio de tomate).



Autor (año)	Objetivo principal del trabajo
(33) Soto-Silva et al., 2016	Presenta una revisión de la literatura sobre modelos de investigación operativa aplicados a la cadena de suministro de fruta fresca. Se trata de un intento de comprender mejor los métodos de IO utilizados en los trabajos revisados.
(34) Amorim et al., 2016	Proponer un nuevo modelo de programación entera mixta, estocástico bi etapa para la selección de proveedores en la industria alimentaria, proceso que maximiza los beneficios y minimiza el riesgo de bajar el servicio al cliente.
(35) Nakandala et al., 2016	Desarrollar un método que apoya la toma de decisiones optimizando el costo del transporte con el objetivo de minimizar el costo total mientras se mantiene la calidad de los productos alimenticios por encima de niveles aceptables. El modelo propuesto considera el coste de transporte, coste de refrigeración y coste de la devaluación del producto debido al deterioro de la calidad durante el transporte.
(36) Araujo & Leal, 2015	Presentar un modelo matemático determinista como una herramienta para la toma de decisiones a nivel táctico, incorporando varios parámetros estocásticos con valores fijos en un primer modelo determinista y de esa forma construir varios escenarios. Estos parámetros son precios de compra y venta del grano en el mercado, la tasa de fracaso de los cultivos y los volúmenes de demanda.
(37) González-Araya et al., 2015	Proponer un modelo de programación lineal entera mixta, para apoyar la planificación y la toma de decisiones a nivel táctico en un huerto de frutales (manzanas) reduciendo al mínimo la cantidad de recursos utilizados y garantizando la producción de fruta de buena calidad para la exportación.
(38) Bahinipati, 2014	Proponer cinco perspectivas de análisis para la CdS de frutas y verduras (F&V) en las cuales se hace presente la importancia de la colaboración. A través de un caso de estudio propone la colaboración a nivel estratégico entre los pequeños agricultores, las cooperativas y los súper mercados para obtener una cadena más efectiva.
(39) Dabbene et al., 2014	Presentar una revisión de la literatura sobre los aspectos de la gestión de la cadena de suministro alimentaria (FSC), discutiendo en detalle los aspectos de la trazabilidad en la gestión y optimización de las FSC, planteando un sistema de trazabilidad (TS) como una herramienta estratégica para el funcionamiento de la FSC.
(40) de Keizer et al., 2014	Explorar los efectos de la colaboración horizontal y vertical mediante el análisis de nacional e internacional de la orquestación logística, desarrollando un MILP para investigar los beneficios de la orquestación logística en tres escenarios.
(41)	Proponer un modelo de optimización multi-objetivo que ayuda a sincronizar los rendimientos de la producción con la demanda del mercado y los requisitos de calidad.



Autor (año)	Objetivo principal del trabajo
Miranda-Ackerman et al., 2014	
(42) Boudahri et al., 2013	Rediseñar la cadena de suministro con el fin de ahorrar y mejorar la distribución de pollo y el pavo de los mataderos a los minoristas.
(43) Hu et al., 2013	Analizar una serie de diagramas desarrollados con el fin de representar un método para modelar el producto, el proceso y la calidad.
(44) Santos et al., 2013	Analizar información recopilada durante 5 años, entregando una visión general de la cadena de producción de zumo en Brasil, todo esto mediante el análisis de redes.
(8) Tsolakis et al., 2013	Realizar una revisión bibliográfica de otros artículos donde da a conocer investigaciones existentes en un marco global para el diseño y la gestión de cadena de suministro agroalimentaria (AFSC) siguiendo una jerarquización natural del proceso de toma de decisiones.
(45) Ahumada & Villalobos, 2012	Presentar un modelo estocástico de planificación táctica para la producción y distribución de productos agrícolas frescos.
(46) Companys-Pascual et al., 2012	Presentar un modelo de programación lineal para determinar un mapa productivo que minimizara los costos de explotación a tres años vista.
(47) Paksoy et al., 2012	Presentar un modelo de programación lineal en el cual la aplicación se realiza a través de datos reales recogidos de la compañía. La red de la cadena de suministro de la compañía incluye proveedor, fábrica y almacenes.
(48) Soysal et al., 2012	A partir de la revisión de varios artículos, mostrar las principales claves logísticas que debe tener un modelo agroalimentario, para que sea competitivo y cumpla con las exigencias de los stakeholders.
(49) Ahumada & Villalobos, 2011	Presentar un estudio de caso sobre la base de dos productos: pimientos y tomates, cuyo modelo de planificación incluye comportamiento de post-cosecha de los cultivos, los efectos del clima, el tiempo de transporte, pudrición post-cosecha, los costos laborales, y entrega.



Autor (año)	Objetivo principal del trabajo
(50) Georgiadis et al., 2011	Presentar una formulación matemática detallada para el problema de diseñar redes de cadenas de suministro que comprenden las instalaciones de producción multiproducto con los recursos de producción compartida, almacenes, centros de distribución y las zonas de los clientes.
(51) Kazaz & Webster, 2011b	Presentar un modelo de programación estocástica donde se estudia la estructura de costos de comercialización.
(52) Kazaz et al., 2011	Desarrollar un modelo estocástico, bi-etapa para la fijación de precios y la producción, abordando problemas de oferta y demanda bajo incertidumbre en la industria del vino.
(53) Kazaz & Webster, 2011a	Presentar el enfoque de modelado utilizado para la fijación de precios y planificación de la producción de un problema negocio agrícola que arrienda espacio agrícola.
(54) Mohamad & Said, 2011	Presentar un modelo de programación lineal para una planificación cultivos mixtos, en un horizonte de tiempo finito.
(55) Mula Bru et al., 2010	Presentar una revisión de otros modelos de programación matemática para la producción y planificación de transporte.
(56) Yanes-Estevez et al., 2010	Evaluar el nivel de incertidumbre en las islas canarias, mediante el Método Rasch, el cual genera resultados a partir de las respuestas del cuestionario que se aplica a todos los agentes de la cadena de suministro.
(57) Verdouw et al., 2010	Modelar a través de modelos de referencia la producción y utilizar software para incluir en la cadena el diseño de procesos de negocios a lo largo de las etapas.
(58) Ahumada & Villalobos, 2009a	Manejar la gestión de perecibilidad, ya que al trabajar con productos frescos es más complejo hacer llegar los productos con buena calidad a los clientes.



Autor (año)	Objetivo principal del trabajo
(59) Peidro et al., 2009	Presentar una revisión de los modelos más adecuados para controlar la incertidumbre
(60) Reardon et al., 2009	Mostrar casos de estudio sobre la rápida transformación de la industria agroalimentaria en los países en desarrollo y sus efectos sobre los pequeños agricultores. Los casos son principalmente de la horticultura y de productos lácteos.
(61) Ferrer et al., 2008	Determinar un plan de programación óptimo para la cosecha de uvas de vino mediante un modelo de programación lineal con el objetivo de minimizar los costos de operación y calidad de la uva.
(62) J. V. Caixeta-Filho, 2006	Desarrollar un modelo de programación lineal que relacione las restricciones químicas, biológicas y logísticas de la calidad de la fruta a cosechar, con el objetivo de maximizar los ingresos.
(63) Widodo et al., 2006	Diseñar un modelo de programación dinámica para integrar la producción, cosecha y almacenamiento de productos perecederos con funciones de pérdida y crecimiento maximizando la demanda satisfecha.
(64) Allen & Schuster, 2004	Determinar la tasa óptima de cosecha e inversión de capital (capacidad) utilizando un modelo de programación no lineal, para reducir las pérdidas por clima y exceso de capacidad.
(65) Kazaz, 2004	Diseñar un modelo de programación estocástico, en dos etapas para determinar los olivos a contratar, a un productor de aceite, en la temporada con rendimiento y demanda incierta, buscando maximizar los ingresos.
(66) Rantala, 2004	Diseñar un modelo de producción y distribución de la cadena de suministro de plantas de semillas con el objetivo de minimizar costos.
(15) Itoh et al., 2003	Presentar un modelo de planificación de cultivos con valores inciertos, difusos y aleatorios, con el objetivo de maximizar el valor mínimo de los ingresos.
(67) J. V. Caixeta-Filho et al., 2002	Desarrollar un modelo de programación lineal para maximizar el ingreso bruto esperado de un invernadero mediante el diseño de un plan adecuado de siembra y comercialización.



Autor (año)	Objetivo principal del trabajo
(68) Ten Berge et al., 2000	Desarrollar un modelo de granja para comparar diferentes tecnologías de cultivo antes de comenzar el trabajo empírico. Con objetivo económicos y ambientales.
(69) Darby-Dowman et al., 2000	Diseñar un modelo de programación estocástico para determinar el óptimo de siembra previsto para un cultivo de vegetales bajo escenarios de clima, maximizando los ingresos.
(70) Romero, 2000	Determinar un modelo eficiente de cultivo, considerando el riesgo de los productores con un modelo multi-objetivo (max ingresos, min variabilidad).
(71) Leutscher et al., 1999	Presentar un modelo de producción con decisiones tácticas y operativas con el objetivo de aumentar la rentabilidad.
(72) Aleotti et al., 1997	Desarrollar un modelo de programación estocástica para optimizar los ingresos al cambiar la capacidad de las instalaciones de conservación de alimentos y teniendo en cuenta la incertidumbre en los mercados del cultivo.
(73) Miller et al., 1997	Determinar un plan de producción y cosecha de una planta de empaque a través de un modelo de programación lineal y programas difusos con el objetivo de minimizar los costos.
(74) Stokes et al., 1997	Desarrollar una producción óptima y decisiones de marketing para la producción de un vivero de plantas ornamentales utilizando un modelo de programación dinámica estocástica con el objetivo de maximizar los ingresos.
(75) Hammer et al., 1993	Determinar un plan de siembra y cosecha de cultivos frescos utilizando un modelo de programación lineal con el objetivo de maximizar las ganancias.
(76) Purcell et al., 1993	Desarrollar un modelo decisional de programación del riesgo para la producción de tierras y paisajes con el objetivo de maximizar la rentabilidad dado un nivel de aversión al riesgo.



Autor (año)	Objetivo principal del trabajo
(77) van Berlo, 1993	Determinar la siembra, la cosecha y los planes de producción utilizando un modelo de programación lineal con el objetivo de minimizar los costos de la cadena logística.
(78) Annevelink, 1992	Determinar un plan para la ubicación de plantas de maceta en el interior de un invernadero con el objetivo de minimizar los costes utilizando heurísticas y algoritmos genéticos.
(79) Saedt et al., 1991	Desarrollar un plan para un invernadero de plantas de maceta con dos modelos, uno de programación lineal para planes de futuro y uno con programación entera mixta para los planes de transición, con el objetivo de maximizar los ingresos.

Tabla 2. Artículos según alcance de planificación

Alcance	Nº Artículos	%
Estratégico	33	52%
Táctico	39	62%
Operativo	14	22%

Tabla 3. Artículos según variable de decisión

Variables de Decisión	Nº Artículos	%
Plantar (P)	35	56%
Cosechar (H)	28	44%
Almacenar (I)	29	46%
Distribuir (D)	33	52%



Tabla 4. Artículos según aproximación de modelado

Aproximación de Modelado	N° Artículos	%
Programación Lineal (LP)	21	33%
Programación Estocástica (SP)	8	13%
Programación Dinámica (DP)	3	5%
Programación Dinámica Estocástica (SDP)	3	5%
Programación Entera Mixta (MIP)	17	27%
Otro modelo o no lineal	22	35%

RESULTADOS Y DISCUSIÓN

Como resultado de la revisión bibliográfica, se presenta la siguiente taxonomía que ordena y clasifica la información relevante en tres perspectivas: Perspectiva alcance de planificación; Perspectiva variables de decisión; Perspectiva aproximación de modelado. Es importante señalar que los artículos pueden dar cuenta de más de una clasificación en una misma perspectiva.



Tabla 5. Taxonomía de la revisión bibliográfica

Autor (año)	Alcance de la planificación						Variables de decisión					Aproximación de modelado					
	S	T	O	SL	A	DM	P	H	D	I	SCM	LP	SP	DP	SDP	MIP	Otro/ No Lineal
Tordecilla et al (2021)	X				N	No se identifica				X	2						X
Tirkolae et al (2021)	X				Y/Y	No se identifica			X		2					X	X
Li, De Li y Jiang (2020)		X			Y/N	Agricultor				X	1						X
Rohmer et al (2019)	X	X			Y/Y	CdS		X	X	X	2	X					
Onggo et al (2019)		X			Y/Y	CdS		X	X	X	2					X	
Mogale et al (2019)	X	X			Y/Y	Asesor			X	X	2						X
Jonkman et al (2019)		X			Y/Y	Agricultor		X	X		1					X	
Jeric y Šorić (2019)		X			Y//	Agricultor		X	X	X	1					X	
Hosseini-Motlagh et al (2019)	X				Y/Y	CdS		X	X	X	2		X				
Cruz et al (2019)	X	X			Y/Y	Planificador				X	2					X	
Behzadi et al (2018)	X				N	Agricultor	X	X	X	X	2	X	X	X	X	X	X
Allaoui et al (2018)	X				Y/Y	Agricultor	X	X	X	X	2						X
Soto-Silva et al (2017)	X	X			Y/Y	Planificador			X	X	1					X	
Ghezavati, Hooshyar y Tavakkoli-Moghaddam (2017)	X				Y/Y	Planificador			X		2					X	
Soto-Silva et al (2016)	X	X	X		Y/N	No se identifica	X	X	X	X	2	X	X	X	X	X	X
Amorim et al (2016)		X			Y/N	Planificador				X	1					X	
Nakandala et al (2016)		X			Y/Y	Asesor			X		1						X
Araujo y Leal (2015)		X			Y/Y	No se identifica				X	1	X					
González-Araya et al (2015)		X		X	Y/Y	Planificador		X			2					X	
Bahinipati (2014)	X				N	No se identifica	X	X			1						X



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Dabbene et al (2014)	X				N	CdS		X			1						X
de Keizer et al(2014)	X	X			Y/N	CdS			X		1						X
Miranda-Ackerman et al (2014)	X				Y/N	Planificador	X	X	X	X	1						X
Boudahri et al (2013)		X	X	X	Y/Y	Agricultor	X		X		2	X					
Hu et al (2013)	X	X		X	Y/N	Agricultor	X	X	X	X	1						X
Santos et al (2013)		X		X	N	CdS	X		X	X	2						X
Tsolakis et al (2013)	x			x	Y/N	No se identifica	X	X	X		2						X
Ahumada y Villalobos (2012)			X	X	Y/Y	Agricultor	X	X	X	X	2		X				
Companys et al (2012)	X	X		X	Y/N	Asesor			X	X	2	X					
Paksoy et al (2012)	X		X		Y/Y	CdS			X		2	X					
Soysal et al (2012)	X				N	No se identifica	X		X	X	2						X
Ahumada y Villalobos (2011)		X	X	X	Y/N	Agricultor	X		X		2						X
Georgiadis et al (2011)	X				Y/N	CdS			X	X	2						X
Kazaz y Webster (2011)		X		X	Y/Y	Asesor	X				1		X				
Kazaz y Webster (2011b)	X			X	Y/Y	Asesor		X		X	1		X				
Kazaz y Webster (2011c)	X			X	Y/N	Agricultor	X				1						X
Mohamad y Said (2011)	X		X	X	Y/Y	Planificador	X	X			1	X					
Mula et al (2010)	X			X	Y/N	Asesor	X		X		2						X
Yanes et al. (2010)	X			X	Y/Y	Planificador	X		X	X	2						X
Verdouw et al. (2010)	X				Y/N	Agricultor		X	X	X	2						X
Ahumada y Villalobos (2009b)		X		X	Y/Y	Planificador	X	X	X		2	X					
Peidro et al. (2009)	X	X	X		N	Agricultor	X		X		2						X
Reardon et al. (2009)	X			X	N	No se identifica	X		X		1						X
Ferrer et al. (2008)		X	X	X	Y/N	Planificador		X			1						X
Caixeta-Filho (2006)		X			Y/N	Planificador		X			2	X					



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Widodo et al. (2006)		X	X	X	N	CdS	X			X	2			X			
Allen and Schuster (2004)	X				Y/Y	Planificador	X	X			1						X
Kazaz (2004)		X		X	Y/N	Planificador	X	X			1		X				
Rantala (2004)	X	X			Y/N	CdS	X		X	X	2					X	
Itoh et al. (2003)		X			N	Agricultor	X				1	X					
Caixeta-Filho et al. (2002)		X	X		Y/Y	Agricultor	X	X			1	X					
Berge et al. (2000)		X			Y/N	Asesor	X				1	X					
Darby-Dowman et al (2000)		X			Y/N	Agricultor	X	X			1		X				
Romero (2000)		X			N	Planificador	X				1	X					
Leutscher et al. (1999)		X	X		N	Agricultor	X				1	X					
Aleotti et al. (1997)	X	X			Y/N	Agricultor		X	X	X	1						X
Miller et al. (1997)			X		Y/N	Planificador		X		X	1	X					
Stokes et al. (1997)		X			Y/N	Agricultor	X				1				X		
Hamer (1994)		X			Y/N	Agricultor	X				1	X					
Purcell et al. (1993)		X			Y/N	Asesor	X				1	X					
van Berlo (1993)	X	X			Y/N	Agricultor	X	X		X	2	X					
Annevelink (1992)			X		N	Agricultor	X				1	X					
Saedt et al. (1991)		X	X		Y/Y	Agricultor	X				1	X					



Como resultado de la revisión anterior se han clasificado los tipos de problemas que cada uno de los autores han ido resolviendo. Para ello se ideó la siguiente metodología.

1. Clasificar el problema en estudio:

- Reconocer en cuál etapa del ciclo de vida de la hortaliza se sitúa el problema a resolver. Esta puede afectar a alguna de las variables de decisión: Plantar (P), Cosechar (H), Distribuir (D) y Almacenar (I).
- Identificar, el alcance del problema resuelto. Este puede ser Estratégico (S), Táctico (T) y Operativo (O).
- Describir brevemente el problema en estudio, detectar y describir aspectos presentes en el problema a resolver o características propias que resuelve el artículo (homogeneizar la problemática).
- Identificar la aproximación de modelado. Esta puede ser Programación Lineal (LP), Programación Estocástica (SP), Programación Dinámica (DP), Programación Dinámica Estocástica (SDP), Programación Entera Mixta (MIP), otro no lineal (NL).

2. Asociar los autores que presentan alguna solución al problema planteado.

Tabla 6 Taxonomía de la revisión bibliográfica

Variable Decisión	Alcance	Problema	Aproximación Modelado	Autor (año)
P	S	Presenta modelos cuantitativos de gestión de riesgos para las cadenas de suministro agrícolas.	NL	Behzadi et al (2018)
		Presenta una revisión bibliográfica de los métodos de investigación operativa para el diseño de cadenas de suministro sostenibles.	NL	Allaoui et al (2018)
		Planificación cultivos mixtos, en un horizonte de tiempo finito.	LP	Mohamad y Said (2011)
		Producción y distribución de semillas, minimizando costos.	MIP	Rantala (2004)
		Determinar la siembra, la cosecha y los planes de producción, minimizando costos.	LP	van Berlo (1993)
	T	Rediseñar la cadena de suministro con el fin de ahorrar y mejorar la distribución de productores a minoristas.	LP	Boudahri et al (2013)
		Planificación post-cosecha de los cultivos, considerando: clima, tiempo de transporte, calidad del producto, costos laborales, y entrega.	MIP	Ahumada y Villalobos (2011)
		Estructurar los costes de comercialización.	SP	Kazaz y Webster (2011)



	Gestionar la perecibilidad, para llegar con productos de buena calidad a los clientes.	LP	Ahumada y Villalobos (2009b)
	Integrar la producción, cosecha y almacenamiento de productos perecederos.	DP	Widodo et al. (2006)
	Determinar los olivos a contratar para un productor de aceite, bajo demanda incierta.	SP	Kazaz (2004)
	Producción y distribución de semillas, minimizando costos.	MIP	Rantala (2004)
	Planificación de cultivos, buscando maximizar el valor mínimo de los ingresos.	LP	Itoh et al. (2003)
	Diseño de un plan adecuado de siembra y comercialización, en invernadero.	LP	Caixeta-Filho et al. (2002)
	Incorporación de tecnologías de cultivo para fines económicos y ambientales.	LP	Berge et al. (2000)
	Determinar un plan de siembra para cultivo de vegetales bajo escenarios de clima.	SP	Darby-Dowman et al (2000)
	Determinar un modelo eficiente de cultivo, considerando el riesgo de los productores.	LP	Romero (2000)
	Presentar un modelo de producción con el objetivo de aumentar la rentabilidad.	LP	Leutscher et al. (1999)
	Decisiones de marketing para la producción de un vivero de plantas ornamentales.	SDP	Stokes et al. (1997)
	Plan de siembra y cosecha de cultivos frescos.	LP	Hamer (1994)
	Programación del riesgo para la producción de tierras y paisajes.	LP	Purcell et al. (1993)
	Determinar la siembra, la cosecha y los planes de producción, minimizando costos.	LP	van Berlo (1993)
	Planificar la producción de plantas de maceta en invernadero, para escenarios actuales y futuros.	LP	Saedt et al. (1991)
O	Rediseñar la cadena de suministro con el fin de ahorrar y mejorar la distribución de productores a minoristas.	LP	Boudahri et al (2013)
	Planificación para la producción y distribución de productos agrícolas frescos.	SP	Ahumada y Villalobos (2012)



		Planificación post-cosecha de los cultivos, considerando: clima, tiempo de transporte, calidad del producto, costos laborales, y entrega.	MIP	Ahumada y Villalobos (2011)
		Planificación cultivos mixtos, en un horizonte de tiempo finito.	LP	Mohamad y Said (2011)
		Integrar la producción, cosecha y almacenamiento de productos perecederos.	DP	Widodo et al. (2006)
		Diseño de un plan adecuado de siembra y comercialización, en invernadero.	LP	Caixeta-Filho et al. (2002)
		Presentar un modelo de producción con el objetivo de aumentar la rentabilidad.	LP	Leutscher et al. (1999)
		Determinar un plan para la ubicación de plantas de maceta en el interior de un invernadero.	LP	Annevelink (1992)
		Planificar la producción de plantas de maceta en invernadero, para escenarios actuales y futuros.	LP	Saedt et al. (1991)
H	S	Presenta el diseño de redes que aborda cuestiones de sostenibilidad en el contexto del sistema alimentario mundial.	LP	Rohmer et al (2019)
		Presenta un modelo matemático, optimizando el coste total de la cadena de suministro de trigo.	SP	Hosseini-Motlagh et al (2019)
		Realiza una revisión exhaustiva de la literatura relativamente limitada sobre los modelos cuantitativos de gestión de riesgos para las cadenas de suministro agrícolas.	No aplica	Behzadi et al (2018)
		Este artículo presenta una revisión bibliográfica crítica de los métodos de investigación operativa para el diseño de cadenas de suministro sostenibles.	NL	Allaoui et al (2018)
		Presenta una revisión de la literatura sobre modelos de investigación operativa aplicados a la cadena de suministro de fruta fresca. Se trata de un intento de comprender mejor los métodos de IO utilizados en los trabajos revisados.	No aplica	Soto-Silva et al (2016)
		Desarrollar un modelo para la fijación de precios y la producción.	SP	Kazaz y Webster (2011b)
		Planificación cultivos mixtos, en un horizonte de tiempo finito.	LP	Mohamad y Said (2011)
		Desarrollar un modelo para el manejo de la capacidad de las instalaciones de conservación de alimentos.	MIP	Aleotti et al. (1997)



	Determinar la siembra, la cosecha y los planes de producción, minimizando costos.	LP	van Berlo (1993)
T	Propone un modelo entero mixto y un algoritmo simheurístico, que integra la simulación de Monte Carlo dentro de una búsqueda local iterada, para una cadena de suministro agroalimentaria con un único proveedor de alimentos frescos, que posee un almacén central que sirve a varios centros de venta al por menor.	MIP	Onggo et al (2019)
	Este artículo explora el diseño de cadenas de suministro de biomasa ecoeficientes y la asignación de beneficios económicos entre los socios de la cadena de suministro.	MIP	Jonkman et al (2019)
	Presenta un modelo de optimización y un método de resolución para el problema de una región de productores de aceite de oliva y agricultores, en su mayoría pequeños, que cultivan y cosechan aceitunas.	MIP	Jerić y Šorić (2019)
	Planificación y la toma de decisiones en un huerto de frutales (manzanas) reduciendo al mínimo la cantidad de recursos utilizados y garantizando la producción de fruta de buena calidad para la exportación.	MIP	González et al (2015)
	Gestionar la perecibilidad, para llegar con productos de buena calidad a los clientes.	LP	Ahumada y Villalobos (2009b)
	Planificación de la cosecha.	MIP	Ferrer et al. (2008)
	Modelo que sostiene un alto nivel de calidad de la fruta a cosechar.	LP	Caixeta-Filho (2006)
	Determinar los olivos a contratar para un productor de aceite, bajo demanda incierta.	SP	Kazaz (2004)
	Diseño de un plan adecuado de siembra y comercialización, en invernadero.	LP	Caixeta-Filho et al. (2002)
	Determinar un plan de siembra para cultivo de vegetales bajo escenarios de clima.	SP	Darby-Dowman et al (2000)
Desarrollar un modelo para el manejo de la capacidad de las instalaciones de conservación de alimentos.	MIP	Aleotti et al. (1997)	
Determinar la siembra, la cosecha y los planes de producción, minimizando costos.	LP	van Berlo (1993)	
O	Presenta una revisión de la literatura sobre modelos de investigación operativa aplicados a la cadena de suministro de fruta fresca.	No aplica	Soto-Silva et al (2016)



		Planificación para la producción y distribución de productos agrícolas frescos.	SP	Ahumada y Villalobos (2012)
		Planificación cultivos mixtos, en un horizonte de tiempo finito.	LP	Mohamad y Said (2011)
		Planificación de la cosecha.	MIP	Ferrer et al. (2008)
		Diseño de un plan adecuado de siembra y comercialización, en invernadero.	LP	Caixeta-Filho et al. (2002)
		Determinar un plan de producción y cosecha.	LP	Miller et al. (1997)
D	S	Método multicriterio para evaluar y calificar a los proveedores.	MIP	Tirkolae et al (2021)
		Problema de diseño de redes que aborda cuestiones de sostenibilidad en el contexto del sistema alimentario mundial.	LP	Rohmer et al (2019)
		Apoyo a la toma de decisiones para la cadena de suministro de alimentos sostenibles.	NL	Mogale et al (2019)
		Modelo matemático, que optimiza el costo total de la cadena de suministro de trigo.	SP	Hosseini-Motlagh et al (2019)
		Revisión de la literatura sobre modelos cuantitativos de gestión de riesgos para las cadenas de suministro agrícolas.	No aplica	Behzadi et al (2018)
		Revisión bibliográfica de los métodos de investigación operativa para el diseño de cadenas de suministro sostenibles.	No aplica	Allaoui et al (2018)
		Apoyo a la toma de decisiones en una planta de procesado de manzanas frescas con el fin de garantizar su suministro anual.	MIP	Soto-Silva et al (2017)
		Planificación periódica para la distribución de productos agroalimentarios.	MIP	Ghezavati, Hooshyar y Tavakkoli-Moghaddam (2017)
		Revisión de la literatura sobre modelos de investigación operativa aplicados a la cadena de suministro de fruta fresca.	No aplica	Soto-Silva et al (2016)
Explorar los efectos de la colaboración horizontal y vertical.	MIP	de Keizer et al(2014)		



	Determinar un mapa productivo minimizando costos de explotación.	LP	Companys et al (2012)
	Gestionar la cadena de suministro.	LP	Paksoy et al (2012)
	Diseñar redes de cadenas de suministro.	MIP	Georgiadis et al (2011)
	Producción y distribución de semillas, minimizando costos.	MIP	Rantala (2004)
	Desarrollar un modelo para el manejo de la capacidad de las instalaciones de conservación de alimentos.	MIP	Aleotti et al. (1997)
T	Problema de diseño de redes que aborda cuestiones de sostenibilidad en el contexto del sistema alimentario mundial.	LP	Rohmer et al (2019)
	Resuelve para una cadena de suministro agroalimentaria con un único proveedor de alimentos frescos, que posee un almacén central que sirve a varios centros de venta al por menor.	MIP	Onggo et al (2019)
	Apoyo a la toma de decisiones para la cadena de suministro de alimentos sostenibles considerando una toda una red de centros de aprovisionamiento, almacenes a nivel central, estatal y de distrito, y tiendas de precio justo.	NL	Mogale et al (2019)
	Diseño de cadenas de suministro de biomasa ecoeficientes y la asignación de beneficios económicos entre los socios de la cadena de suministro.	MIP	Jonkman et al (2019)
	Presenta un modelo de optimización y un método de resolución para el problema de una región de productores de aceite de oliva y agricultores, en su mayoría pequeños, que cultivan y cosechan aceitunas.	MIP	Jerić y Šorić (2019)
	Propone un modelo de apoyo a la toma de decisiones en una planta de procesamiento de manzanas frescas con el fin de garantizar su suministro anual.	MIP	Soto-Silva et al (2017)
	Explorar los efectos de la colaboración horizontal y vertical.	MIP	de Keizer et al(2014)
	Rediseñar la cadena de suministro con el fin de ahorrar y mejorar la distribución de productores a minoristas.	LP	Boudahri et al (2013)
	Determinar un mapa productivo minimizando costos de explotación.	LP	Companys et al (2012)



		Planificación post-cosecha de los cultivos, considerando: clima, tiempo de transporte, calidad del producto, costos laborales, y entrega.	MIP	Ahumada y Villalobos (2011)
		Gestionar la perecibilidad, para llegar con productos de buena calidad a los clientes.	LP	Ahumada y Villalobos (2009b)
		Producción y distribución de semillas, minimizando costos.	MIP	Rantala (2004)
		Desarrollar un modelo para el manejo de la capacidad de las instalaciones de conservación de alimentos.	MIP	Aleotti et al. (1997)
	O	Rediseñar la cadena de suministro con el fin de ahorrar y mejorar la distribución de productores a minoristas.	LP	Boudahri et al (2013)
		Planificación para la producción y distribución de productos agrícolas frescos.	SP	Ahumada y Villalobos (2012)
		Gestionar la cadena de suministro.	LP	Paksoy et al (2012)
		Planificación post-cosecha de los cultivos, considerando: clima, tiempo de transporte, calidad del producto, costos laborales, y entrega.	MIP	Ahumada y Villalobos (2011)
I	S	Este artículo revisa la literatura existente sobre el uso de métodos de simulación-optimización de simulación en el diseño de redes de cadenas de suministro (SCNs) resistentes.	NL	Tordecilla et al (2021)
		Problema de diseño de redes que aborda cuestiones de sostenibilidad en el contexto del sistema alimentario mundial.	LP	Rohmer et al (2019)
		Apoyo a la toma de decisiones para la cadena de suministro de alimentos sostenibles considerando una toda una red de centros de aprovisionamiento, almacenes a nivel central, estatal y de distrito, y tiendas de precio justo.	NL	Mogale et al (2019)
		Presentando un nuevo modelo matemático, se optimiza el coste total de la cadena de suministro de trigo.	SP	Hosseini-Motlagh et al (2019)
		Apoyar el diseño y la planificación de las cadenas de suministro agroalimentarias.	MIP	Cruz et al (2019)
		Realiza una revisión exhaustiva de la literatura relativamente limitada sobre los modelos cuantitativos de gestión de riesgos para las cadenas de suministro agrícolas.	No aplica	Behzadi et al (2018)



	Este artículo presenta una revisión bibliográfica crítica de los métodos de investigación operativa para el diseño de cadenas de suministro sostenibles.	NL	Allaoui et al (2018)
	Propone un modelo de apoyo a la toma de decisiones en una planta de procesamiento de manzanas frescas con el fin de garantizar su suministro anual.	MIP	Soto-Silva et al (2017)
	Presenta una revisión de la literatura sobre modelos de investigación operativa aplicados a la cadena de suministro de fruta fresca.	No aplica	Soto-Silva et al (2016)
	Determinar un mapa productivo minimizando costos de explotación.	LP	Companys et al (2012)
	Diseñar redes de cadenas de suministro.	MIP	Georgiadis et al (2011)
	Desarrollar un modelo para la fijación de precios y la producción.	SP	Kazaz y Webster (2011b)
	Producción y distribución de semillas, minimizando costos.	MIP	Rantala (2004)
	Desarrollar un modelo para el manejo de la capacidad de las instalaciones de conservación de alimentos.	MIP	Aleotti et al. (1997)
	Determinar la siembra, la cosecha y los planes de producción, minimizando costos.	LP	van Berlo (1993)
T	Configuración de la cadena de suministro de alimentos para optimizar a nivel táctico las decisiones de posicionamiento de inventarios para una cadena de suministro de alimentos general de varios niveles.	NL	Li, De Li y Jiang (2020)
	Problema de diseño de redes que aborda cuestiones de sostenibilidad en el contexto del sistema alimentario mundial.	LP	Rohmer et al (2019)
	Resuelve para una cadena de suministro agroalimentaria con un único proveedor de alimentos frescos, que posee un almacén central que sirve a varios centros de venta al por menor.	MIP	Onggo et al (2019)
	Apoyo a la toma de decisiones para la cadena de suministro de alimentos sostenibles considerando una toda una red de centros de aprovisionamiento, almacenes a nivel central, estatal y de distrito, y tiendas de precio justo.	NL	Mogale et al (2019)
	Presenta un modelo de optimización y un método de resolución para el problema de una región de	MIP	Jerić y Šorić (2019)



	productores de aceite de oliva y agricultores, en su mayoría pequeños, que cultivan y cosechan aceitunas.		
	Apoyar el diseño y la planificación de las cadenas de suministro agroalimentarias.	MIP	Cruz et al (2019)
	Selección de proveedores en la industria alimentaria, cuidando el servicio al cliente.	MIP	Amorim et al (2016)
	Presentar un modelo de precios de compra y venta del grano en el mercado.	LP	Araujo y Leal (2015)
	Determinar un mapa productivo minimizando costos de explotación.	LP	Companys et al (2012)
	Integrar la producción, cosecha y almacenamiento de productos perecederos.	DP	Widodo et al. (2006)
	Producción y distribución de semillas, minimizando costos.	MIP	Rantala (2004)
	Desarrollar un modelo para el manejo de la capacidad de las instalaciones de conservación de alimentos.	MIP	Aleotti et al. (1997)
	Determinar la siembra, la cosecha y los planes de producción, minimizando costos.	LP	van Berlo (1993)
O	Planificación para la producción y distribución de productos agrícolas frescos.	SP	Ahumada y Villalobos (2012)
	Integrar la producción, cosecha y almacenamiento de productos perecederos.	DP	Widodo et al. (2006)
	Determinar un plan de producción y cosecha.	LP	Miller et al. (1997)



CONCLUSIÓN

Una vez realizada la revisión y hecho el análisis, parece relevante destacar los siguientes aspectos:

Modelos integrados de planificación: El uso de modelos integrados de planificación en el estudio de cadenas de suministros alimentarias y en particular en cadenas de productos perecederos aún es muy limitado, si se compara con los estudios en el sector de productos perecederos, dada la complejidad que esto significa: mayor coordinación de actividades, gestión de recursos y control. Sin embargo, al observar la perspectiva de variables de decisión, en los 43 nuevos artículos incorporados a la revisión, el resultado indica que un 72% integra en su modelo al menos dos variables y dentro de ellos la variable que sostiene una mayor relación con algún otra es la de distribución, tal vez por ser pieza clave a la hora de llevar el producto al cliente final. Se espera entonces que al integrar las decisiones se logre una cadena más eficiente en términos de tiempos y utilización de recursos.

Modelos estocásticos realistas: En la mayoría de los estudios realizados de cadenas de productos perecederos, se tienen proyecciones del comportamiento de variables desconocidas o poco conocidas, es por ello que se debe buscar, incorporar datos reales a los modelos en estudio. Como, por ejemplo: vida útil de cada uno de los productos, estacionalidad del lugar de producción, calidad y tratamiento de los suelos, comportamiento de la demanda, entre otros. Se hace vital, conocer los datos reales sobre los cuales correrá el modelo y de esa forma asegurar la frescura de los productos perecederos. En el caso de esta revisión, solamente un 13% de los artículos se aproximaron al modelo desde la programación estocástica.

Modelos de planificación operativa: Al observar la perspectiva de alcance de planificación se identifica que solamente el 16% de los modelos estudiados resuelven problemas en un nivel de planificación operativa, lo que constituye un riesgo dado la naturaleza de los productos perecederos. La planificación a nivel estratégico debe ser capaz de bajar al nivel operativo de manera que se pueda cumplir su implementación y en este caso hacerse cargo de planificar acciones a corto plazo, saber cómo almacenar, detectar si requieren tratamiento de frío, cuantas se distribuyen inmediatamente, entre otras problemáticas asociadas. Finalmente se puede decir que los modelos a nivel operativo hacen la diferencia entre un buen rendimiento y una operación rentable.

Modelos operacionales que integran decisiones de producción y distribución: Teniendo en consideración dos de los hallazgos anteriores, resulta interesante analizar el comportamiento de aquellos modelos, que teniendo un alcance de planificación operativo toman decisiones referentes a producción (Plantar-Cosechar-Almacenar) y distribución a la vez. Al hacer el recuento la cantidad de artículos que abordan esta temática es solamente el 10%, lo que pone en alerta la necesidad de desarrollar modelos integrados que permitan manejar de la mejor forma la corta vida de los productos perecederos y lograr no bajar la calidad de los mismos. Se hace urgente integrar estos modelos no sólo por el beneficio que pueda lograr la industria agroalimentaria, sino también por ofrecer un producto de calidad al consumidor final.

Respecto a la clasificación de problemas la mayor cantidad de autores modelan y/o resuelven problemas del ámbito de la plantación y la distribución, llegando a 32 de los 63 autores revisados. En el caso de la etapa de plantación el alcance a nivel táctico destaca por sobre lo estratégico u operativo y en el caso de la etapa de distribución es más fuerte el alcance estratégico. La etapa de almacenamiento es la que sigue en orden de importancia, para los autores revisados y en ese sentido se ocupan de resolver y modelar problemas desde el punto de vista estratégico y táctico más que operativos. Finalmente, en la etapa de cosecha lo más estudiado por estos autores es de alcance táctico, alcanzando un número de 12 artículos.

Como pasos futuros, es posible ampliar esta categorización de problemas, incorporando el tipo de solución planteada y desde qué perspectiva (max o min) y codificar las categorías para poder representarlo gráficamente y facilitar su comprensión.

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EL MATRIMONIO INFANTIL UN PROBLEMA DE IMPORTANCIA EN EL DERECHO MEXICANO CHILD MARRIAGE A MAJOR ISSUE IN MEXICAN LAW

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RESUMEN

Abordar el matrimonio infantil requiere identificar los diversos factores que lo posibilitan. Si bien las raíces de esta práctica varían en función del país y la cultura, la pobreza, la falta de oportunidades educativas y el acceso limitado a la asistencia sanitaria son factores que la perpetúan (Rosa, 2019). Algunas familias casan a sus hijas a una edad temprana con el fin de reducir su carga económica u obtener ingresos; otras, porque creen que de ese modo asegurarán el futuro de sus hijas o las protegerán.

Palabras claves: Matrimonio infantil, desigualdad de genero, niñas, niños y adolescentes

ABSTRACT

Addressing child marriage requires identifying the various factors that enable it. While the roots of this practice vary by country and culture, poverty, lack of educational opportunities and limited access to health care are factors that perpetuate it (Rosa, 2019). Some families marry off their daughters at an early age in order to reduce their financial burden or earn an income; others, because they believe that in this way they will secure the future of their daughters or protect them.

Keywords: Child marriage, gender inequality, children and adolescents

Introduccion

Esta es una práctica arraigada en muchas culturas y países en desarrollo, incluido México. De acuerdo a la Convención Universal sobre los Derechos del Niño de la Organización de Naciones Unidas, “El matrimonio infantil se considera una forma de matrimonio forzoso, ya que no se cuenta con el consentimiento pleno, libre e informado de una de las partes o de ninguna de ellas” y establece el matrimonio en menores de 18 años como matrimonio forzoso. Este se considera una violación de los derechos humanos y una forma de explotación infantil. A pesar de que la edad legal para contraer matrimonio en México es de 18 años, las leyes y prácticas locales permiten que los menores se casen en algunas circunstancias. Según la Comisión Nacional de los Derechos Humanos, en México, al menos 1 de cada 4 mujeres se casan antes de cumplir los 18 años. En algunos estados, esta cifra puede ser aún más alta.

El matrimonio infantil tiene graves consecuencias para los niños y afectando en gran medida a las niñas. En muchas culturas, las niñas son consideradas una carga económica y social para sus familias, por lo que son casadas jóvenes para reducir el costo de su manutención y asegurar su futuro económico. Estas niñas se ven obligadas a abandonar la escuela y asumir responsabilidades adultas, como el cuidado del hogar y la crianza de hijos, lo que limita enormemente sus oportunidades de desarrollo personal y profesional. Las niñas que se casan antes de los 18 años tienen un mayor riesgo de sufrir violencia doméstica, abuso sexual, embarazo precoz y mortalidad materna. Los niños también pueden verse afectados por el matrimonio infantil, ya que pueden ser obligados a trabajar para mantener a su familia.



Desarrollo

El matrimonio infantil ha sido una práctica común en muchas culturas a lo largo de la historia, incluyendo México y otros países del mundo. En México, el matrimonio infantil ha sido una práctica cultural arraigada en algunas comunidades indígenas y rurales, y se ha practicado durante siglos. La idea detrás del matrimonio infantil a menudo es que se considera una forma de proteger a las hijas de la familia de la violencia y el abuso, así como una forma de asegurar su futuro y su estabilidad económica. Sin embargo, también es cierto que el matrimonio infantil a menudo se utiliza como una forma de controlar a las mujeres y de restringir sus oportunidades. Según la Organización Mundial de la Salud (OMS), se estima que en todo el mundo, unos 650 millones de mujeres y niñas se casaron antes de los 18 años, y de ellas, aproximadamente el 17% se casaron antes de los 15 años. Las consecuencias del matrimonio infantil son devastadoras y pueden incluir la interrupción de la educación, la violencia sexual y doméstica, la falta de acceso a la atención médica y la mayor probabilidad de contraer VIH/SIDA y otras enfermedades.

En los últimos años, ha habido un creciente reconocimiento de que el matrimonio infantil es un problema grave que afecta la vida y el bienestar de millones de niños y niñas en todo el mundo. Se han tomado medidas para combatir esta práctica, incluyendo la promoción de leyes y políticas que prohíben el matrimonio infantil, la promoción de la educación de las niñas y la lucha contra la discriminación de género. También se han creado organizaciones y campañas para concientizar sobre el tema y apoyar a las personas afectadas por el matrimonio infantil.

El matrimonio infantil también se asocia con mayores tasas de pobreza y desigualdad de género, ya que a menudo perpetúa ciclos de pobreza intergeneracional y puede limitar el acceso de las niñas a oportunidades educativas y económicas.

A pesar de que muchas organizaciones internacionales están trabajando para erradicar el matrimonio infantil, sigue siendo un problema generalizado en muchas partes del mundo. Los esfuerzos para abordar el problema incluyen la promoción de la educación, el empoderamiento de las niñas y la implementación de leyes y políticas que prohíban el matrimonio infantil y protejan los derechos de los niños y niñas.

En 1989 se llevo a cabo la Convención sobre los derechos de los niños, tratado internacional que la ONU firma con países pertenecientes a esta organización. Este tratado se compone de distintas normas que garantizan protección a la infancia y derechos a la niñez, puesto que, por primera vez se reconoce a las y los niños como sujetos de derecho y a los adultos como sujetos de responsabilidades.

La agenda 2030, reconoce que el matrimonio infantil se debe de eliminar, por lo que hace recomendaciones precisas para erradicar la problemática y recomienda trabajar en la concientización de padres, tutores, legisladores y autoridades competentes erradicando la desigualdad de género, garantizando educación para las niñas, los niños y los adolescentes que oriente en materia de derechos sexuales y reproductivos, así como proporcionar servicios de salud eficientes los cuales estén al alcance de toda la población.

El derecho mexicano ha tomado medidas para combatir el matrimonio infantil como la creación de la Ley General de los Derechos de Niñas, Niños y Adolescentes, y en 2014, se modificó el Código Civil Federal para establecer que la edad mínima para contraer matrimonio es de 18 años. Además, varios estados mexicanos han aprobado leyes para prohibir el matrimonio infantil y proteger los derechos de los niños. Sin embargo, a pesar de la prohibición legal, el matrimonio infantil sigue siendo una práctica común en algunas zonas rurales y marginadas del país. Según un informe del Fondo de las Naciones Unidas para la Infancia (UNICEF), en México, el 30% de las mujeres se casan antes de los 18 años y el 9% antes de los 15 años. Además, el informe indica que las tasas de matrimonio infantil son más altas en los estados de Chiapas, Guerrero y Oaxaca, donde la pobreza, la discriminación y la marginación son más comunes. Por lo que todavía hay una brecha entre la ley y la práctica en algunas partes del país.

Para combatir el matrimonio infantil en México, es necesario abordar las causas subyacentes de este problema. En muchos casos, la pobreza y la falta de acceso a la educación son factores clave que



contribuyen al matrimonio infantil. Para abordar estos problemas, se necesitan esfuerzos coordinados y sostenidos, políticas y programas que promuevan el acceso a la educación y la igualdad de género.

Es importante sensibilizar a la sociedad sobre los riesgos del matrimonio infantil y promover la educación, especialmente para las niñas. También se deben fortalecer las leyes y políticas para garantizar que los niños y las niñas estén protegidos de las prácticas nocivas. Además, es importante trabajar con las comunidades y las familias para cambiar las normas culturales que promueven el matrimonio infantil.

En México persiste el problema que los usos y costumbres para el caso de los matrimonios y uniones infantiles, tienen prioridad sobre las leyes. (Ortega González, s. f.) Aunque la Constitución Política reconoce el derecho de los pueblos y comunidades indígenas a la libre determinación y, en consecuencia, a la autonomía para aplicar sus propios sistemas normativos, se deben respetar los derechos humanos y, de manera relevante, la dignidad e integridad de las niñas y mujeres.

El marco legal mexicano de protección a la niñez incluye varias leyes y políticas que buscan garantizar los derechos de los niños y niñas en México. A continuación se explica cada uno de los artículos más relevantes:

Artículo 1 de la Constitución Política de los Estados Unidos Mexicanos: establece el derecho de todas las personas, incluyendo los niños y niñas, a la protección de sus derechos humanos, y obliga al Estado a garantizar el respeto a los mismos.

Artículo 2 de la Constitución Política de los Estados Unidos Mexicanos: reconoce la diversidad cultural y lingüística de México, y obliga al Estado a proteger y promover los derechos de las comunidades indígenas, incluyendo los derechos de los niños y niñas indígenas.

Artículo 3 de la Constitución Política de los Estados Unidos Mexicanos: establece el derecho a la educación, obliga al Estado a garantizar la educación gratuita, laica y obligatoria, y reconoce el derecho de los niños y niñas a recibir una educación de calidad.

Ley General de los Derechos de Niñas, Niños y Adolescentes: establece los derechos de los niños y niñas en México, incluyendo el derecho a la educación, la salud, la protección contra la violencia y la discriminación, y el derecho a una vida libre de explotación. También establece la obligación del Estado de proteger y garantizar el ejercicio de estos derechos.

Artículo 2. El interés superior de la niñez deberá ser considerado de manera primordial en la toma de decisiones sobre una cuestión debatida que involucre niñas, niños y adolescentes. Cuando se presenten diferentes interpretaciones, se elegirá la que satisfaga de manera más efectiva este principio rector. Cuando se tome una decisión que afecte a niñas, niños o adolescentes, en lo individual o colectivo, se deberán evaluar y ponderar las posibles repercusiones a fin de salvaguardar su interés superior y sus garantías procesales.

Artículo 3. La Federación, las entidades federativas, los municipios y las demarcaciones territoriales del Distrito Federal, en el ámbito de sus respectivas competencias, concurrirán en el cumplimiento del objeto de esta Ley, para el diseño, ejecución, seguimiento y evaluación de políticas públicas en materia de ejercicio, respeto, protección y promoción de los derechos de niñas, niños y adolescentes, así como para garantizar su máximo bienestar posible privilegiando su interés superior a través de medidas estructurales, legales, administrativas y presupuestales.

Artículo 6. Para efectos del artículo 2 de esta Ley, son principios rectores, los siguientes: I. El interés superior de la niñez;

Ley para la Protección de los Derechos de Niñas, Niños y Adolescentes del Estado de México: establece los derechos de los niños y niñas en el estado de México, así como los mecanismos de protección y las sanciones por violaciones a sus derechos.

Código Penal Federal: establece las sanciones por delitos cometidos contra los niños y niñas, incluyendo el delito de matrimonio con persona menor de edad.



Ley General para la Prevención y Atención de la Tortura y Otros Tratos o Penas Crueles, Inhumanos o Degradantes: establece las medidas de prevención y sanciones en casos de tortura y otros tratos crueles, inhumanos o degradantes, incluyendo los casos que afecten a niños y niñas.

En resumen, el marco legal mexicano de protección a la niñez establece los derechos y obligaciones del Estado para garantizar una vida digna y libre de violencia para los niños y niñas en México, y establece sanciones para aquellos que violen estos derechos.

En el ámbito internacional, la Convención sobre los Derechos del Niño, adoptada por la Asamblea General de las Naciones Unidas en 1989, establece que los niños y niñas tienen derecho a una vida libre de violencia y que el matrimonio infantil debe ser prohibido. Además, varios tratados internacionales, como la Convención sobre la Eliminación de todas las Formas de Discriminación contra la Mujer y la Convención Internacional sobre la Eliminación de todas las Formas de Discriminación Racial, también establecen la prohibición del matrimonio infantil.

Además de los tratados internacionales mencionados anteriormente, también existen acuerdos regionales y nacionales que abordan el problema del matrimonio infantil. Por ejemplo, en América Latina, la Convención Interamericana sobre la Protección de los Derechos Humanos de las Personas Mayores y la Convención Interamericana para Prevenir, Sancionar y Erradicar la Violencia contra la Mujer (Convención de Belém do Pará) establecen la prohibición del matrimonio infantil. En México, además de las leyes nacionales mencionadas anteriormente, varios estados han adoptado leyes específicas para prevenir el matrimonio infantil y proteger a los niños y niñas afectados por esta práctica.

En todo el mundo, varias organizaciones no gubernamentales trabajan para prevenir y eliminar el matrimonio infantil, así como para proteger a los niños y niñas afectados por esta práctica.

Hay varias organizaciones en todo el mundo que trabajan para prevenir el matrimonio infantil y proteger los derechos de las niñas y adolescentes. Algunas de las organizaciones más conocidas son Girls Not Brides, UNICEF, Plan International y Save the Children, etc.

Girls Not Brides: es una organización global que trabaja para poner fin al matrimonio infantil y los compromisos tempranos. Trabajan con una amplia gama de organizaciones, incluidos gobiernos, líderes religiosos y comunitarios, así como con niñas y mujeres afectadas por el matrimonio infantil.

Plan International: es una organización de desarrollo que trabaja para proteger los derechos de los niños y las niñas, incluido el derecho a una educación y una vida libre de violencia y explotación. Trabajan en muchos países de todo el mundo y abordan el matrimonio infantil como una de las principales preocupaciones.

UNICEF: es la agencia de las Naciones Unidas responsable de la protección y el bienestar de los niños en todo el mundo. UNICEF trabaja para prevenir el matrimonio infantil y promover los derechos de las niñas y los niños a nivel mundial.

Save the Children: es una organización global que trabaja para mejorar las vidas de los niños y niñas en todo el mundo. Trabajan para prevenir el matrimonio infantil a través de la educación, el empoderamiento y la promoción de políticas que protejan los derechos de los niños.

Child Helpline International: es una red global de líneas de ayuda que ofrecen apoyo y asesoramiento a niños y jóvenes. Ofrecen apoyo a niños que están en riesgo de matrimonio infantil y trabajan para proteger sus derechos y seguridad.

El UNFPA (Fondo de Población de las Naciones Unidas) promueve el diseño de políticas, programas y legislación orientadas a poner fin al matrimonio infantil. Asimismo, apoya la inversión en estudios con base empírica centrados en las niñas que las empoderen mediante la información, las aptitudes y los servicios necesarios para que puedan gozar de buena salud, recibir una educación y sentirse seguras, para que de esa forma superen con éxito la transición a la edad adulta. El UNFPA también respalda las necesidades de las niñas casadas, especialmente en las esferas de la planificación familiar y la salud materna.



Hay muchas otras organizaciones que trabajan para prevenir el matrimonio infantil y proteger los derechos de las niñas y los niños en todo el mundo. Cada organización tiene su propia área de enfoque y estrategia, pero todas trabajan hacia un objetivo común: poner fin al matrimonio infantil y garantizar un futuro más seguro y justo para las niñas y los niños.

También se han tenido avances en la protección de los derechos de las niñas casadas, con la implementación de programas de apoyo para ayudarlas a escapar de situaciones de abuso o explotación y a reintegrarse en la sociedad. Además, se han creado redes de apoyo y organizaciones de la sociedad civil que trabajan para erradicar el matrimonio infantil y proteger a los niños y niñas de esta práctica.

Conclusion

En los lugares en los que el matrimonio infantil persiste, las prohibiciones por sí solas no siempre son suficientes; puesto que este es normalmente el resultado de una falta de opciones y porque se percibe como lo habitual, en las familias y las comunidades. Por lo que deben reforzarse y aplicarse leyes que prohíban el matrimonio infantil, sin embargo, las leyes por sí solas no pondrán fin al matrimonio infantil. Así que es necesario avanzar en el ámbito de la igualdad de género. Cuando educar a las hijas se considera igual de útil que educar a los hijos, otorgan la misma importancia al potencial futuro de las niñas y los niños, y existen menos motivos para practicar el matrimonio infantil.

La existencia de mejores circunstancias para las familias también elimina el incentivo de obligar a sus hijos a casarse; se requieren varios cambios, así como un mejor acceso a educación, servicios sanitarios y oportunidades económicas. Las niñas pueden desempeñar un papel importante a la hora de poner fin al matrimonio infantil cuando conocen sus derechos y tienen acceso al derecho de la información y las oportunidades.

En conclusión, el matrimonio infantil es un problema grave en México que afecta los derechos humanos y el desarrollo de los niños y las niñas. Se necesitan esfuerzos coordinados para abordar las causas subyacentes de este problema, incluida la pobreza y la falta de acceso a la educación, y sensibilizar a la sociedad sobre los derechos de los niños y las niñas.

El derecho mexicano ha tomado medidas para combatir el matrimonio infantil, pero aún hay un largo camino por recorrer para garantizar que todos los niños y niñas tengan la oportunidad de crecer y desarrollarse en un ambiente seguro y saludable.

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LOS DESAFÍOS DE LA REPARACIÓN DEL DAÑO EN CASOS DE VIOLENCIA DE GÉNERO: PERSPECTIVA JURÍDICA Y DE DERECHOS HUMANOS

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RESUMEN

El artículo se centra en los retos que enfrenta el sistema jurídico para reparar el daño en casos de violencia de género, enfatizando la importancia de un enfoque integral y basado en los derechos humanos. Se destaca que la reparación no solo debe ser económica, sino también incluir apoyo emocional, servicios de salud, asistencia legal y medidas de protección.

El trabajo subraya la necesidad de atender las necesidades físicas, psicológicas, sociales y económicas de las víctimas para ayudarles a sanar y reintegrarse a la sociedad. Se menciona la relevancia de los marcos normativos internacionales y nacionales, como la CEDAW y la legislación mexicana, que obligan a los Estados a garantizar una reparación integral.

Desde una perspectiva jurídica y de derechos humanos, se argumenta que la reparación debe ser completa, evitar la revictimización, ser accesible y permitir la participación activa de las víctimas. El artículo también identifica desafíos y obstáculos en el proceso de reparación, aunque el texto proporcionado no detalla estos puntos.

Palabras clave:

Las palabras clave del artículo incluyen violencia de género, sistema jurídico, reparación del daño y acceso a la justicia, reflejando su enfoque en cómo abordar eficazmente el daño causado por la violencia de género a través del sistema legal y los derechos humanos.



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Objetivo: ofrecer una perspectiva crítica y reflexiva sobre la necesidad de un enfoque integral y centrado en los derechos humanos para lograr una reparación efectiva en casos de violencia de género.

Resumen: *En el presente trabajo se abordan los desafíos que enfrenta el sistema jurídico en la reparación del daño en casos de violencia de género, analizándose las limitaciones y obstáculos que dificultan el acceso a la justicia para las víctimas, así como posibles soluciones y enfoques que pueden contribuir a una reparación más efectiva y significativa.*

Abstract: *This paper addresses the challenges faced by the legal system in repairing harm in cases of gender-based violence. It analyzes the limitations and obstacles that hinder victims' access to justice, as well as possible solutions and approaches that can contribute to a more effective and meaningful reparation.*

Palabras clave: Violencia de género, Sistema jurídico, Reparación del daño, Desafíos, Acceso a la justicia, Víctimas, Soluciones, Enfoques, Reparación efectiva, Reparación significativa.

Keywords: Gender-based violence, Legal system, Repairing harm, Challenges, Access to justice, Victims, Solutions, Approaches, Effective reparation, Meaningful reparation

1. Reparación Integral del Daño en Casos de Violencia de Género: Un Enfoque Multidimensional.

La violencia de género es una problemática global que vulnera los derechos fundamentales de millones de personas, generando un impacto profundo en sus vidas, ya que, a pesar de los esfuerzos internacionales por erradicarla, la reparación del daño en casos de violencia de género sigue siendo un desafío complejo y multifacético (Carrera, 2019).

La reparación del daño no se limita únicamente a la compensación económica, sino que también implica brindar apoyo emocional, acceso a servicios de salud física y mental, asistencia legal y medidas de protección efectivas (Pelchor-Castro, 2023).

En los casos de este tipo de violencia, la reparación del daño es crucial para:

- a) garantizar que las víctimas reciban el apoyo necesario para reconstruir sus vidas;
- b) promover una sociedad más justa, igualitaria y libre de violencia de género;
- c) reconocer y enfrentar las consecuencias físicas, psicológicas y sociales que experimentan las víctimas; y
- d) superar los efectos negativos de la violencia sufrida.

En este contexto, se refiere al conjunto de medidas y acciones destinadas a reconocer, compensar y restaurar los derechos y el bienestar de las víctimas (Guillerot, 2009), que a través de un enfoque de género, busca generar conciencia sobre la importancia de abordar la reparación del daño en casos de violencia de género desde un enfoque integral, garantizando el pleno ejercicio de los derechos de las víctimas, del modo siguiente:

1. En primer lugar, es necesario abordar integralmente las necesidades de las víctimas para ayudarles a sanar, reconstruir sus vidas y recuperar su autonomía.
2. La reparación del daño busca abordar los aspectos físicos de las víctimas, incluyendo la atención médica y la rehabilitación necesaria para tratar las lesiones y secuelas físicas causadas por la violencia.



3. Esto puede implicar el acceso a servicios de salud especializados, intervenciones quirúrgicas, terapias físicas y cualquier otro tratamiento necesario para restablecer la salud física de las víctimas.
4. Además, la reparación del daño se enfoca en los aspectos psicológicos de las víctimas, debido esto a que la violencia de género puede provocar traumas, trastornos de estrés postraumático, depresión, ansiedad y otras consecuencias psicológicas graves.
5. Por lo tanto, es fundamental brindar apoyo psicológico y terapias especializadas para ayudar a las víctimas a sanar emocionalmente y reconstruir su bienestar mental.

Asimismo, la reparación del daño aborda los aspectos sociales de las víctimas. La violencia de género puede tener un impacto significativo en las relaciones familiares, sociales y laborales de las personas afectadas, por lo que es necesario ofrecer programas de apoyo social, asesoramiento familiar y medidas para facilitar la reintegración social y laboral de las víctimas (Sandoval, 2013).

En relación a los aspectos económicos, la reparación del daño implica garantizar el acceso a recursos económicos que permitan a las víctimas reconstruir sus vidas y recuperar su autonomía financiera, lo cual puede incluir indemnizaciones económicas por los daños sufridos, asistencia para encontrar empleo o emprender proyectos productivos, y medidas para asegurar la estabilidad económica de las víctimas (Díaz, 2016).

2. Marco normativo internacional y nacional de la reparación del daño en casos de violencia de género.

El marco normativo internacional sobre la reparación del daño en casos de violencia de género está compuesto por varios tratados y acuerdos internacionales. Entre estos, la Convención sobre la Eliminación de todas las Formas de Discriminación contra la Mujer (CEDAW) y la Declaración sobre la Eliminación de la Violencia contra la Mujer son dos de los instrumentos internacionales más relevantes, que obligan a los Estados a tomar medidas efectivas para prevenir, investigar, sancionar y reparar los actos de violencia de género, lo cual incluye el reconocimiento del derecho de las víctimas a recibir una reparación integral y el acceso a mecanismos de reparación adecuados, como la restitución, rehabilitación, indemnización y garantías de no repetición (Díaz, 2016). Además, la CEDAW reconoce el derecho de las mujeres a una reparación efectiva, rehabilitación y reintegración, así como el derecho a recibir una compensación justa y adecuada por los daños sufridos (CEDAW, 1979).

En México, el marco normativo nacional sobre la reparación del daño en casos de violencia de género se basa en leyes como la Ley General de Acceso de las Mujeres a una Vida Libre de Violencia, la Ley General de Víctimas y los Códigos Penales Federal y Estatales. Estas leyes establecen mecanismos específicos para prevenir, atender, sancionar y erradicar la violencia contra las mujeres, así como garantizar la reparación integral del daño a las víctimas.

Este marco normativo se complementa con los instrumentos internacionales antes mencionados, creando un sistema integral que busca garantizar la protección y los derechos de las mujeres.

3. Perspectiva Jurídica y de Derechos Humanos de la Reparación del Daño en Casos de Violencia de Género

La reparación del daño en casos de violencia de género es un proceso intrincado que debe ser abordado desde una perspectiva jurídica y de derechos humanos (Rojas, 2019). Este enfoque garantiza el reconocimiento y la protección de los derechos de las víctimas (Rojas, 1996), a la vez que proporciona un marco para la rendición de cuentas y la justicia, bajo los siguientes principios:

Acceso a la Justicia: Este principio se refiere a la capacidad de las víctimas para buscar y obtener remedio a través del sistema legal. Las víctimas de violencia de género deben tener garantizado el acceso a mecanismos legales y judiciales efectivos, accesibles, oportunos y no discriminatorios.

Reparación Integral: Este concepto implica que la reparación debe ser completa y debe abordar todas las dimensiones del daño causado por la violencia, incluyendo física, psicológica, económica y social. Esto puede incluir servicios médicos, asesoramiento psicológico, apoyo social y asistencia legal.



No Revictimización: Este principio es esencial para garantizar que las víctimas no sean sometidas a más daño o trauma durante el proceso de reparación. Esto puede lograrse garantizando su seguridad, privacidad y confidencialidad, y evitando cualquier forma de culpabilización o estigmatización.

Enfoque Basado en los Derechos Humanos: La reparación del daño debe basarse en el respeto y la promoción de los derechos humanos de las víctimas. Esto implica reconocer y proteger sus derechos a la vida, la integridad personal, la dignidad, la igualdad y la no discriminación.

Participación de las Víctimas: Las víctimas deben estar involucradas en el proceso de reparación. Deben tener la oportunidad de expresar sus necesidades y preferencias, y tomar decisiones informadas sobre las medidas de reparación que deseen recibir.

4. Desafíos y Obstáculos en la Reparación del Daño en Casos de Violencia de Género

La reparación del daño en casos de violencia de género enfrenta varios desafíos y obstáculos (Taus, 2014). Estos pueden ser estructurales, culturales o legales, e incluyen:

- **Falta de Conciencia y Sensibilización:** La falta de comprensión sobre la violencia de género puede dificultar el acceso a la justicia y la reparación para las víctimas.
- **Estigma y Discriminación:** Las actitudes negativas hacia las víctimas pueden resultar en discriminación, lo que puede dificultar su acceso a la justicia y la reparación.
- **Barreras Económicas y Legales:** Las víctimas pueden enfrentar obstáculos económicos y legales que dificultan su acceso a la justicia y la reparación.
- **Ineficiencia del Sistema Judicial:** La falta de eficiencia y eficacia del sistema judicial puede resultar en retrasos y barreras para la justicia y la reparación.
- **Falta de Coordinación Interinstitucional:** La falta de coordinación entre las instituciones pertinentes puede dificultar la implementación de medidas de reparación efectivas.
- **Escasez de Recursos y Servicios Especializados:** La falta de recursos y servicios especializados puede limitar la capacidad de proporcionar una reparación integral a las víctimas.

Desde una perspectiva jurídica, la reparación del daño en casos de violencia de género presenta varios desafíos (Sánchez, 2017):

- **Garantizar una Reparación Integral:** La reparación debe ser proporcional a la gravedad del daño causado y a la afectación sufrida por la víctima. Esto implica garantizar que las medidas de reparación sean adecuadas, eficaces y completas.
- **Garantizar el Acceso Efectivo a la Justicia:** Las víctimas deben tener acceso efectivo a la justicia y a mecanismos de reparación. Esto implica eliminar barreras como la falta de recursos económicos, la discriminación de género, o la falta de conciencia sobre los derechos de las víctimas.
- **Adoptar un Enfoque de Género:** La reparación del daño debe tener en cuenta las desigualdades y discriminaciones estructurales que subyacen a la violencia de género. Esto implica abordar las necesidades específicas de las víctimas en términos de atención médica, apoyo psicológico, asesoramiento legal y empoderamiento económico.
- **Promover Cambios Transformadores:** La reparación del daño debe contribuir a prevenir futuras violaciones y promover cambios estructurales para erradicar la violencia de género. Esto implica abordar las causas subyacentes de la violencia, como las normas culturales y los estereotipos de género, y promover la igualdad y el respeto hacia todas las personas.

5. Implementación y Cumplimiento del Marco Normativo

En casos de violencia de género, para asegurar la efectividad del marco normativo en la reparación del daño, es imperativo su implementación y cumplimiento íntegro (Martínez, 2018).



Esto conlleva la capacitación y sensibilización adecuada de las autoridades competentes, quienes deben estar plenamente informadas acerca de las particularidades de la violencia de género y los derechos de las víctimas.

Además, es crucial garantizar un acceso efectivo a la justicia para las víctimas de violencia de género, eliminando cualquier barrera que pudiera impedir o dificultar la denuncia de actos violentos, la participación en el proceso judicial y la consecución de una reparación integral (Astelarra, 2004).

Es de igual importancia realizar un seguimiento y evaluación constante del marco normativo y su implementación. Dicha evaluación debe llevarse a cabo con un enfoque de género y derechos humanos, e incorporar la participación activa de las víctimas y las organizaciones que las representan (Fernández, 2012).

En resumen, el marco normativo proporciona una serie de herramientas legales para prevenir, sancionar y reparar la violencia de género. Sin embargo, su eficacia se encuentra intrínsecamente ligada a su correcta implementación y cumplimiento, así como al compromiso y voluntad política para garantizar los derechos de las mujeres a una vida libre de violencia y a una reparación integral en caso de ser víctimas.

6. Conclusiones

La reparación del daño en casos de violencia de género es un proceso complejo y multifacético, que requiere un enfoque integral que va más allá de la mera sanción penal y se adentra en la restauración de la dignidad, la autonomía y el bienestar de las víctimas. Este enfoque debe estar arraigado en los principios de los derechos humanos, garantizando el respeto y la protección de los derechos fundamentales de las víctimas durante todo el proceso.

Además, este proceso requiere un compromiso continuo y sostenido de todos los actores involucrados, incluyendo actores estatales como los sistemas judiciales y las instituciones gubernamentales, así como organizaciones de la sociedad civil y la comunidad en general, teniendo todos y todas un papel importante que desempeñar para garantizar que las víctimas reciban la reparación que necesitan y merecen.

Sin embargo, a pesar de este compromiso, existen desafíos y obstáculos estructurales, culturales y legales que pueden dificultar el acceso a la justicia y la reparación para las víctimas de violencia de género, que pueden incluir actitudes patriarcales arraigadas, estigmas y prejuicios, barreras legales y burocráticas, y la falta de recursos y apoyo para las víctimas. Por lo tanto, superar estos desafíos es una parte esencial del proceso de reparación que requiere esfuerzos concertados para cambiar actitudes y comportamientos culturales, reformar leyes y políticas, mejorar los sistemas judiciales y proporcionar apoyo adecuado a las víctimas.

Finalmente, es importante recordar que la reparación del daño en casos de violencia de género no es solo una cuestión de justicia, sino también una cuestión de derechos humanos, y un paso fundamental hacia la erradicación de la violencia de género y la promoción de una sociedad más igualitaria y justa.

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FIRST JUDGMENT OF THE INTERNATIONAL CRIMINAL COURT ON REPARATION TO VICTIMS: THE PROSECUTOR C. THOMAS LUBANGA DYILO CASE, AUGUST 7, 2012

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Keywords: Congo, Human Rights, Resolution.

In this presentation there will be a study on the resolution and relevant aspects of the ruling, the legal issues that arise, it is important to mention that the sociocultural context in which some people live in the regions of the Congo has generated confrontations between them, For this reason, they do not respect the human rights of anyone, especially in this case, children and adolescents, demanding that they join the fight in an arbitrary, violent and imposing manner. Regardless of the violence and crimes committed by the patriotic forces for the Liberation of the Congo, their leader being Lubanga Dyilo, in this sentence, they were only limited to the charges of recruiting, enlisting and using force against boy and girl soldiers, the who were taken from their families illegally, to fight in the Conflicts in the Democratic Republic of the Congo.



VIOLENCIA CONTRA LA MUJER: SUMATORIA DE OTRAS VIOLENCIAS ASOCIADAS

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RESUMEN

La violencia contra la mujer deja daños en la integridad personal, sin duda en el proyecto y plan de vida en el cual a raíz de la violencia hay un antes y después; sin embargo, en este tipo de violencia caracterizada por ser dos actores del hombre a la mujer, hay otras violencias que se le suman y que quedan invisibilizadas, más no los daños vividos por ellas, el presente estudio pretende identificar los otros tipos, nombrarlos y evidenciarlos para con ello poder plantear las acciones de atención, se utiliza para ello la investigación descriptiva y causal, en el relato de una participante mujer que ha vivido este tipo de violencia, se le apoya a identificar otros tipos de daños y la narración de estos. La sumatoria de violencias vividas es de al menos 4 tipos de violencia, además de la recibida por su pareja, entre ellas, violencia institucional, violencia entre mujeres (suegra y cuñadas), violencia obstétrica, violencia digital. Se aprecia que evocar, enlistar, visibilizar otras violencias, además de la recibida por quien fuera su pareja, le apoya dimensionar lo vivido e insta a dar un paso a la atención de estas, así mismo siembra retos pendientes para la prevención y erradicación.

Palabras clave: violencia contra la mujer, poliviencias, wollying, violencia digital, violencia institucional



MARCAS Y PATENTES DE LOS PUEBLOS INDÍGENAS: ENTRE LA PROTECCIÓN Y LOS DESAFÍOS CULTURALES

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Patentes, Pueblos indígenas y Propiedad Intelectual

Los pueblos indígenas, dueños de ricas tradiciones y sabiduría ancestral, se enfrentan a desafíos en la protección de sus marcas y patentes, especialmente en lo que respecta a la preservación de sus conocimientos tradicionales. A pesar de su rica herencia cultural, la globalización y los avances tecnológicos han aumentado la apropiación no autorizada de estos conocimientos, llevando a la necesidad de encontrar soluciones éticas y legales que respeten la propiedad colectiva y promuevan el desarrollo sostenible. El consentimiento informado, la participación activa de las comunidades indígenas y la búsqueda de beneficios equitativos son elementos clave en esta compleja interacción entre patentes y tradiciones culturales.

La colaboración entre los pueblos indígenas, gobiernos, organizaciones no gubernamentales y empresas es esencial para encontrar soluciones equitativas. Empoderar a las comunidades indígenas en la toma de decisiones sobre sus conocimientos y recursos es clave para garantizar que cualquier acuerdo o patente beneficie genuinamente a quienes han sido custodios de estas tradiciones.

En última instancia, la relación entre marcas, patentes y los pueblos indígenas destaca la necesidad de repensar los marcos legales y éticos. La protección de los conocimientos tradicionales debe ir más allá de las patentes convencionales y abordar las cuestiones fundamentales de la apropiación cultural y la desigualdad. En un mundo cada vez más interconectado, el respeto a la diversidad cultural y la justicia son esenciales para garantizar un equilibrio adecuado entre la protección de la propiedad intelectual y el respeto por las comunidades indígenas y sus herencias culturales.



TUBERCULOUS MENINGITIDIS CASES IN A UNIVERSITY HOSPITAL

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ABSTRACT

Mycobacterium tuberculosis complex is an acid-resistant, aerobic bacillus, an obligate human pathogen, first described by Robert Koch in 1882. It may involve many parts of the body such as the kidney, spine, brain and especially the lung. Tuberculosis meningitis (TBM) is a meningoencephalitis caused by *M. tuberculosis complex* and is the most severe form of tuberculosis infection. Lesions occur in the parenchymal tissue due to meningeal involvement, which is mostly seen in the basal part of the brain, and direct spread of the inflammatory response. It may cause vasculitis in arteries and veins. Although effective anti-tuberculosis agents are used in treatment, mortality and morbidity rates are high. Approximately half of the patients either die or face severe neurological sequelae. In addition, the mortality rate of patients with HIV-1 co-infection in TBM cases can reach 50%. Molecular methods are very important for both rapid diagnosis and development of treatment protocols. The World Health Organisation (WHO) recommends GeneXpert MTB/RIF Ultra (Cepheid, Sunnyvale, USA) as a TB diagnostic kit. However, GeneXpert sensitivity of approximately 50-70% and culture sensitivity of approximately 60% cause difficulties in identification.

Cerebrospinal Fluid (CSF) samples of 484 patients who applied to various outpatient clinics and services of Gaziantep University Şahinbey Research and Application Hospital between January 2017 and June 2023 with a preliminary diagnosis of tuberculosis meningitis were included in our study. 231 (47.7%) of these samples belonged to male patients and 253 (52.3%) belonged to female patients (Table 1). CSF samples were examined using microscopic, Polymerase Chain Reaction (PCR) and culture methods. In the cultivation stage, samples were homogenized by vortexing. 0.5 ml CSF sample was mixed with 0.8 ml PANTA Supplement and added to Middlebrook (MB) 7H9 broth medium and incubated in BACTEC MGIT 960 (BD, USA). Antibiograms were performed against Rifampicin (RIF), Streptomycin (STR), Isoniazid (INH) and Ethambutol (EMB) antibiotics (Table 2). The samples were stained with the Ehrlich Ziehl Neelsen (EZN) staining method and examined under a microscope. PCR amplification test was performed by GeneXpert PCR (Cepheid, Sunnyvale, USA) using a separate cartridge for each patient sample and the results were evaluated in accordance with the manufacturer's recommendations.



Table 1. Distribution of CSF samples according to patient gender and years

	BOS				Total
	MALE		FEMALE		
	Negative n (%)	Positive n (%)	Negative n (%)	Positive n (%)	n (%)
2017	10 (40)	1 (4)	13 (52)	1 (4)	25 (100)
2018	16 (42.1)	0 (0)	21 (55.3)	1 (2.6)	38 (100)
2019	12 (26.7)	1 (2.2)	32 (71.1)	0 (0)	45 (100)
2020	18 (43.9)	1 (2.4)	22 (53.7)	0 (0)	41 (100)
2021	15 (45.5)	0 (0)	18 (54.5)	0 (0)	33 (100)
2022	94 (48.5)	1 (0.5)	98 (50.5)	1 (0.5)	194 (100)
2023	61 (56.5)	1 (0.9)	46 (42.6)	0 (0)	108 (100)
TOPLAM	226 (46.7)	5 (1)	250 (51.7)	3 (0.6)	484 (100)

When the results are evaluated 8 (1.7%) samples were found to be positive with culture tests. All eight samples that we found positive in culture method turned out to be negative in the EZN staining method. PCR test was found to be negative in 2 of the CSF samples of 8 patients whose culture was positive. (Table 2)

False negativity found in PCR despite culture positivity shows that, contrary to popular belief, clinicians should not act only by considering the PCR result. In addition, since PCR test shows the genome of living or non-living bacteria, PCR positivity may continue in some cases even if the healing process is completed. *M. tuberculosis complex* bacilli can be found in small amounts in CSF samples. Therefore, both microscopy might be insufficient in early diagnosis. Molecular methods are important for both early diagnosis and development of treatment protocols. However, PCR test missed three TBM cases in our study. For this reason, radiological findings should be evaluated together in addition to conventional and molecular methods from a clinical perspective.

Table 2. Characteristics of tuberculous meningitis (TBM) cases

Year	Service	Gender	Age	EZN	Culture	Antibiogram				PCR	A/EX
						RIF	STR	INH	EMB		
2017	Infection	M	36	-	+	S	S	S	S	+	EX
	Infection	F	25	-	+	R	S	S	S	+	A
2018	Infection	F	36	-	+	S	S	S	S	+	A
2019	Emergency	M	25	-	+	S	S	S	S	+	A
2020	Central Laboratory	M	2	-	+	S	S	S	S	+	A
2021	-	-	-	-	-	-	-	-	-	-	A
2022	Emergency	F	63	-	+	S	S	S	S	-	EX
	Neurology	M	22	-	+	S	S	S	S	-	A
2023	Infection	M	8	-	+	S	S	S	S	+	EX

*RIF: Rifampicin, STR: Streptomycin, INH: Isoniazid, EMB: Ethambutol, A: Alive, EX: Dead, F: Female, M: Male

Keywords: *M. tuberculosis complex*, Tuberculous meningitis, CSF, MGIT 960, GeneXpert PCR



THE FLIPPED INCLUSION MODEL. A STATISTICAL ANALYSIS OF THE VALUES AND SWB OF IN-SERVICE SUPPORT TEACHERS

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ABSTRACT

Personal value priorities guide teachers' educational action, also towards the design of inclusive teaching practices (Perrin et. al, 2021). At the same time, some values - more than others - could be correlated with greater/lower levels of perceived subjective well-being (Ianniello et.al., 2022). In this regard, the present study aims to detect the value priorities of a sample of 842 in-service support teachers (M=289/F=553) and investigate their possible relationships with subjective well-being.

To detect the value priorities of the participants, the Portrait Values Questionnaire (PVQ-RR) was administered (Schwartz, 2012) and the SPSS statistical software was used for the quantitative analysis. To investigate Subjective Well-Being, the Satisfaction with Life Scale (SWLS) was administered (Diener, 2018). The results show that the value priorities of the participants are directed towards the values of Self-transcendence (=4.84), with a significant incidence towards the value of Benevolence (=4.92), and that the majority of the interviewees (84%) is placed in the bands that express life satisfaction.

The comparison of the four value dimensions (Higher Order Values) of the Portrait Values Questionnaire (PVQ-RR) with the ranges relating to the Satisfaction With Life Scale (SWLS) does not allow us to establish the calculation of correlation coefficients, but highlights how, for three dimensions values out of four (=Self-transcendence/Openness to change/Conservatism), the fourth range of responses to the PVQ-RR tends to coincide with the High Score range of the SWLS.

Starting from these results, in the educational field, we recommend the use of pedagogical models, such as Flipped Inclusion (Corona, 2017), which aim to train awareness of the importance of values and the well-being of each and every one, to support the establishment of scholastic and social inclusion processes.

Keywords: Values; Teachers' Well-Being; Inclusive Education; Special Pedagogy.



PROCEDIMIENTO ADMINISTRATIVO MIGRATORIO DE NIÑAS, NIÑOS Y ADOLESCENTES ACOMPAÑADOS Y SOLOS EN CONDICIÓN DE ESTANCIA IRREGULAR

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Fue el 25 de mayo de 2011, cuando en el Diario Oficial de la Federación se decreta y expide la Ley de Migración en los Estados Unidos Mexicanos, la cual está dirigida a regular el ingreso y salida de personas extranjeras y mexicanas, así como el tránsito y estancia de personas extranjeras en territorio mexicano. Era una ley llena de lagunas jurídicas que no alcanzaba a dimensionar los distintos ámbitos que habían de ser regulados en dicha ley, cuestiones que al pasar de los años fueron visualizadas y llevadas al congreso de la unión con el fin de observar y reformar la misma. La Ley de migración fue reformada en su artículo 112 para mejorar la protección de las niñas, niños y adolescentes migrantes (2013), el cual tenía como objetivo garantizar el trato adecuado de los mismos, en virtud de que México presenta un complejo problema como país de tránsito. Sin embargo, en la práctica esto no parecía tener mayor impacto. Fue hasta que en México se aprobó la Ley General de los Derechos de las Niñas, Niños y Adolescentes (LGDNNA) la cual en su artículo 85, párrafo segundo data de la siguiente manera:

“Niñas o niños, en ningún caso podrán ser detenidos, retenidos o privados de su libertad por la supuesta comisión o participación en un hecho que la ley señale como delito”. (LGDNNA, 2014)

Y en cumplimiento con el derecho internacional, el Reglamento de la LGDNNA (2015) en el artículo 111 menciona que en ningún momento las niñas, niños o adolescentes migrantes, independientemente de que viajen o no en compañía de una persona adulta, serán privados de la libertad en estaciones migratorias o en cualquier otro centro de detención migratoria, toda vez que esto es contrario a su Interés superior. ¿Cómo se aplica el procedimiento administrativo migratorio para los niños y adolescentes acompañados y solos en condición de estancia irregular en la ciudad de Villahermosa, Tabasco?

Palabras clave: migrantes, derechos, procedimiento, estancia irregular.



THE UTILIZATION OF MACHINE LEARNING ALGORITHMS FOR THE CATEGORIZATION OF IRIS FLOWER SPECIES: AN EXTENSIVE INVESTIGATION OF THE IRIS FLOWER DATASET

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ABSTRACT

This research mainly focuses on employing Machine Learning algorithms into real life situations in order to fabricate the concept of applying machine learning into real-life situations and problems. Machine learning algorithms can be crucial in shaping our future, as we can apply them into a wide range of fields, spanning from daily tasks that can be done with ease to sophisticated tasks that involve complex computations and planning. This research specifically focuses on Iris flowers, and distinguishing between their species using key features and characteristics in their appearance and internal structures. There are a plethora of approaches to this task, one of them being the utilization of machine learning algorithms. For instance, using logistic regression, we can train a machine learning model to differentiate between various species of Iris flowers using their key features and their specific characteristics. In this research, the logistic regression algorithm and many other algorithms are employed in order to compare the accuracies of different algorithms in classifying iris flower species. Using this information, machine learning algorithms can be distinguished and understood in a much more intricate manner, and in a much more specific way, as they will all have different accuracies, and all of their application areas can be used in different ways. According to the research, we can establish that machine learning algorithms can reach extremely high accuracies and precision rates, almost as high as a human expert in specific fields, which is a very crucial step into a new technological era where robots and software algorithms are a lot more prominent and used in a much more ubiquitous manner.

Introduction

The family Iridaceae, which includes the genus Iris, contains a vast variety of flowering plants known as the Iris flower species, commonly referred to as iris or iris plants. These plants are often cultivated for their decorative value and are noted for their abnormal, frequently vivid blossoms.

In botany and gardening, the taxonomy of iris flower species is of utmost significance. Our understanding of plant diversity, evolution, and ecological functions is deepened by this. This classification supports conservation efforts by identifying and preserving uncommon or endangered iris species. Additionally, it aids horticulturists in deciding which cultivable kinds would result in healthy and robust plants. The classification of iris species also advances scientific understanding of genetic diversity and speciation, providing insights into more general concepts of biological evolution. In essence, distinguishing between different iris flower species improves our comprehension of the natural world's complexities while also refining our knowledge of botany and acting as a vital component for preserving biodiversity. This research will be utilizing disparate Machine learning algorithms and concepts in order to achieve successful classification between different species of Iris flowers.

What is machine learning?

Something that does not occur during conventional programming is computers learning from the editing done for the code, and becoming more accurate over the several times you run your code. However, in machine learning and other contemporary ways of instructing computers to a specific task, computers



may now learn from data and make predictions or choices without explicit programming thanks to the revolutionary technique known as machine learning. It has a wide range of practical applications in fields like healthcare, banking, and transportation. It supports disease detection and medicine development in healthcare. It improves stock market forecasting and fraud detection in finance. It drives autonomous vehicles for safer and more effective transportation. Additionally, machine learning personalized streaming platform suggestions, enhances logistics in the supply chain, denotes differences between several images, and even helps with climate modeling. It is an essential tool for innovation and efficiency due to its capacity to analyze big databases and uncover insightful new information.

Research Report

Research Question: To what degree can machine learning algorithms effectively categorize Iris flower species based on the Iris Flower dataset, and what is the comparative assessment of various algorithms concerning their classification accuracy and interpretability?

Using the well-known Iris Flower dataset, the main purpose of this research investigation is to evaluate the effectiveness of machine learning algorithms in correctly recognizing Iris flower species. How well discrete machine learning algorithms can consistently carry out species classification tasks is the main topic the research seeks to answer. This study also examines the essential issue of algorithm interpretability, assessing how simple it is to comprehend and justify the choices made by these models. This study advances both the field of machine learning and botanical research by offering insightful information about the usefulness of machine learning in the real world for categorizing species and by highlighting the trade-offs involved in deciding with an algorithm based on performance and interpretability.

This question will be the main essence of this report, and throughout the research report it will be answered using a wide range of methodologies, ideas, application areas and other techniques that can be effectively utilized in these kinds of situations. This can be exemplified by modern machine learning algorithms, such as Logistic Regression.

Literature Review

Machine learning depends critically on learning and categorization, which together lay the groundwork for its operation. Algorithms are trained on data through learning to spot patterns and relationships, which enables systems to adapt and make wise judgments. A key task is classification, which divides data into predetermined groups to aid with data management and decision-making. Various machine learning applications, such as image identification and natural language processing, are supported by these methods. Machines would struggle to generalize from data without good learning and categorization, which would restrict their ability to address challenging real-world situations. Thus, the success and practical utility of machine learning systems depends on their competence in these tasks.

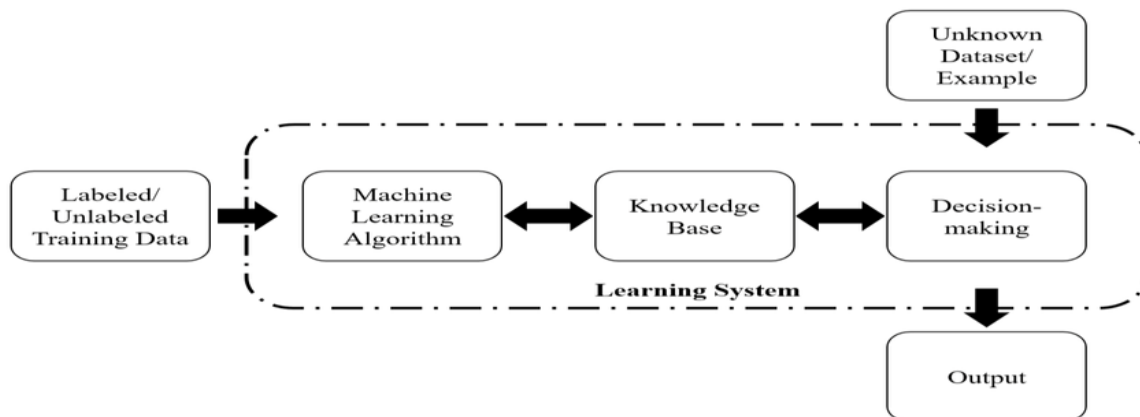


Fig 1. (Fundamental Machine Learning Configuration and System)(Kumar *A machine learning system configuration (adapted from Du and Sun, 2006 ...)*)



Despite the Iris flower dataset being one of the most famous and prominent datasets in machine learning and in computer science in general, the difference between the applications of different machine learning algorithms remains relatively unknown among the computer science and data science community. This is a relatively serious issue, as accuracy and precision is a huge part of computer science, especially in machine learning algorithms. This is because machine learning is often used for real-life applications, meaning that it has to be as precise as possible in order to yield the most accurate result as possible.

Previous Postulations, Attempts and Solutions

The classification of the Iris Flower dataset using a variety of machine learning methods has been thoroughly investigated in numerous earlier research studies, making a substantial contribution to the fields of machine learning and botanical research. These studies evaluated the accuracy of iris flower species classification using methods including k-nearest neighbors (KNN), decision trees, support vector machines (SVM), and neural networks. Additionally, researchers examined how different feature selection strategies, model hyperparameters, and data preprocessing procedures affected classification results. These research have aided in the selection of acceptable methods for classifying iris flower species and have shown important light on the strengths and limitations of algorithms. As a result, the accuracy and dependability of these classification tasks have been improved.

An example for this kind of research would be the famous study conducted by Yu Yang of the Turku University of Applied Sciences [(Yang *A study of pattern recognition of iris flower based on ... - theuseus*)]. The study employed various machine learning algorithms and variations in order to classify and distinguish between different species of Iris flowers, and also recognize additional patterns.

For different kinds of tasks, different algorithms shall be utilized. There are a lot of algorithms that are efficient for one specific task, but fail to do so in other situations. An example would be when someone wants to build a model that detects and supervises fraudulent credit card transactions. Logistic regression, for instance, may be highly inaccurate in such a situation as the dataset will be highly imbalanced, which will cause the model to have a low accuracy. This is because algorithms like Logistic Regression often tend to have a bias factor towards the most common outcome, which in this case is the non-fraudulent transactions, in order to achieve the highest accuracy possible.

There are numerous main areas where people disagree when choosing the best machine learning algorithm for categorization problems. First, there is the issue of data complexity. While some contend that uncomplicated problems may be solved by using simple methods like logistic regression or decision trees, others support the effectiveness of deep learning models even in the presence of sparse data. Second, computational resources are important, and there are issues with the effectiveness and scalability of sophisticated algorithms. Another source of dispute is interpretability; while some people emphasize accuracy over interpretability, favoring black-box models like neural networks, others prioritize regulatory compliance and favor transparent models like decision trees. The decision ultimately depends on the details of the issue, the data, and the trade-offs between interpretability, accuracy, and resource limitations.

In the end, despite there being disagreements, solutions are always present. In this case, constructing neural networks rather than using any pre-built algorithm is always the better method, as it is a lot more reliable and efficient. Neural networks require advanced computer science and machine learning knowledge, and to achieve that is not easy at all. This is why a lot of data scientists and other researchers who don't have any expertise in the field stick to using conventional algorithms, such as random forest, logistic regression, Decision trees classifier and many others. There are gaps in knowledge in every field of knowledge, including machine learning and its application areas.

Data (Information and Statistics)

This research consists of the famous Iris flower dataset, which is one of the most renowned and commonly employed datasets in machine learning, especially for beginners and amateurs. In the fields of statistics and machine learning, the Iris flower dataset is a well-known and often used dataset. Ronald A. Fisher, a British biologist and statistician, first proposed it in 1936. The setosa, versicolor, and



virginica species of iris flowers are represented in the collection along with measurements of their sepal and petal lengths and widths. It serves as a baseline for classification and clustering tasks with 150 samples, 50 of each species. It is an excellent educational tool for teaching and testing different machine learning methods, assisting researchers and students in understanding the fundamentals of data analysis and pattern recognition. This is due to its simplicity, balanced class distribution, and distinct feature differences between species.

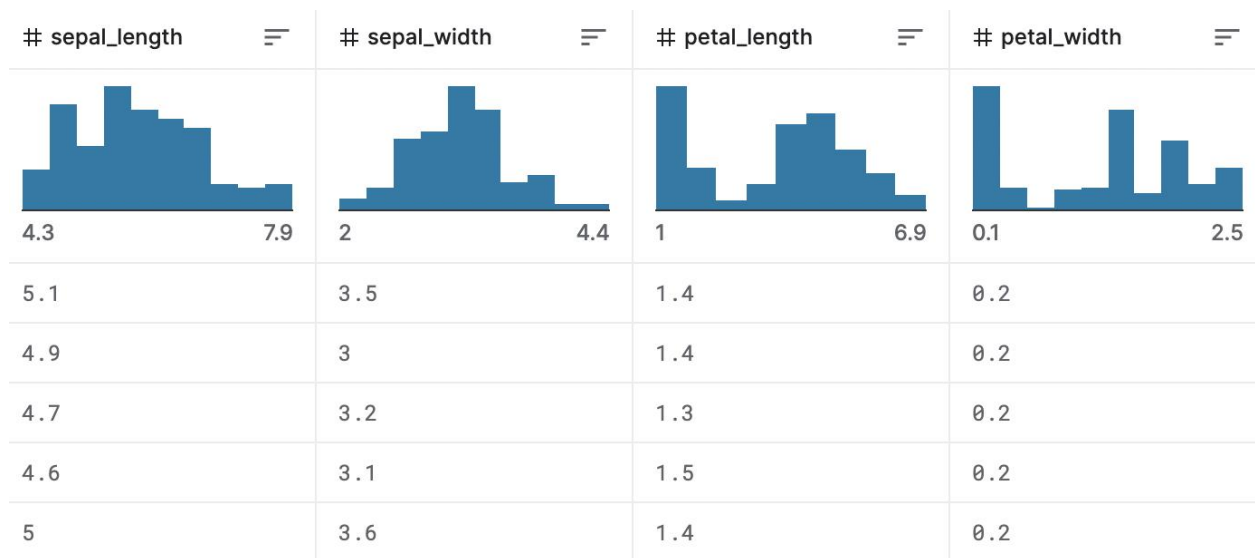


Fig 2. (Few samples from the Kaggle Iris flower dataset)("MathNerd" *Iris flower dataset, Kaggle.com*)

The code has been done using the dataset which was imported from Kaggle, consisting of 50 species and 150 different samples. ("MathNerd" *Iris flower dataset, Kaggle.com*)

Methodology

In order to successfully complete this research, the product, which in our case is the code, shall be done in an efficient and professional manner. Using Jupyter Labs, which is a platform where Data scientists can create and share documents with live code, equations, graphs, and narrative text using the open-source interactive development environment (IDE), I wrote the code and tested every line of the code, to make sure it works and runs in the way that is correct, and to test if every output of the code is desirable.

Following this, using the necessary libraries you can make your code a bit less complicated and a lot easier to follow and replicate.

The very first library that should be included in your code should be pandas. Pandas is a Python library that provides data structures and functions for effective data handling. It is used for data manipulation and analysis.

The next library will be Numpy, which is very crucial for scientific computing and data analysis and it also offers support for huge, multi-dimensional arrays and matrices as well as mathematical functions to effectively operate on them.

Following this, the next library is a Python module named Matplotlib and it can be used to produce interactive, animated, and static visualizations. It provides a variety of tools for creating plots, charts, and graphs to present data in an approachable way.

On top of Matplotlib, Seaborn is a Python data visualization library. It makes it simpler to create visually appealing and informative statistical visuals, which makes it simpler to explore and comprehend complex datasets.



Finally, the most important one out of them all, Python's Scikit-Learn, sometimes known as sklearn, is a well-liked machine learning package. For many machine learning tasks, including classification, regression, clustering, dimensionality reduction, and more, it provides a complete range of tools. For training and deploying machine learning models, Scikit-Learn offers a consistent and user-friendly interface. It covers techniques for feature selection, model evaluation, and data preprocessing. Sklearn is appropriate for a variety of applications because it supports both supervised and unsupervised learning. It is a useful tool for data scientists and machine learning practitioners to design and deploy predictive models due to its extensive documentation, robust community support, and compatibility with other Python libraries.

All of these libraries will play a significant role in the construction of the model and in the training part too, which will be explained later throughout the methodology section.

The next step is to find the Iris flower dataset, which is available online in many websites and resources. One of the most reliable resources out there for datasets and other purposes, kaggle, is a perfect option to choose from as you can import your dataset from there into Jupyter notebook, or into any other interactive coding-based notebook platform. After importing the iris flower dataset, you will begin to write your code, and import all the libraries you have downloaded.

The code can be employed with various Machine learning algorithms, such as the Logistic Regression classifier, Decision trees classifier, Random forest classifier, Naive bayes classifier, support vector machines (SVM's) or even a neural network that can be constructed and utilized for categorization and classification purposes. Also, when employing the dataset, you have to check for any null-values, as if any null-values goes unprecedented, it can cause a reduction in the accuracy and potential errors in the code which can be time-consuming to troubleshoot.

After successfully utilizing these algorithms, the models can be trained by using different values from the datasets, which is a concept from reinforcement learning. For instance, you can create two variables "X" and "Y", and after label-encoding them using the in-built function from sklearn, assign them to a value from the iris flower dataset, which in this case is the species and the petal and sepal lengths and widths. Training these models can be done manually, or in a much easier way by employing the built-in function from the Sklearn library that we have downloaded earlier.

Using matplotlib and seaborn, you can achieve different forms of graphs of the data, where it states important factors and results that have been achieved as a result of the dataset and the algorithm.

Finally, as the last step, the accuracy of the model can be tested by using the in-built function of the Sklearn library, which is the model.score function. Different accuracies will be achieved as a result of employing disparate algorithms.



Results

	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm
count	150.000000	150.000000	150.000000	150.000000
mean	5.843333	3.054000	3.758667	1.198667
std	0.828066	0.433594	1.764420	0.763161
min	4.300000	2.000000	1.000000	0.100000
25%	5.100000	2.800000	1.600000	0.300000
50%	5.800000	3.000000	4.350000	1.300000
75%	6.400000	3.300000	5.100000	1.800000
max	7.900000	4.400000	6.900000	2.500000

Fig 3. (Different parameters of the dataset, achieved using an in-built sklearn function)

The graph above displays the different parameters that can be derived from different mathematical formulas. These are also very important to confirm throughout the coding process, as you can accidentally or inadvertently employ the wrong dataset, or use the wrong libraries as a result of human error.

The next table that can be derived from the dataset values is a correlation matrix. In machine learning, a correlation matrix is a table that shows the correlation coefficients between several variables. In a dataset, it measures the magnitude and direction of linear correlations between pairs of features. There is no correlation if the value is 0, and the values range from -1 (perfectly negative correlation) to 1 (perfectly positive correlation). It aids in feature selection and understanding how many aspects interact, which is essential for activities like feature engineering, dimensionality reduction, and model development. It also helps discover which variables are closely related. In this case, if two variables have high correlation, then we can neglect one variable from those two.

	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm
SepalLengthCm	1.000000	-0.109369	0.871754	0.817954
SepalWidthCm	-0.109369	1.000000	-0.420516	-0.356544
PetalLengthCm	0.871754	-0.420516	1.000000	0.962757
PetalWidthCm	0.817954	-0.356544	0.962757	1.000000

Fig 4. (The Iris flower dataset correlation matrix with values)

Using the values from the dataset, we can see the difference in parameters for different species, especially in Iris-setosa from the other two species. This will be the case for petal length and width too, as species have different features and this is the key to classifying them using machine learning models.



These are the main aspects of results in terms of the dataset value, but after utilizing the machine learning algorithms and after training the model, the main results achieved will be the accuracy. The main purpose of this research was to compare the accuracies of models that use different machine learning algorithms, which in this case is the Random forest classifier and the Logistic Regression classifier.

```
print("Accuracy:", model.score(x_test, y_test))
```

Accuracy: 0.9777777777777777

Fig 6. (The accuracy of the logistic regression classifier algorithm, after the most efficient techniques and strategies have been employed)

```
print(metrics.classification_report(expected, predicted))
print(metrics.confusion_matrix(expected, predicted))
```

	precision	recall	f1-score	support
0	1.00	1.00	1.00	50
1	0.94	0.98	0.96	50
2	0.98	0.94	0.96	50
accuracy			0.97	150
macro avg	0.97	0.97	0.97	150
weighted avg	0.97	0.97	0.97	150

Fig 7. (The accuracy of the random forest classifier, after assigning two variables)

As you can see from the results, the accuracy for both algorithms are very high and very desirable. However, the logistic regression is a lot more stable and statistics based, and often relies on a lot of bias factors unlike the Random forest classifier. From the results, it can be understood that the random forest classifier is a lot better for other application areas other than the iris flower dataset, but the Logistic regression classifier is also highly profitable.

Conclusion and Evaluation (Discussion and Possible Limitations)

Practical and every-day implications of the results [1]

There are two different machine learning algorithms that have been employed in this complex analysis, which are the Random Forest Classifier and Logistic Regression algorithms, each of which is best suited to a particular task. As an ensemble learning technique, Random Forest integrates various decision trees to produce predictions. It can handle complex, non-linear correlations in the data and is frequently used for tasks requiring high predicted accuracy. For binary or multiclass classification, however, the simpler linear model of logistic regression is used. It is more easily interpretable and compatible for jobs where it is necessary to understand the impact of particular variables on the target variable since it predicts the probability of an outcome depending on input features. The precise qualities and objectives of the task at hand should determine which of these algorithms to use, with Random Forest excelling in predictive power and Logistic Regression in interpretability.



Potential Theoretical Implications [2]

Logistic Regression and Random Forest Classifier are two different machine learning techniques with different consequences for theory and real-world use. An ensemble technique called Random Forest combines different decision trees to create forecasts. This method excels at handling complicated, nonlinear data relationships. The Logistic Regression model, on the other hand, assumes linear relationships between the features and the target log-odds and is a linear model that estimates probabilities for binary or multiclass outcomes.

Due to the ensemble nature of the Random Forest model, where each tree captures a different component of the data, it tends to be more complex. Because it is less complicated, logistic regression uses fewer parameters. Because of this, Random Forest models frequently have lower interpretability but higher predictive power. Because it is linear, logistic regression provides more transparent insights into the impact of particular features on results. The particulars of the work at hand should determine which of these methods is used, balancing theoretical and practical concerns to maximize model performance and insight creation.

The initial hypothesis of this project was that the algorithms differed in accuracy according to different application areas, as both of these machine learning algorithms can be used in different areas of interest. According to the data and the results that have been achieved as a result of employing these machine learning algorithms into models, this hypothesis has been largely supported, as random forest was not more accurate than the logistic regression algorithm classifier, but instead it had approximately the same accuracy.

Potential Limitations

Although there are advantages, using machine learning algorithms for classification tasks, such as Logistic Regression and Random Forest, has some drawbacks. A common worry is overfitting, which occurs when models perform well on training data but badly on fresh data. Though not immune, Random Forest is less vulnerable. Logistic Regression provides distinct insights into feature influence, although Random Forest's ensemble structure can mask contributions. Interpretability varies. Models rely on accurate, representative data, so data quality is essential. Biased predictions may result from unbalanced datasets. Both methods have scaling issues, although Random Forest is worse for huge datasets. Expertise and computational resources may be needed for model selection and hyperparameter adjustment.

Summing up, the main hypothesis has been proved to be mostly true according to the experiment, and the machine learning models have been employed successfully. In the future, for potential experiments focusing on the differing accuracies of the algorithms, applying these algorithms and models into different datasets that have disparate characteristics and dimensions would be extremely helpful, as understanding for which kind of situations specific algorithms can be applied for is very useful and saves a lot of time from the decision-making process. Despite it not seeming like a major issue, in the future when machine learning algorithms are a lot more prominent and widely-used, there will be a lot of new algorithms that will be developed, and distinguishing between them is crucial.

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ANALYTICAL SIGNIFICANCE OF SPHERICAL REGULARIZED MACROCYCLIC SCHIFF BASES

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ABSTRACT

In modern times, the development of chemical analysis methods and their practical application is one of the most actual problems in all fields of science.

Schiff-based macrocyclic dibenzo-diazacrown ethers containing various analytically active and functional groups are of great importance in the practice of analytical chemistry. The synthesis of this type of crown ether is very important for the development and implementation of convenient analytical methods. Nitrogen groups contained in dibenzo-diazacrown ethers form a covalent bond with the complexing agent and permanent donor-acceptor, OH^- groups. Due to their high selectivity and sensitivity towards Me^{n+} ions, dibenzo-diazacrown ethers have a wide application field in the practice of chemical analysis as organic ligands.

In this regard, our research work aims to obtain spherical tunable macrocyclic Schiff bases (dibenzo-diazocrown ethers) by capping bisphenols with trans-1,4-dibromobutene-2 as the capping component and to study their importance in chemical analysis. The degree of purity of the obtained macrocyclic Schiff bases was studied by chromatographic analysis methods; their structures were confirmed based on IR- and PMR-spectra; and the fields of application were studied.

A common property of spherically tunable Schiff-based macrocyclic compounds is that they transit from the trans- to the cis- form and vice versa, from the cis- form to the trans- form. Using this property, we prepared an adsorbent for the concentration of Ag^+ ions in very dilute solutions by chromatographic method. In order to prepare an adsorbent from Schiff-based macrocyclic compounds, we soaked it on the surface of ACK brand silica gel and filled the received adsorbent into a quartz glass flask with a length of 1 m and a diameter of 1 cm. Then we add a very clear solution of AgNO_3 (10^{-6} mol/l) to the beaker. Thus, since the Ag^+ ion in the AgNO_3 solution is captured by the adsorbent in the column, pure water comes out of the column. After the sorption process was completed, we performed the desorption process. That is, to desorb the Ag^+ ion from the column, we irradiated the quartz glass column with UV rays. At this time, the crown passes from the trans-state to the cis-state, and the complex compound breaks down, which means that Ag^+ ions are eluted from the column with a small amount of water. With this method, we can increase the concentration of the Ag^+ ion up to 40–100 times.

In order to restore the adsorption capacity of the column, it was heated by electric current with the help of its spiral. As a result, cis-crown ether returns to the trans state and regains its adsorption capacity, which causes it to interact with the Ag^+ ion again.

These crown ethers (macrocyclic compounds) were also tested as a stationary liquid phase in the analysis of chlorinated derivatives of hydrocarbons (allyl chloride) by gas-liquid chromatography, and trace amounts of chlorosubstituted hydrocarbons in the mixture were determined. It was determined that the separation coefficient of the crown ether we synthesized is 1.5–2 times better than the previously used adsorbents in gas-liquid chromatography.

Based on the conducted experimental studies, it can be concluded that the obtained dibenzo-diazacrown ether can be successfully used for determinations in one or another field of analytical chemistry.



LOS MECANISMOS DE SOLUCIÓN DE CONTOVERSIAS EN LAS MARCAS COLECTIVAS

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RESUMEN

El presente artículo atiende los MASC en la resolución de conflictos entre titulares de marcas colectivas. Las marcas colectivas es un tipo de signo distintivo que se reconoce en las legislaciones de propiedad industrial como una categoría especial distinta a las marcas individuales; sin embargo, va a cumplir las mismas funciones que éstas. Se trata de una marca que va a servir para distinguir un origen o cualquier otra característica particular de productos o servicios que pertenecen a empresas o personas diferentes y que son usadas bajo el control de un único titular, dan referencia de que el producto que se consume cumple ciertas características de calidad, origen, material, modo de fabricación o cualquier otra característica común de productos o servicios que protegen. En ocasiones se presentan conflictos referentes a la sociedad, la marca, las reglas de uso, las buenas prácticas, entre otros asuntos, que no pueden ser resueltos por la autoridad en la materia, ya que las disputas internas son ajenas a sus facultades. Los MASC como un medio alternativo de resolución de conflictos entre los titulares de las marcas colectivas persigue acercar a las partes en conflicto para atenuar sus diferencias; de igual forma, busca con su participación propiciar el diálogo para que las partes, a través de ello, puedan encontrar una solución final a sus diferencias. Es un estudio descriptivo, transversal y observacional. El objetivo es analizar los MASC como método de resolución de conflictos en las marcas colectivas.

Palabras clave: Marca colectiva, MASC, resolución de conflictos.



RECURSOS TECNOLÓGICOS EN EL ENTORNO FORMATIVO ACTUAL DE LOS SERVICIOS PÚBLICOS

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RESUMEN

En la presente investigación se analizan los aspectos relevantes del uso de recursos tecnológicos en la formación e integración de los nuevos entornos pedagógicos para los servidores públicos, desde los enfoques socio-económico y alfabetización tecnológica. La metodología empleada, consistió en realizar una revisión documental de los 3 últimos periodos de gobiernos, para conocer los diversos planes de trabajo, proyectos, instrumentos formativos, así como los recursos tecnológicos empleados en la formación continua de los servidores públicos. Los objetivos se enfoca en conocer los alcances del uso de estos recursos tecnológicos, en plataformas, técnicas y servicios.

Palabras claves: Gobernanza electrónica, servicios ciudadanos, gobierno electrónico, digitalización, transformación digital.



PERCEPCIÓN DEL ALUMNO SOBRE LA IDENTIDAD EN LAS INSTITUCIONES UNIVERSITARIAS

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RESUMEN

Hoy en día los alumnos universitarios presentan una falta de identidad universitaria ya que se carece de participación voluntaria autores como Cabrera et al. (2012) mencionan que la apatía es un síndrome comportamental o una disfunción del proceso que origina los actos provocados por estímulos externos o por los propios; por lo tanto, la apatía se presenta cuando se alteran los sistemas que generan y que controlan la voluntad.

El presente proyecto tiene como propósito descubrir el por qué existe un desinterés de las nuevas generaciones estudiantiles por la simbología y entorno universitario.

Asimismo, esta problemática presentada es sumamente importante ya que al momento de que el alumno presente este desinterés, se perderá nuestra identidad universitaria y este será perjudicial a la misma.

La presente investigación tendrá un enfoque cuantitativo ya que se pretende medir la falta de interés estudiantil por la simbología, en este caso haciendo un énfasis en la falta de identidad Universitaria, de igual manera se busca controlar este dicho fenómeno, utilizando pruebas de hipótesis y el control de ellas, así obteniendo la generalización de resultados.

El diseño con el cual se cuenta es no experimental ya que se implementará sin manipular a el alumnado, teniendo en cuenta las consecuencias que el desinterés ha tenido sobre la cultura organizacional, no se manipularan variables ya que únicamente nos enfocaremos al alumnado universitario del ciclo escolar 2019-2023, por tal motivo esta investigación contara con un subdiseño transeccional.

El alcance dicha investigación es explicativa con una índole cuantitativa ya que se limita al análisis de establecimiento de la variable que causa el desinterés estudiantil y de que manera esta afecta la cultura organizacional de las instituciones universitarias.

Obteniendo así como resultado un acierto en la teoría de falta de interés con respecto a: 1. No se tiene una interacción constante con la cultura organizacional.

2. No sentirse identificados con la institución.

Se implementarán cursos y congresos de participación para todo el alumnado para dar a conocer toda nuestra cultura organizacional, además de implementar de manera más llamativa los congresos y reuniones post alumnos.

Palabras clave: Identidad universitaria, desinterés, alumnos, cultura organizacional.



IMPORTANCIA DE LAS ASIGNATURAS SOCIO AMBIENTALES EN LAS CARRERAS DE LA DIVISIÓN ACADÉMICA DE CIENCIAS ECONÓMICO-ADMINISTRATIVAS DE LA UNIVERSIDAD JUÁREZ AUTÓNOMA DE TABASCO EN EL 2022

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RESUMEN

Instituciones como la UNESCO, a través de sus programas, ha reconocido el grave problema del deterioro ambiental, el cual constituye uno de los mayores retos actuales de la humanidad. La educación viene a ser una herramienta fundamental en la generación de una cultura respetuosa del medio ambiente a través de la generación y construcción del conocimiento. Las Instituciones de Educación Superior (IES) no deben permanecer ajenas a la solución de la problemática ambiental, a través de sus funciones principales como la investigación y la docencia.

El objetivo de esta investigación es determinar la importancia en los planes de estudios de diversas materias cuyo impacto contribuya al perfil de egreso en cada carrera dentro de la en la DACEA-UJAT y a la solución de problemas sociales y ambientales que actualmente la sociedad requiere. Académicamente se ha implantado a la sustentabilidad, para garantizar la adopción de estrategias que les permita enfrentar dichas condiciones, mejorar su calidad de vida, y cómo enfrentarlos, entonces; el desarrollo sostenible, y la responsabilidad social serán factores determinantes para las futuras generaciones. Las materias impartidas en las distintas carreras de esta división pasaran entonces a contribuir al desarrollo sustentable y a la responsabilidad social universitaria de la UJAT.

Palabras claves: Desarrollo sostenible, educación ambiental, currícula académica, responsabilidad social universitaria



IMPACTO SOCIOECONÓMICO EN EL SECTOR PRODUCTIVO PARA EL LIDERAZGO DE ALGUNOS PAÍSES INDUSTRIALIZADOS

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RESUMEN

El interés por el tema del sector productivo surge de la apreciación de la diferencia de roles que algunas entidades cumplen en los países industrializados, respecto a los que realizan en los países de menor desarrollo, lo que guarda relación con la desigualdad que entre ambos grupos de naciones existe en cuanto al desarrollo económico y de la ciencia y la tecnología. De tal modo, los países industrializados son los líderes mundiales en esta materia, posición desde la cual han podido decidir sobre los mecanismos del mercado mundial, sobre relaciones internacionales e incluso sobre cuestiones de política interna de otros países. Mientras que los países de menor desarrollo, con retraso respecto de los países industriales, se han visto obligados a tomar medidas tendientes a reforzar su sistema científico-tecnológico, así como a promover la vinculación del sector productivo, con objeto de prepararse para responder a los desafíos de la sociedad moderna y sobre todo, para estar en condiciones de integrarse a la globalización de la economía mundial.

Los factores claves para el liderazgo de algunos países industrializados en el conjunto de países desarrollados, consisten en una mayor inversión en ciencia y tecnología y una elevada participación de la empresa privada en el proceso de innovación tecnológica. Esta situación, se presenta en el Grupo de los tres países más desarrollados (EUA, Japón y Alemania), que de acuerdo con Marcovitch (1991).

Se toma en cuenta dos factores importantes. :

- Un sistema adecuado de formación de mano de obra calificada, orientado hacia las necesidades del sector productivo.
- Un sistema adecuado para la absorción y adaptación de los conocimientos existentes en las regiones más desarrolladas.

El sector productivo consiste en una acción concertada, en la que el Estado cumple un papel importante, el cual participa como elemento integrador del proceso de vinculación (Albala, 1991). Dicho papel constituye la vía para desarrollar tecnología apropiada, a través del establecimiento de las condiciones nacionales, empresariales y universitarias idóneas, principalmente en aquellas áreas donde estratégicamente convenga y donde se tenga mayor experiencia, con el propósito de optimizar el uso de los recursos y de construir mejores condiciones de vida para la población.

Palabras clave: Liderazgo, industria, sector, sociedad.



IMPACTO DE LAS EMPRESAS FAMILIARES EN MÉXICO POR LA LLEGADA DE LA PANDEMIA “COVID-19”

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RESUMEN

Debido a la pandemia más importante mundialmente en los últimos años, Covid-19, las empresas familiares han causado un gran impacto en la economía mexicana, pues según la revista El Financiero (2022), contribuyen con al menos un 85% del PIB y representan el 90% de las unidades de negocio que hay en el país.

La finalidad de dar a conocer el papel sustancial que este tipo de empresas aportan a nuestro país. Además, de las diversas acciones que han tomado ante los desafíos derivados de la pandemia. Debido a las crisis de la Covid-19, un estimado de 1.6 millones de negocios mexicanos cerraron de forma definitiva entre octubre 2020 y julio 2021, mismo periodo en el cual surgieron 1.2 millones de establecimientos.

A pesar de ello, 72% de las empresas familiares obtuvieron progreso y crecimiento en sus ventas y un 66% mostraron un aumento en su patrimonio.

Por otro lado, ante los desafíos derivados de la pandemia, las empresas familiares han tomado diversas acciones como: Trabajo a distancia para la totalidad o parte del personal, análisis y recorte de gastos de oficina, diferimiento de pagos, en su totalidad o parcialmente, a proveedores y en pasivos por deuda, reducción o diferimiento de pagos a ejecutivos de la compañía.

Las empresas familiares enfrentan desafíos en forma constante durante su desarrollo: al inicio de la actividad, al madurar y al buscar permanecer en el tiempo.

Sin duda, hoy en día, las empresas familiares desempeñan un papel sustancial en la economía del país, y el liderazgo de sus diversas generaciones marca la pauta en la gestión resiliente de los numerosos retos que plantea la nueva realidad.

Palabras claves: Pandemia, impacto económico, empresas familiares, Covid-19, desafíos, acciones.



GOBIERNO ELECTRÓNICO DEL MUNICIPIO DEL CENTRO Y SU TRANSFORMACIÓN EN LA MEJORA DE LOS SERVICIOS PÚBLICOS

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RESUMEN

La presente revisión documental, tiene como objetivo analizar las acciones del gobierno electrónico del Municipio del Centro del Estado de Tabasco y su transformación en la mejora de los servicios públicos. La metodología utilizada consistió en establecer el diseño de un instrumento cuantitativo aplicado por Internet durante 6 meses, concentrando a una población de estudio de 1056 ciudadanos, de diversas localidades, analizando las variables de gobierno electrónico, su percepción ciudadana, y la importancia de la tecnología. Del análisis se establecieron los criterios relacionados con la transformación electrónica y de servicios hacia los ciudadanos del municipio del Centro, del Estado de Tabasco, en comparación con otros periodos de gubernamentales del mismo municipio, de acuerdo con la documentación de informes, planes y agendas digitales existentes en los últimos 5 años.

Palabras claves: Gobernanza electrónica, servicios ciudadanos, gobierno electrónico, digitalización, transformación digital.



EL APRENDIZAJE HÍBRIDO

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RESUMEN

Debido a la pandemia de SARS-CoV-2, la Organización Mundial de la Salud (OMS) mencionó en el año 2020 que el primer estudio piloto demostró que el cierre de escuelas puede reducir la transmisión comunitaria y mantener el distanciamiento social mejor que otras medidas sanitarias.

En este contexto, a lo largo del tiempo antes y después del desarrollo de la pandemia, los países han decidido adoptar etapas separadas de aislamiento y las medidas adecuadas como política nacional basada en las estadísticas obtenidas por los resultados en la búsqueda de concretar un panorama en que se redujeran las posibilidades de contagio y riesgos. Todos los países han luchado con políticas de salud, limitaciones financieras, la introducción de nuevas formas de trabajo, la adaptabilidad de los procesos tecnológicos y la adaptación de las personas al gobierno. Las actividades de toma de decisiones adoptan muchas formas, pero a pesar de estas adaptaciones, el miedo y la incertidumbre siguen desempeñando un papel importante en la salud humana. En México, que por sus características territoriales y su gran población a diferencia de muchos países latinoamericanos manifestó indicadores sumamente alarmantes desde marzo, al igual que otros países del mundo al enfrentar una temible pandemia, ha cambiado su programa de trabajo en todos los ámbitos, lo que sin duda ha afectado a muchos como la alimentación, los deportes, infraestructura, medio ambiente y sobre todo la educación, esto con base en el enfoque de brindar contenidos para la nueva forma de vida durante la pandemia y la que vendría después de ella (Hernández et al., 2021).

En los últimos años, el rápido desarrollo de la ciencia y la tecnología, estrechamente relacionada con lo cotidiano y lo no cotidiano, ha creado un torbellino de cambios sociales, culturales, políticos y económicos con la que la sociedad se ha esforzado por adaptarse progresivamente.

Definitivamente, las TIC juegan un papel importante en el proceso educativo, puesto que estimulan la práctica docente y promueven el aprendizaje significativo para enfrentar los desafíos de la sociedad del conocimiento actual. Las prácticas educativas deben cambiar para brindar a los estudiantes mejores oportunidades de aprendizaje, involucrarlos en un camino de enseñanza innovador, interactivo y motivador centrado en aprender nuevas habilidades y destrezas digitales (Demera-Zambrano et al., 2023).

Palabras clave: Tecnologías, aprendizaje, desarrollo, educación.



EL PAPEL DE LA ORIENTACIÓN AL MERCADO Y LA ORIENTACIÓN AL APRENDIZAJE A MEJORAR LA INNOVACIÓN Y EL RENDIMIENTO EN PYMES DEL SECTOR SERVICIO: CASO RESTAURANTES Y HOTELES DE LA CD. DE VILLAHERMOSA, TABASCO

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RESUMEN

La presente investigación tiene como objetivo analizar la relación entre las orientaciones al aprendizaje y su impacto en la orientación de mercado. La cual se sustenta teóricamente en teorías del comportamiento organizacional y en conceptos del marketing. El diseño de este estudio es de enfoque cuantitativo/correlacional. La población de estudio serán las pequeñas y medianas empresas del sector servicio del estado de Tabasco, el tipo de muestreo será probabilístico aleatorio, la forma de recolección de los datos a una muestra de 222 unidades empresariales por medio de encuestas aplicables a los dueños, directores o gerentes generales, para recabar la información se aplica el instrumento de orientación al aprendizaje sugerida por Baker y Sinkula, que se compone de tres subescalas: compromiso organizacional, visión compartida y mentalidad aperturista, para medir la orientación al mercado se midieron con la escala de MARKOR, que se compone de tres subescalas: la generación de inteligencia, diseminación de la inteligencia y respuesta. Se espera al finalizar la investigación obtener evidencias que permitan contractar el modelo de estudio y teórico sobre la orientación al aprendizaje, y puedan existir evidencias significativas y respaldos sólidos que nos den una visión clara sobre el grado de impacto o influencia de las variables en la orientación al mercado.

Palabras claves: orientación al mercado, orientación al aprendizaje, Pymes, sector servicio



ORIENTACIÓN AL MERCADO: APLICACIÓN DE LA ESCALA MARKOR EN MIPYMES DEL SECTOR SERVICIO DEL ESTADO DE TABASCO, MÉXICO

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RESUMEN

La presente investigación tiene como objetivo analizar el grado de orientación al mercado que tienen las MiPymes del sector hotelero en el Estado de Tabasco, México. Para lo se empleó la escala MARKOR de Jaworski & Kohli (1993) que se compone de tres subescalas: las generación de inteligencia, diseminación de la inteligencia y respuesta para medir la orientación al mercado, a partir de la adaptación de Mahmoud et al., (2016) y ÇÖMEZ y KİTAPÇI. (2016) que consta de 23 ítems. El diseño de este estudio es de enfoque cuantitativo exploratorio. La población de estudio fueron micros, pequeñas y medianas empresas del sector servicio del estado de Tabasco, el tipo de muestreo será probabilismo aleatorio, la forma de recolección de los datos a una muestra de 222 unidades empresariales por medio de encuestas aplicables a los dueños, directores o gerentes generales. La investigación comprueba que el modelo aplicado a estas empresas puede ser aplicado a mas empresas de esta rama del sector servicio de la economía mexicana. Se concluye que las empresas del sector hotelero del estado, tienen un alto grado de orientación al mercado, sin embargo, se debe trabajar en estrategias que permitan seguir elevando su nivel competitivo y productivo.

Palabras claves: *Orientación al mercado, MiPymes, sector servicio, escala MARKOR*



TECNOLOGÍA EMERGENTE DISRUPTIVAS: EL IMPACTO DE LOS CHATBOTS EN LOS NUEVOS MODELOS DE SERVICIOS

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RESUMEN

Las tecnologías de información emergente son los factores de innovación tecnológicas existentes en nuestra vida social. El impacto de los servicios de internet, la expansión y crecimiento de los dispositivos móviles y nueva realidad disruptiva tecnológica son solo algunos aspectos en la transformación digital que se vive en la sociedad actual. El uso de tecnología como los chatbots, son factores detonantes para un cambio en los servicios y la simplificación de actividades después de la pandemia del COVID-19. El presente artículo pretende analizar los principales aspectos en el uso de esta y otras tecnologías emergentes. Se diseñó un instrumento cuantitativo, aplicado en internet a una población de 1054 ciudadanos. Los resultados muestran una tendencia en el uso de las tecnologías para la simplificación de servicios, para cubrir sus principales actividades dentro del ciberespacio social postpandemia.

Palabras claves: Inteligencia del negocio, Inteligencia Artificial, Ecosistema digital, Globalización Digital, Sociedad del conocimiento.



PANORAMA DEL DESARROLLO TECNOLÓGICO EN LA REGIÓN DEL SURESTE DE MÉXICO

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RESUMEN

El uso de las tecnologías de la información, sus servicios e innovaciones, son unos de los ejes principales en la transformación social. Desde la conceptualización del desarrollo regional y la unificación de estos instrumentos, permiten sustentar algunos de los principales cambios en las estructuras de las localidades y comunidades de algunas regiones del sureste. El presente artículo, pretende mostrar un panorama general del avance tecnológico de algunas regiones del sureste de México. Se diseñó un instrumento cuantitativo, aplicado en internet a una población de 779 ciudadanos de diversas localidades, analizando aspectos que incluyen las Tecnologías de la Información, su impacto en la economía, cultura, y servicios; así como los principales retos de integración.

Palabras claves: Desarrollo Tecnológico, comunidades digitales, analfabetismo digital, cultura tecnológica, Impacto Social.



LA INTELIGENCIA ARTIFICIAL COMO HERRAMIENTA PARA LA DIGITALIZACIÓN EN EL SERVICIO DE ADMINISTRACIÓN TRIBUTARIA DE MÉXICO

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RESUMEN

En la actualidad la Inteligencia Artificial ha adquirido un papel primordial en la automatización de muchos trámites y servicios que se realizan en el Servicio de Administración Tributaria de México por lo que representa un panorama esperanzador en la recaudación de impuestos. La implementación de esta tecnología ha permitido desarrollar aplicaciones como el asistente virtual llamado Orienta SAT y la aplicación SAT ID, que han facilitado la orientación al contribuyente sin dejar atrás la lucha contra las prácticas fraudulentas. Según datos del Servicio de Administración Tributaria en el año 2023 la aplicación SAT ID se posicionó en el segundo canal de comunicación con mayor demanda con una cifra de 7 millones 657 mil 322. El objetivo del siguiente trabajo es mostrar desde una perspectiva general el impacto que tiene el uso de esta inteligencia en la administración tributaria esto mediante una metodología cualitativa en base a la revisión documental de artículos científicos y páginas oficiales. En conclusión, la utilización de las herramientas tecnológicas que ofrece el Servicio de Administración Tributaria ha mejorado los canales de comunicación para los contribuyentes y el cumplimiento de sus obligaciones, pero aún se requiere trabajar en la protección de datos ya que el marco normativo con el que cuenta el país no es suficiente en media que la inteligencia artificial cada día se presta para cometer delitos.

Palabras claves: Inteligencia Artificial, Servicio de Administración Tributaria, impuestos, contribuyente.



LAS MIPYMES EN MÉXICO Y SU BAJA COMPETITIVIDAD ESTATEGICA

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RESUMEN

Hoy en día es fácil encontrar en cada esquina una micro, pequeña y mediana empresa en México por lo que generan la mayoría de los empleos en el país y a su vez representan una gran parte de la economía, pero desafortunadamente estas se enfrentan a diferentes problemáticas que generan un alto índice de mortalidad empresarial, que muchas veces pueden ser generados por la falta de un plan de estrategias competitivas que limitan su crecimiento. En ocasiones esta causante se presenta por la falta de conocimientos o experiencia para el diseño de dichas estrategias y los procesos que se necesitan para poder lograr su efectividad. El objetivo de este documento es analizar los factores que dificultan la competitividad en este sector económico, en base a una investigación documental con información recabada de artículos científicos y páginas oficiales. En conclusión, la creación e implementación de un plan estratégico puede determinar el éxito o fracaso de una empresa sin importar su tamaño, por lo que es importante considerar los factores internos y externos que permitan brindar ventajas para ser competitivos en el mercado actual.

Palabras claves: MIPYMES, Plan de estrategias, Competitividad, mercado.



BENEFICIOS GENERADOS A COMERCIANTES POR LA CELEBRACIÓN DE TRATADOS INTERNACIONALES EN MATERIA DE COMERCIO EXTERIOR EN MÉXICO

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RESUMEN

Los tratados de libre comercio son aquellos que por medio de sus reglamentos realizan y mejoran los intercambios de productos, servicios y de una forma que busquen eliminar o disminuir los obstáculos que generan los aranceles elevados entre las partes. México actualmente cuenta con 14 tratados internacionales de libre comercio. El propósito de esta indagación documental, es identificar las principales ventajas y mejoramientos que generan la celebración de tratados de libre comercio entre México y otros países. La información procesada en esta investigación fue de manera documental, de datos recabados por las páginas oficiales del gobierno con estadísticas en materia de comercio exterior y por información ya documentada. De los resultados obtenidos que generan los tratados de libre comercio donde Mexico es parte, se pudo observar beneficios a los comerciantes en: el acceso a mercados más amplios, competitividad y acceso a una mayor diversidad de productos y servicios, eliminación de condiciones y barreras comerciales e intercambio de tecnología. Como se puede observar, la celebración de tratados en materia de comercio exterior trae consigo las oportunidades y facilidades que se le otorga aquellos comerciantes que exportan sus productos a otros países, aquellos que quieren llegar a nuevos mercados internacionales, que sus productos sean transportados de manera segura, con precios razonables y al mismo tiempo que compitan en calidad y precio frente a otras mercancías similares.

Palabras clave: Comercio exterior, Tratados internacionales, comerciantes, aranceles.



PROMOCIÓN DEL TURISMO SOSTENIBLE EN EL MUNICIPIO DE NACAJUCA, TABASCO

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RESUMEN

El municipio de Nacajuca es una de las cabeceras municipales que cuenta con una de las mayores concentraciones de población indígena que habla maya-chontal en el estado. Pero es uno de los municipios que atrae menos turismo, y tiene un alto índice de pobreza, con este proyecto se pretende difundir el turismo sostenible o turismo de naturaleza y su gran potencial de crecimiento turístico en el estado y todos sus atractivos naturales y diversidad. Difundir sus tradiciones, fiestas, sus paisajes, asimismo, realizar un análisis sobre el impacto económico que tendría este municipio de llegar a convertirse en uno de los principales destinos turísticos en Tabasco.

En la metodología se plantea realizar un estudio descriptivo del caso del municipio de Nacajuca, Tabasco que se enfoca principalmente en la recopilación, clasificación y análisis de información documental

Se ha visto que el turismo necesita una renovación urgente relacionada con la gestión y el desarrollo de las prácticas turísticas que se están llevando a cabo ya que, de no ser así, no se podrán mantener a largo plazo determinadas actividades debido a que no responden al compromiso necesario con el medio ambiente requerido actualmente y a la vez convirtiéndose en incompatible con las necesidades actuales de la demanda. Para que esto sea posible se necesita el compromiso de todas las instituciones involucradas en la gestión de las actividades y la concienciación colectiva para que el turismo continúe siendo un factor relevante dentro de la economía. Con la participación de las diferentes entidades locales, del Municipio de Nacajuca, se puede conseguir fomentar el turismo sostenible.

Palabras clave: Difusión, turismo sostenible.



DIGITALIZACIÓN EN LA AUDITORÍA CONTABLE

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RESUMEN

La digitalización ha permeado en prácticamente todos los ámbitos de la vida cotidiana y profesional, llevando consigo grandes ventajas, pero también desafíos; a su vez está cambiando la manera de hacer negocios, por lo que las organizaciones tienen que adaptarse a cambios que impacta en lo operativo y estratégico.

El ámbito de la auditoría contable no es la excepción, ya que unas de las facetas de la digitalización en la auditoría contable es la automatización de procesos, con tareas que restaban tiempo; así la auditoría contable está siendo transformada por la tecnología; Sin embargo, un factor relevante para lograr una adaptación digital exitosa en este entorno tan veloz es tener a la gente adecuada con las capacidades necesarias para generar valor dentro de la organización, sin olvidar que todo esto va ligado a la ética en el uso de información.

Unos de los puntos sería Evaluar el impacto de la digitalización en la precisión, eficiencia y confiabilidad de los procesos de auditoría, pues la Inteligencia Artificial permitirá a los auditores contables anticipar riesgos y problemas mediante el análisis de patrones y tendencias; y permitiría identificar posibles áreas de preocupación antes de que se conviertan en problemas significativos, permitiendo una toma de decisiones más proactiva.

También ver las Perspectivas sobre las áreas de la auditoría contable que se han beneficiado más de la digitalización e Identificar las principales herramientas y plataformas tecnológicas que están siendo utilizadas en la auditoría contable para beneficio y logros de objetivos de la organización pues estos serán la claves para seguir mejorando continuamente.

Palabras claves: digitalización, auditoría contable, ética, organizaciones.



EDUCACIÓN FINANCIERA PARA DISMINUIR EL DESEMPLEO EN MÉXICO

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RESUMEN

La educación financiera puede desempeñar un papel clave en la reducción del desempleo al preparar a los individuos con las habilidades financieras que les permita tomar decisiones más informadas sobre su carrera y finanzas personales. Esta es una investigación de carácter documental para encontrar la relación entre educación financiera y el desempleo en México. En los aspectos investigados a tomar en cuenta se tiene a la planificación financiera; donde es fundamental el desarrollo de dicha habilidad para ayudar a las personas a plantear objetivos a corto y largo plazo, también tenemos el ahorro de manera efectiva y la gestión adecuada de los recursos. Otro aspecto en el estudio son las iniciativas gubernamentales y empresariales, donde las campañas y programas de educación financieras respaldados por el gobierno dan herramientas efectivas para mejorar la preparación financiera de la población activa otorgando herramientas para la gestión del dinero y la capacidad de adaptación en periodos de desempleo. También tenemos el desarrollo de habilidades blandas ya que también es necesario el desarrollo de habilidades para la toma de decisiones, la resiliencia, y la adaptabilidad que son necesarios en el mercado laboral cambiante. Por otra parte también es importante la formación para el emprendimiento, la educación financiera puede incluir aspectos relacionados con el emprendimiento manifestando habilidades para iniciar y gestionar negocios propios que es una alternativa viable frente al desempleo. En conclusión, es importante destacar el impacto de la educación financiera para fomentar su implementación y participación, además, la efectividad de estos aspectos claves están sujetos a la adaptabilidad de las condiciones cambiantes del mercado laboral y económico.

Palabras claves: Educación financiera, desempleo, emprendimiento, México.



EFFECTOS NEGATIVOS EN LA SALUD HUMANA RELACIONADOS CON LA EXPOSICIÓN A LOS CONTAMINANTES ATMOSFÉRICOS

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RESUMEN

Existen estudios que evidencian los efectos adversos en la salud humana en relación con la exposición a los contaminantes atmosféricos. Estos estudios epidemiológicos han permitido asociar los cambios en la concentración de estos contaminantes con riesgos para la salud.

En estos efectos se pueden considerar los incrementos de enfermedades respiratorias y cardiovasculares, de mortalidad prematura, el aumento de incapacidades y días de trabajo perdidos. Estos impactos en la salud resultado de la exposición a la contaminación del aire no solo merman la calidad de vida, sino que también tienen efectos en el ámbito económico del individuo y en la sociedad en general.

Ante esta situación, las autoridades se han visto obligadas a tomar decisiones para prevenir y controlar la contaminación atmosférica. Para mejorar la calidad del aire de una región determinada se requiere, de la identificación de las principales fuentes de emisión de contaminantes, cuantificar sus emisiones y determinar si éstas están causando deterioro de la calidad del aire y efectos en la salud de la población. Es igualmente necesario conocer las principales características socioeconómicas y fisiográficas de la región, con el fin de diseñar estrategias de política ambiental que permitan modificar actividades y actitudes con el apoyo de los diversos sectores económicos, sociales y gubernamentales.

Se debe buscar reducir la emisión de contaminantes a la atmósfera y con ello proteger la salud de la población en el Estado. Esto siempre y cuando se tenga la participación de las autoridades ambientales municipales, estatales y federales, así como del sector económico local, miembros de la academia y organizaciones de la sociedad civil, con el fin de establecer una nueva normatividad en la materia.

Palabras clave: Salud humana, contaminantes atmosféricos, calidad del aire.



FACTIBILIDAD DE LAS COOPERATIVAS ACUÍCOLAS EN TABASCO

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RESUMEN

El desarrollo de las cooperativas acuícolas en tabasco, como medio de producción y sustitución se encuentra ante la adversidad, ya que las tendencias en la producción indican que esta actividad continuará creciendo, considerando que las pesquerías acuícolas se encuentran en explotación y en máximo esfuerzo; ya que se desarrollan en diversos cultivos ya sea de agua salada o dulce, y que es un sector primario productor de alimentos con mayor desarrollo. bajo condiciones totalmente controladas y al cuidado.

Estos son unos de los factores con lo que no cuentan estas cooperativas más que su vasta experiencia y una alianza de costumbres familiares con la que mayormente están compuestas; y no con la formación especializada, o la guía de expertos, esta sería una de las acciones específicas para seguir capacitando a los productores y técnicos que llevan a cabo esta actividad; ya que en la actualidad, el mayor reto que pueden enfrentar esta industria acuícola son las enfermedades de origen bacteriano debido a varios factores, estas enfermedades pueden ocasionar pérdidas de cultivos parciales y totales, así como pérdidas de empleos e ingresos económicos; ya que las cooperativas son el pilar que contribuye a la seguridad alimentaria, pero también refuerzan la posición negociadora frente a los mercados, dando mejor acceso a la infraestructura y a los procesos que aumentan la productividad acuícola.

Esta actividad contribuye al crecimiento y estabilidad del sistema alimentario, ayuda a la conservación de especies acuáticas y promueve la disminución de impactos ambientales que es lo que actualmente sucede en Tabasco.

Palabras claves: factibilidad, acuícolas, cooperativa, ambiental.



¿SABES QUE ES EL FOBAPROA? EFECTOS EN LA ECONOMÍA MEXICANA DESPUÉS DE 29 AÑOS DE SU ACTIVACIÓN

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RESUMEN

El Fondo Bancario de Protección al Ahorro (FOBAPROA) fue un fondo de contingencia creado en 1990 por el gobierno mexicano. Se activó hasta 1995. La presente investigación es de carácter cualitativo que reúne información de artículos, libros, periódicos digitales entre otros, con el objeto de analizar y dar a conocer a los jóvenes lectores del siglo XXI el tema del FOBAPROA, efectos e impacto económico en la economía mexicana a 29 años de su activación. Fue un esquema que estaba diseñado para funcionar como un seguro para los depósitos bancarios de los ahorradores. Tras la crisis económica conocida como “error de diciembre” en 1994, el gobierno de Ernesto Zedillo (1994-2000) utilizó el fondo para devolver solvencia a los bancos y, por ende, proteger el ahorro de los clientes en contra de la quiebra. En octubre de 1994 se produjo un derrumbe de reservas internacionales que provocó una crisis económica que afectó gravemente la economía de los mexicanos, la mala gestión económica internacional, sumada a acontecimientos políticos internos, detonó el llamado “error de diciembre”, en el que en el ámbito financiero nacional provocó la crisis de la banca y una de las peores crisis económicas que ha vivido el pueblo de México. Los pequeños y medianos empresarios tuvieron que hipotecar sus propiedades para pagar deudas. En Tabasco, las protestas contra el gobierno y contra la “banca usurera” se incrementan. Amalia Ocampo, señaló que unos 25,000 usuarios, de todas las ramas productivas de Tabasco, tienen problemas de cartera vencida. Según el Centro Bancario de Villahermosa, la cartera vencida en la entidad asciende a 700 millones de nuevos pesos. En 1995 la cartera vencida se multiplicó del 15 al 44 %, se incrementó el servicio a la deuda externa de los bancos por la devaluación y para el 2020, la deuda del FOBAPROA equivalía a más de 1.8 billones de pesos, es decir 10% del Producto Interno Bruto (PIB) de ese año.

Palabras Claves: FOBAPROA, Devaluación, Hipoteca, Economía.



IMPACTO ECONÓMICO AMBIENTAL DEL PROGRAMA SEMBRANDO VIDA EN TABASCO

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RESUMEN

Sembrando Vida es un programa del Gobierno de México con la finalidad de aportar a la conveniencia social de sembradores por medio del estímulo de la autosuficiencia alimentaria con actividades que beneficien la edificación de la estructura social y del rescate del medio ambiente, mediante la puesta en marcha de parcelas con sistemas productivos agroforestales. El objetivo de esta investigación fue conocer el impacto que genera este programa en la economía de los productores y el impacto positivo del medio ambiente del estado de Tabasco. La información obtenida se analizó por medio de la indagación documental, principalmente de la del gobierno de México y algunas entrevistas de productores, así como datos ya documentados. Actualmente el estado de Tabasco es uno de los 21 estados miembros del programa federal con apoyo económico mensual de \$ 6,250.00 pesos por cada productor que cumpla con los criterios para recibir el apoyo, que son: Ser sujeto agrario que habite en algún municipio o localidad con rezago social, ser mayor de edad, tener disponibles 2.5 hectáreas para trabajar en un proyecto agroforestal (se debe acreditar la propiedad o posesión), aceptar el cumplimiento de todas las disposiciones legales aplicables, identificación oficial vigente en original y copia. De esta manera el productor podrá ser participante del programa y así ser acreedor a los beneficios económicos que les serán otorgados, de la misma manera que su aportación al medio ambiente será significativa.

Palabras clave: Impacto Económico-Ambiental, Sembrando Vida, Gobierno de México, Autosuficiencia Alimentaria.



IMPACTO ECONÓMICO DEL NEARSHORING EN EL SURESTE DE MÉXICO

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RESUMEN

El Nearshoring es el proceso en el cual las empresas trasladan parte de sus operaciones o servicios a países cercanos. Esta es una investigación documental para analizar el impacto económico del Nearshoring. Para el caso de México algunos de los aspectos claves del crecimiento económico son donde el Nearshoring ha contribuido al crecimiento de México es al traer inversión extranjera y crear nuevas fuentes de empleo. Un aspecto clave son que las empresas se benefician de costos laborales más bajos en comparación de los países desarrollados, lo que incentiva a la inversión extranjera directa. Otro aspecto son los desafíos laborales y sociales porque el Nearshoring generará empleo, aunque hay críticas acerca de las condiciones laborales, salarios y derechos laborales ya que se encontró algunos estudios la necesidad de abordar esos desafíos para tener el impacto positivo y sostenible. También se encuentra la cadena de suministro, que se debe de adaptar para buscar una mayor proximidad y agilidad en el contexto del mundo post COVID-19 ya que esta demostró la necesidad de una cadena de suministro más resiliente. Al final la competitividad regional debe de posicionarse como un destino atractivo para el Nearshoring compitiendo con otros países de la región, la infraestructura, estabilidad política y las reformas económicas son factores que han influido en la competitividad de México en este contexto. Se concluye que México debe de tomar todas las medidas posibles antes mencionadas para ser un destino atractivo para el Nearshoring y a la vez se pueda disfrutar de todos esos beneficios económicos aprovechando esta inversión extranjera.

Palabras claves: Nearshoring, Crecimiento económico, Inversión extranjera, Competitividad regional, México.



MÉXICO Y TRATADO DE LIBRE COMERCIO DE AMÉRICA DEL NORTE (TLCAN). EL IMPACTO EN LA ECONOMÍA MEXICANA DE LA MICROEMPRESA

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RESUMEN

El TLCAN (Tratado de Libre Comercio de América del Norte) es un acuerdo en el que se establecieron reglas para el comercio internacional y las inversiones. El Tratado de Libre Comercio de América del Norte se firmó en diciembre de 1992 entre México, Estados Unidos de América EUA, y Canadá, particularmente por los Presidentes: Carlos Salinas de Gortari de México (precursor del TLCAN), George Bush de Estados Unidos y Brian Mulroney de Canadá. Se realizó este trabajo gracias a la recopilación de información de artículos y periódicos digitales, realizada por investigadoras e investigadores, con el propósito de analizar la situación histórica-económica que existía en la década de los noventa en relación con la microempresa de aquel entonces. Desde su entrada en vigor en 1994, el Tratado de Libre Comercio de América del Norte (TLCAN), fue visto con cierta duda. Es acuerdo entre países desarrollados como Canadá y Estados Unidos representaba un reto para México, como país en vías de desarrollo. Aquel 1 de enero cuando entró en vigor hubo confusión en el aeropuerto de la Ciudad de México. Solo unas cartulinas pegadas en las paredes informaban sobre los nuevos aranceles que Hacienda ordenó. Lo presentaron como “la entrada triunfal a la modernidad” aunque para muchos significó pérdida de pequeñas y medianas empresas, empleos, afectación al sector primario y atraso en la economía del país. También se alertó sobre las desventajas de entrar al TLCAN sin modernizar al sector secundario: “Enrique Zambrano, presidente de la Cámara de la Industria de la Transformación, manifestó que más del 50% de las empresas mexicanas desaparecerán. Entre 1990 y 2008 la tasa de informalidad se duplicó, de 18.9 a 43.7%. Estas cifras disimulan el desempleo y el subempleo, consecuencias previsibles del fin de la reforma agraria y del ejido, de las privatizaciones y la bancarrota de empresas provocadas por la competencia externa. Actualmente México cuenta con 14 tratados comerciales internacionales vigentes, siendo el firmado con EEUU y Canadá el más amplio y antiguo. A la fecha la renovación del tratado de libre comercio entre US Estados Unidos, CA Canadá, MX México, claro con nuevas reglas.

Palabras Claves: TLCAN, Microempresa, Internacional, Economía.



CONOCIMIENTO SOBRE UMBRALES DE IDENTIFICACIÓN DE LAVADO DE DINERO

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RESUMEN

Conforme al Instituto Mexicano de Contadores Públicos el umbral de identificación se interpreta como el importe que la ley establece para que los Sujetos Obligados (SO) cumplan con las demás responsabilidades contenidas en la Ley Federal para la Prevención de Operaciones con Recursos de Procedencia Ilícita (LFPIORPI).

Los umbrales señalan los montos de operación a partir de los cuales, una empresa puede identificar (umbral de identificación) y dar aviso (umbral de aviso) a la autoridad sobre una actividad sospechosa.

La LFPIORPI facilita una lista sobre las actividades que se consideran vulnerables, así como los montos que exceden la cantidad establecida en la ley, calculados en Unidad de Medida y Actualización (UMA).

Aunque una organización desconozca que ha sido parte de un proceso de “blanqueo de capitales”, no se exime de su responsabilidad y podría ser acreedora a multas que van de entre 12 mil a los 4 millones de pesos, por la omisión de avisar a la autoridad correspondiente al detectar alguna actividad sospechosa.

Actividades ilícitas como el lavado de dinero se van adaptando a las nuevas tecnologías, lo cual complican en demasía su detección. Estas prácticas representan un desafío para las autoridades y obstaculizan la investigación y persecución del lavado de dinero en México. Es fundamental que las empresas realicen esfuerzos adicionales para prevenir su implicación en una cadena de lavado de dinero.

Palabras clave: umbral, omisión



MEDIDAS DE ACCIÓN DE UNA EMPRESA ANTE UMBRALES DE IDENTIFICACIÓN DE LAVADO DE DINERO

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RESUMEN

El lavado de dinero, o blanqueo de capitales, como se conoce comúnmente, es un delito que consiste en ocultar el origen ilegal de recursos provenientes de actividades ilícitas, tales como el narcotráfico, contrabando, fraudes y extorsiones, entre otros.

La Ley Federal para la Prevención de Operaciones con Recursos de Procedencia Ilícita (LFPIORPI) precisa los montos a partir de los cuales, las empresas pueden identificar las operaciones ilícitas y dar el aviso correspondiente a la autoridad, de este modo prevenir que se le implique en dichos delitos.

Dentro de las medidas de acción que toda organización debe implementar ante una alerta de lavado de dinero, es que deben mantener un protocolo de acción para generar expedientes sobre los clientes y dar los avisos correspondientes a la Secretaría de Hacienda y Crédito Público (SHCP) cuando detecten operaciones inusuales,

Se establece en la ley que, “cuando el sujeto obligado tiene sospecha de que el cliente pudiere estar utilizando el negocio como táctica para blanquear activos, tiene que informarle a la autoridad en un término de 24 horas a partir de que conozca dicha información”.

La Ley Antilavado impone multas a quienes incumplan con identificar clientes, presentar avisos en tiempo y forma, no atiendan los requerimientos de la SHCP, o incumplan la forma en que se paguen las obligaciones (fedatarios públicos)

Palabras clave: umbral, medidas de acción,



PARTICIPACIÓN DE LAS PYMES EN EL COMERCIO EXTERIOR, UNA APORTACIÓN A LA ECONOMÍA INCLUSIVA

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RESUMEN

Las pequeñas y medianas empresas (Pymes) representan un componente esencial de la economía mundial, desempeñando un papel de vital importancia en el tejido económico de cualquier país. A medida que el entorno empresarial se globaliza, estas empresas desempeñan un papel crucial en la expansión de las actividades comerciales más allá de las fronteras nacionales, afectando directamente la economía global y local. Su participación en el comercio exterior ha sido un tema de debate y estudio, especialmente su impacto en la economía inclusiva.

El presente artículo de investigación busca analizar la participación de las pequeñas y medianas empresas en el comercio exterior y su contribución a la economía inclusiva, examinando la literatura existente y proporcionando una visión más detallada acerca de la participación de las Pymes en el comercio internacional.

Esta investigación se desarrolla a través de un enfoque documental cualitativo, utilizando fuentes primarias y secundarias. Se realizaron búsquedas en bases de datos académicas, informes gubernamentales y documentos de organismos internacionales, abordando la importancia de las Pymes en las transacciones internacionales, explorando como su participación puede contribuir a una economía más inclusiva, se analizan las oportunidades y los desafíos regulatorios y restricciones financieras que afectan a estas empresas en México y que limitan su participación efectiva en el comercio internacional.

Palabras clave: Pymes, Comercio Exterior, Economía inclusiva, Entorno empresarial.



USO DEL BLOCKCHAIN EN LA CONTABILIDAD COMO HERRAMIENTA PARA LA PREVENCIÓN Y DISMINUCIÓN DEL FRAUDE

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RESUMEN

En la actualidad, con temas más inmersos en la digitalización y sistematización de procesos, la contabilidad se encuentra en medio de una revolución impulsada por la tecnología blockchain. Este innovador enfoque ha demostrado ser más que una simple base para criptomonedas sino que tiene una adaptabilidad en muchas otras ramas y una de ellas es la contabilidad. Al proporcionar una plataforma segura, transparente y descentralizada para el registro y verificación de transacciones financieras.

A través de una investigación documental con enfoque cualitativo, Este artículo explora como el blockchain está transformando la contabilidad, mejorando la confianza, eficiencia e integridad de los datos financieros, destacando su potencial como herramienta innovadora para prevenir y reducir el fraude financiero. A medida que las tecnologías emergentes transforman las prácticas contables, el blockchain se presenta como una solución segura que puede revolucionar la forma en que se gestionan los registros financieros.

Esta investigación también muestra el estudio de casos reales de algunas empresas que han adoptado con éxito esta herramienta en sus sistemas contables, destacando la mejora en la seguridad y la reducción de actividades fraudulentas.

Palabras clave: Blockchain, contabilidad, fraude financiero, digitalización.



¿CÓMO ROMPER EL CICLO DEL MALTRATO INFANTIL? ESTRATEGIAS PARA PROTEGER A LOS NIÑOS Y PROMOVER SU BIENESTAR

HOW TO BREAK THE CYCLE OF CHILD ABUSE? STRATEGIES TO PROTECT CHILDREN AND PROMOTE THEIR WELL-BEING

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RESUMEN

El maltrato infantil es un problema grave que puede tener consecuencias devastadoras para el bienestar y el desarrollo de los niños. Para romper el ciclo del maltrato infantil, es necesario implementar diversas estrategias que aborden tanto la prevención como la intervención. Estas estrategias incluyen la educación y la sensibilización sobre el maltrato infantil, la promoción de entornos familiares seguros y amorosos, la capacitación de profesionales para identificar y responder al maltrato, la intervención temprana para brindar apoyo a las familias en riesgo, y el acceso a servicios de apoyo y tratamiento para las víctimas de maltrato. Al abordar el maltrato infantil de manera integral y colaborativa, podemos trabajar hacia la protección de los niños y la promoción de su bienestar.

Palabras clave: maltrato infantil, ciclo, estrategias, prevención, intervención, educación, sensibilización, entornos familiares, capacitación, identificación, respuesta, intervención temprana, apoyo, servicios, bienestar.

ABSTRACT

Child abuse is a serious problem that can have devastating consequences for children's well-being and development. To break the cycle of child abuse, it is necessary to implement various strategies that address both prevention and intervention. These strategies include education and awareness about child maltreatment, promoting safe and loving family environments, training professionals to identify and respond to maltreatment, early intervention to provide support to at-risk families, and access to services, support and treatment for victims of abuse. By addressing child maltreatment in a comprehensive and collaborative manner, we can work toward protecting children and promoting their well-being.

Keywords: child abuse, cycle, strategies, prevention, intervention, education, awareness, family environments, training, identification, response, early intervention, support, services, well-being.



INTRODUCCION

El maltrato infantil es una forma de violencia que afecta a niños y adolescentes menores de 18 años, y que puede manifestarse de diversas maneras, como abuso físico, sexual, psicológico o emocional, o como desatención de sus necesidades básicas. El maltrato infantil no solo causa daño físico y emocional a las víctimas, sino que también tiene consecuencias negativas para la familia, la comunidad y la sociedad en general, por lo que se considera un problema de salud pública a nivel mundial (OMS, 2022).

El maltrato infantil puede tener diversas causas, que varían según el país y la cultura, pero que suelen estar relacionadas con la violencia, la falta de afecto y el descuido de los padres o cuidadores hacia los niños. Algunos factores que pueden favorecer el maltrato infantil son la pobreza, la migración, la deserción escolar, el estrés, el consumo de alcohol o drogas, o la falta de educación o información sobre el desarrollo y la salud de los niños.

El maltrato infantil es una práctica muy común en el mundo desde tiempos muy remotos, desde México hasta en el resto del mundo. Pues en México es algo tan común que muchas de las veces lo vemos como algo normal pero que a la larga y si analizamos a profundidad los niños que sufren de un maltrato en casa suelen ser adultos con traumas. La Asociación Profesional Americana define el Abuso Infantil como *“un patrón repetido o un incidente extremo de rechazo, aterrorizar, aislamiento, explotación/corrupción, ignorar o negligencia hacia la salud mental, médica o educativa del niño”* (Arruabarrena, 2011), desde un punto de vista personal el niño que es maltratado es un niño que cambia de aptitudes, su forma de pensar, de ser y de actuar, como bien sabemos el maltrato puede ser de diversos tipos y la que más destaca podría ser el maltrato psicológico, ya que con pequeños comentarios que hacen los integrantes de la familia hacia el menor, suelen afectarle aunque no parezca o el adulto no lo perciba. En términos psicológicos es una patología del comportamiento. En términos jurídicos, señala que es un comportamiento delictivo o criminal que debe ser definido y sancionado legalmente. Sociológicamente es un problema y un fenómeno social y en términos morales o éticos, un problema de violación de derechos. (Cabral, 2014).

Eso puede ser detonante para que el menor se sienta menos o que no cuenta con capacidad para hacer cosas. Es inaceptable que los niños sean víctimas de abuso físico, emocional o sexual, y es nuestra responsabilidad como individuos y como comunidad trabajar juntos para prevenirlo y detenerlo. Para ello debemos implementar estrategias en donde podamos evitar tales abusos con los menores, es una lucha constante la cual debemos de algún modo propiciar a terminar con esa dificultad que tienen los menores

El maltrato infantil es un problema global que puede causar un daño potencial a la salud física y mental de quien lo padece. Según (Monjarás Rodríguez, M. T. (2023). Prevención del maltrato infantil: un enfoque multisectorial. UNAM), este problema se presenta en diversas formas, incluyendo el abuso físico, el abuso sexual, el abuso emocional y la negligencia.

Estos tipos de maltrato tienen características distintas y pueden tener efectos diferentes en los niños y adolescentes. Por ejemplo, el abuso físico se refiere a cualquier acto de violencia que cause daño físico al niño, mientras que el abuso sexual implica cualquier actividad sexual entre un adulto y un niño. El abuso emocional puede incluir actos como insultar, humillar, amenazar o ignorar al niño, y la negligencia se refiere a la falta de atención a las necesidades básicas del niño, como la alimentación, la educación y la atención médica.

Las causas del maltrato infantil son multifactoriales y pueden incluir factores individuales, familiares y sociales. Los factores individuales pueden incluir el estrés parental, la salud mental de los padres y el abuso de sustancias. Los factores familiares pueden incluir la violencia doméstica, la pobreza y la falta de apoyo social. Los factores sociales pueden incluir la desigualdad social, la falta de políticas de protección infantil y la aceptación cultural de la violencia contra los niños.

Los efectos del maltrato infantil en los niños y adolescentes pueden ser devastadores. Pueden incluir problemas de salud física, como lesiones y enfermedades crónicas, problemas de salud mental, como



depresión y ansiedad, dificultades académicas, como bajo rendimiento y abandono escolar, y problemas de comportamiento, como agresión y delincuencia.

Este análisis se sustenta en la teoría del apego, que sostiene que los niños desarrollan un sentido de seguridad y confianza a través de sus relaciones con sus cuidadores. (Bowlby, J. (1969). Attachment and loss: Vol. 1. Attachment. Basic Books) Cuando estos cuidadores son abusivos o negligentes, puede afectar negativamente el desarrollo del niño y su capacidad para formar relaciones saludables en el futuro (Bowlby, 1969).

La Voz de la Niñez: Un Estudio sobre la Percepción del Maltrato Infantil

En primer lugar, encontramos que el maltrato infantil es un problema prevalente y grave. Según un estudio realizado por (Tovar Domínguez et al. 2016, El maltrato infantil desde la voz de la niñez. Revista mexicana de ciencias agrícolas), el maltrato infantil es un problema de salud pública a nivel mundial¹. En su estudio, aplicaron un cuestionario a 1,506 niños de educación primaria en 17 comunidades y encontraron que los niños solo perciben como maltrato una acción cuando ésta les causa daño grave a nivel físico, psicológico y emocional.

Por ejemplo, un niño podría no reconocer como maltrato una acción que le cause un daño físico leve, como un empujón o un pellizco. Sin embargo, sí reconocería como maltrato una acción que le cause un daño físico grave, como un golpe fuerte o una quemadura.

En el caso del maltrato emocional, un niño podría no reconocer como maltrato una acción que le cause un daño emocional leve, como un comentario despectivo ocasional. Sin embargo, sí reconocería como maltrato una acción que le cause un daño emocional grave, como insultos constantes o humillaciones.

Estos hallazgos son importantes porque sugieren que muchos niños pueden no estar informando sobre el maltrato a menos que sea extremadamente grave. Esto puede dificultar la detección temprana y la intervención en casos de maltrato infantil.

Posibles soluciones

- Desarrollar un estatuto de seguridad en la escuela o crear una cadena con promesas de papel para promover la seguridad¹. Esta es una forma de involucrar a los estudiantes, los maestros y los padres en la creación de un ambiente escolar libre de violencia, donde se respeten los derechos y las opiniones de todos. La cadena con promesas de papel consiste en que cada persona escriba en un papel una promesa de cómo va a contribuir a la seguridad de la escuela, y luego se unan los papeles para formar una cadena que se cuelgue en un lugar visible.
- Crear un mapa de la comunidad y un plan de acción. Esta es una forma de conocer y mejorar el entorno donde viven los niños y adolescentes, y de fomentar su participación ciudadana. El mapa de la comunidad consiste en que los niños y adolescentes dibujen o representen con materiales reciclados los lugares más importantes de su comunidad, como la escuela, el parque, la tienda, etc. Luego, se identifican los lugares o situaciones que pueden generar violencia o inseguridad, y se proponen soluciones con la ayuda de los adultos. El plan de acción consiste en definir las acciones que se van a tomar para mejorar la comunidad, asignar responsables y plazos, y evaluar los resultados.
- Juegos educativos: Esta solución consiste en utilizar juegos digitales o físicos para enseñar a los niños sobre sus derechos, sus emociones, sus límites, y cómo pedir ayuda en caso de sufrir o presenciar maltrato infantil. Los juegos educativos pueden ser una forma divertida y atractiva de transmitir mensajes positivos y de fomentar el desarrollo de habilidades sociales y personales.

CONCLUSIONES

El maltrato infantil es una forma de violencia que afecta a millones de niños y niñas en todo el mundo, y que tiene graves consecuencias para su salud, su desarrollo y su bienestar. El maltrato infantil puede tener diversas causas, como la violencia, la falta de afecto, el estrés, el consumo de alcohol o drogas, o la falta de educación o información sobre el desarrollo y la salud de los niños. El maltrato infantil puede



manifestarse de diversas maneras, como el abuso físico, sexual, psicológico o emocional, o la desatención de las necesidades básicas de los niños.

En este ensayo, se ha planteado la hipótesis de que la educación es la clave para prevenir y erradicar el maltrato infantil, tanto a nivel individual, como a nivel familiar y social. Se ha argumentado que la educación puede promover una cultura de respeto, igualdad y no violencia entre los miembros de la familia, y que puede dotar a los niños y niñas de las herramientas y los recursos necesarios para defender sus derechos, expresar sus emociones, establecer sus límites, y pedir ayuda en caso de sufrir o presenciar maltrato infantil. Se ha apoyado esta argumentación con datos, ejemplos y testimonios de diversas fuentes.

Sin embargo, la educación no es la única solución para el maltrato infantil, sino que se requiere de la participación y la colaboración de todos los sectores de la sociedad, como el legal, el sanitario, el educativo y el comunitario, para diseñar e implementar políticas y programas integrales y efectivos que protejan a los niños de la violencia. También se requiere de la sensibilización y la movilización de la opinión pública, para que tome conciencia de la existencia y la gravedad del maltrato infantil, y para que exija a las autoridades que tomen medidas al respecto.

El maltrato infantil es un problema que nos afecta a todos, y que debemos enfrentar con responsabilidad y compromiso. Los niños son el futuro de la humanidad, y merecen vivir en un ambiente seguro, donde se les respete y se les quiera. La educación es una herramienta poderosa para lograr este objetivo, pero no es la única. Se necesita de la acción conjunta y coordinada de todos los actores sociales, para poner fin a este flagelo y garantizar el pleno desarrollo y la felicidad de los niños.

Esos niños que son maltratados podrían ser los tuyos y al final las personas no actúan o no empiezan a tomar cartas en el asunto porque como no es algo que les afecte a ellos no les interesa pero al final ningún niño es inmune a sufrir maltrato.

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EFFECTS ON FERTILIZATION OF FRESH AND FROZEN OOCYTES

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ABSTRACT

Cryopreservation is a combination of chemical events that allow cells and tissues to be stored at sub-zero temperatures for long periods of time. Thanks to the egg freezing process, which is among the in vitro fertilization applications today, it has become possible to collect a woman's eggs and store them for having children in the future. This procedure is performed in cases where AMH levels are low or in treatments that damage oocyte cells, such as chemotherapy and radiotherapy, or before surgeries that will cause loss of reproductive function (such as removal of the ovaries). In the oocyte freezing process, the number of oocytes to be obtained must first be increased by applying controlled ovulation induction to the patient, as is applied in in vitro fertilization treatment. The collected oocytes are frozen 2 hours later, following pre-freezing preparation procedures, using a special vitrification kit and a special freezing protocol, and stored at -195 C. In oocyte cryopreservation cycles that have taken their place in clinical practice, oocyte survival rates after freezing-thawing, pregnancy and live birth rates obtained with these oocytes have been found to be close to embryo freezing-thawing rates. It is thought that oocyte freezing-thawing applications, which have achieved high viability and success rates with the developments in vitrification techniques, will have a stronger place in assisted reproductive techniques within the indications.

Key words: Oocyte, oocyte freezing, cryopreservation, infertility

Introduction

Today, assisted reproductive techniques in the treatment of infertile couples; In Vitro Fertilization (IVF) and Intracytoplasmic Sperm Injection (ICSI) are most commonly used. Infertility is divided into two: primary and secondary infertility. Primary infertility is the inability of a woman to become pregnant or have children. Secondary infertility is the inability of a woman who has had at least one pregnancy and given birth to become pregnant (1). In recent years, fertility and birth rates have been decreasing among women due to reasons such as increased career planning and education level, increased marriage age and divorce rate, birth control, and advanced maternal age, and there is a significant increase in the number of patients applying to infertility clinics (2). . Causes of infertility; Men are responsible for 30-40% and women are responsible for 40-50%. Unexplained infertility is present in 10-15% of couples (3). Ovulation disorders are responsible for 30-40% of female infertility. These disorders are manifested by amenorrhea, anovulation and menstrual irregularities. Lack of ovulation is the most important cause of infertility due to menstrual irregularities (anovulation). Ovulation; It provides control through the regular functioning of the hypothalamus, pituitary and ovarian axis. Anovulation may occur as a result of disorders in this axis. With the diagnosis of anovulation, diseases such as hypothalamic-pituitary disorders, polycystic ovary syndrome (PCOS), premature ovarian failure and hypothyroidism should be considered (4). To determine ovulation, it is possible to monitor ovulation with ultrasonography (USG) and check basal FSH, E2 and P4 hormone levels in the serum. In addition, the ovarian reserve is checked with the Clomiphene citrate stimulation test (CCCT) and the response of the ovaries is observed. This



test is especially used in women over the age of 40 or in women with a family history of premature ovarian failure (5).

Cryopreservation

In 1776, cryopreservation by controlled slow freezing of animal sperm was performed for the first time in Italy. In 1938, post-thawing motility was detected in frozen sperm using this method. Cryopreservation of rabbit oocytes was carried out in 1947. The first successful embryo freezing was performed on mouse embryos by Whittingham and his colleagues in 1972. Later, Wilmut and Rowson reported that they achieved pregnancy from bovine embryos that they had frozen and thawed. In these early studies, DMSO (dimethylsulfoxide) was used as a cryoprotectant and a cooling rate of 0.2°C per minute was applied. In the following years, different animal and human embryos were successfully frozen (6). In 1983, the first human pregnancy was achieved using frozen and thawed embryos after IVF, and the first live birth occurred in 1984. (7). In 1986, pregnancy was achieved for the first time with mature oocytes frozen and thawed after IVF. Oocyte, embryo and ovarian tissue cryopreservation methods used to preserve fertility in women with previous ovarian surgery, a family history of early menopause, chemotherapy or radiotherapy are open to new developments.

Cryopreservation Methods

Three basic methods have been developed for cryopreservation of embryos. It is divided into 3 main groups as follows: 1) Classical slow-freezing protocol (slow-freezing), 2) Rapid-freezing, 3) Vitrification.

Classic Slow Freezing

In the classic slow freezing method, a planer device is used to provide a programmed cooling rate. During programmed slow freezing with the Planer device, 2°C/min from room temperature to -6°C. cooling rate is achieved. In the slow freezing process, ice crystal formation is kept under control by starting from the area far from the embryo with a manual seeding process (8).

Rapid Freezing

Fast freezing is a method mainly used in sperm freezing processes. Before applying high freezing rates (approximately 1200-1250°C per minute) to the tissues or cells to be frozen, they are kept in liquid nitrogen vapor at approximately -80°C as an intermediate step. In this way, the cells are partially dehydrated. After this stage, the frozen material is directly immersed in -196 °C liquid nitrogen (9).

Vitrification

The vitrification method is a method of freezing the material or cell to be frozen by direct vitrification (vitrification) without the formation of ice crystals by providing a high cooling rate (20000-22000 min/°C) with high cryoprotectant density. (Stachecki and Cohen, 2004). With the vitrification method, oocytes, cleavage period embryos, 5th or 6th day blastocyst stage embryos, endometrial cells, ovarian tissue and even organs can be vitrified and frozen. The aim of this method is to prevent the formation of ice crystals. After the equilibrium stage, the material to be frozen is coated with a cryoprotectant material and immersed directly in liquid nitrogen, ensuring a high cooling rate. The amount of cryoprotectant required for vitrification is reduced, thus reducing the risk of toxic damage. Ice formation is prevented by quickly passing temperatures between -5 and -15°C, where biological structures sensitive to cold are damaged. In the vitrification method, if the cooling rate is not fast enough, ice crystals may form and vitrification may not occur completely. When this situation is resolved, it causes damage to the cells (10).

Oocyte Freezing

When we look at medical sources, freezing human reproductive cells and then resulting in birth does not appear to be a new phenomenon. The first birth using frozen sperm was in 1953, and the first birth using frozen eggs was in 1986 (11). On the other hand, egg freezing techniques have lagged behind, but since the early 2000s, egg freezing has become a more effective technology with the use of an ultra-fast



freezing technique (vitrification) (12). Therefore, until 2012, egg freezing technology was considered an experimental technology by leading professional organizations, the American Society for Reproductive Medicine and the European Society of Human Reproduction and Embryology. After egg freezing technology was removed from its experimental status, the option of egg freezing for "non-medical" situations became more popular. Thus, in case of age-related decrease in fertility, the aim is for a woman to freeze her eggs in advance (preferably while her eggs are still abundant and healthy) and to become pregnant in the future through in vitro fertilization.

A mature oocyte is one of the largest cells in mammals. It is approximately 70 μm in diameter in the mouse and 120 μm in humans and cows. In most vertebrates, oocytes undergo the second meiosis division close to ovulation, and the meiotic process stops until fertilization. At this stage, chromosomes are concentrated and spindle fibers are located on the metaphase plate. Cryopreservation of human oocytes is an alternative to embryo freezing; It was developed to solve ethical problems that may arise. In addition, it is recommended as the only solution for women who are at risk of losing reproductive capacity due to pelvic diseases, premature ovarian failure, surgery and chemotherapy / radiotherapy (13). This method has not yet been legalized in some countries due to doubtful approaches that cryopreservation may damage the chromosomal structure and the risk that genetic anomalies that may arise may be transmitted to the next generation. Some studies have shown that the cytoplasmic features of the oocyte, the nuclear phase in which it is located, and the structural features of the corona cumulus complex (CCC) can affect success (14). A decision has not yet been reached as to whether oocytes should be frozen together with cumulus oophorus, and the results of the studies have been found to be contradictory. In the first studies, it was argued that cryoprotectants penetrate the oocyte cytoplasm more easily in the absence of cumulus cells, and the first 17 pregnancies were achieved by cryopreservation of oocytes that did not contain cumulus (15). There are many publications on immature oocyte cryopreservation, but success rates are low (16). Therefore, recent studies have focused more on metaphase II (MII) oocyte cryopreservation.

Oocyte cryopreservation is less successful than embryo cryopreservation for many reasons. Oocytes have a small surface to volume ratio, a temperature-sensitive metaphase spindle (17), a very specific structure of the zona pellucida, and sensitivity to parthenogenetic activation. Oocytes are one of the largest cells with a high probability of intracellular ice formation (18). Oocytes are very unique cells because of their developmental capacity to support fertilization and subsequent early embryonic development. This capacity results from the maternal inheritance of numerous transcripts, proteins, and energetic substrates as well as cytoplasmic organelles that facilitate the early mitotic division of the embryo until embryonic genome activation occurs (19). This highly organized structure often causes serious damage after cryopreservation. The volume of the mammalian oocyte is much larger than that of spermatozoa, so the surface/volume ratio is significantly reduced, making them sensitive to cold and highly susceptible to intracellular ice formation. In fact, in a developing embryo, cleavage division occurs without any increase in volume until the blastocyst stage, leading to a higher nuclear-to-cytoplasmic ratio of embryo blastomeres compared to the oocyte. Oocytes are significantly more prone to cryodamage than embryos. The number of blastomeres in early embryos provides great flexibility to compensate for the deleterious effects of cryopreservation, since missed blastomeres can be replaced by daughter cells obtained from division of intact ones. Oocytes contain half of the future individual's genetic material, and therefore any damage to chromatin structure can lead to deleterious defects in the developmental competence of the resulting embryo. Damage to the meiotic spindle can cause chromosomal abnormalities after resolution. The permeability of the oocyte plasma membrane to cryoprotective agents is low compared to the embryo (20).

Although mature oocytes in metaphase II are susceptible to cryopreservation (detrimental effect on the meiotic spindle or premature cortical granule release) and immature oocytes in prophase I (GV oocytes) appear to be more suitable for cryopreservation. It is well known that oocytes frozen at the GV stage have reduced efficiency of in vitro maturation and increased spontaneous parthenogenetic activation (21). Therefore, it is recommended to use in vitro maturation of immature oocytes and then perform vitrification. It has been demonstrated that the highly organized structure of the fresh oocyte changes



dramatically (at the cellular, ultrastructural, molecular and developmental levels) after cryopreservation. Cryopreserved oocytes have different cellular properties than fresh oocytes.

Conclusion

It has been concluded in many studies that the method of freezing embryos or embryos obtained from frozen eggs and thawing the stored embryos in another cycle and transferring them is advantageous. It has been reported that with this method, long-term administration of hormone medications to the woman is prevented, high pregnancy rates are achieved without the need for many stages of the in vitro fertilization process, and it can provide many economic and psychological advantages to couples. In addition, the importance of endometrial thickness, single or double embryo transfer, and blastocyst stage transfer has been understood in success.

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THE IMPORTANCE OF SPERM MORPHOLOGY IN IVF

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ABSTRACT

In couples diagnosed with infertility, approximately 50% of the problems are caused by the male factor. Most cases of male infertility occur as a result of inadequate sperm quality. Other causes of infertility; It consists of a number of factors such as anatomical problems, hormonal imbalances and genetic disorders. Insufficient sperm quality means that the characteristics of the sperm are below standard levels. The form and shape of sperm, also known as sperm morphology, is an important element for fertilization to occur. Sperm deformity is a common cause of infertility problems. For successful fertilization, the sperm cell must present an undamaged nucleus to the secondary oocyte. Therefore, the quality of sperm DNA can affect the success of fertilization and embryonic development. In recent years, methods aiming to select sperms that preserve DNA integrity in cases of unexplained infertility and to reduce the impact of these anomalies on embryo development and pregnancy have been implemented. This study focused on the importance of sperm morphology in the fertility of different patient groups who applied with a diagnosis of infertility in the IVF clinic, which is a rapidly developing sector in recent years.

Keywords: Infertility, IVF, fertilization, sperm morphology

Introduction

Male factors in infertility may be caused by the urogenital system organs. Sperm production disorders, structural and numerical disorders of sperm, blockages in sperm ducts, presence of antibodies against sperm, genetic mutations, testicular trauma, hormonal and chromosomal disorders, anatomical problems, varicocele, previous diseases, urogenital infections, environmental factors, unexplained reasons and some medications may affect men. These can be shown as causes of infertility (1-4). In a study emphasizing that there is a significant and close relationship between sperm morphology disorders and sperm motility, it was shown that the localization of the morphological disorder may affect motility (6). The main purpose of morphological evaluation is to reveal spermatozoa quality by distinguishing normal and abnormal spermatozoa. The morphologically abnormal appearance of sperm is one of the factors affecting fertilization (7, 8). The World Health Organization (WHO) criteria and the Kruger criteria are the most widely used for morphology evaluation of spermatozoa. Sperm consists of 4 parts: head, neck, midpiece and tail, and is on average 60-65 µm long. In a normal sperm morphology, the head should be oval in shape, its length should be 5-6 µm and its width should be 2.5-3.5 µm, and the acrosome, which plays an important role in fertilization, should constitute 40-70% of the front part of the head. The number of vacuoles in the head area should be less than 2% and the vacuole should not exceed 20% of the area covered by the head. There should be no vacuoles in the Postacrosomal region. The tail should not be broken or curled (1, 8). Head, neck, midpiece and tail defects may occur in the morphology of the sperm. In head defects; The head of the sperm may be large (megalo head) or small (micro head) compared to normal size, conical, pyriform, round, amorphous, vacuolated, double-headed or a few of these, depending on its normal shape. Head and midpiece defects occur if the head enters the midpiece asymmetrically, if the midpiece is thick, thin or irregular, or if one or more of these occur together (9).



The basis of fertilization is the fusion of oocytes and spermatozoa. Many elements related to sperm, oocyte, various stimulating factors and cell-cell interactions play a role in the realization of this fusion (10). In order for fertilization to occur in a healthy way, the sperm must have normal sperm morphology. In a normal sperm cell, consisting of head, neck, midpiece and tail, the plasma membrane surrounds the sperm from the head to the tail. The majority of the head consists of the dense and compact nucleus containing paternal DNA. In addition to the plasma membrane, there is an acrosome structure surrounding the nucleus. The acrosome, which is divided into two parts: the head and the equatorial region, covers 40-70% of the sperm head (11).

Sperm Head Defects

Defects in sperm morphology occur as a result of structural disorders during spermatogenesis, and these negatively affect sperm functions. Environmental, urogenital and genetic factors lie behind these structural and functional disorders. Defects in each part of the sperm can be observed in human semen. One of the most common of these is head defects. During spermiogenesis, post-meiotic male germ cells undergo radical morphological changes with temporary cuff formation. These changes are carried out by α - and β -tubulins, which organize the formation of the sperm head. In the following process, the cuff lengthens, the spermatid nucleus becomes denser, and the divided centrosomaxoneme structure begins to grow. More than one gene plays a role in this event. In a study, it was discovered that the SEPTIN12 gene interacts with α - and β -tubulins. Defects in the expression of the SEPTIN12 gene affect the organization of α - and β -tubulins, causing disruptions in sperm head formation and the acrosome (12, 13). Chen et al. In their study based on Kruger morphology criteria, they stated that increased head defects were more common than tail defects (14). Head defects can be classified as defects related to the shape of the head, acrosome region and nucleus. In studies conducted in the sperm nuclei of infertile men, a higher rate of loosely packed chromatin and damaged DNA was observed. Defective head morphology is an indicator of DNA damage in sperm. In a study, large, small, elongated, amorphous heads and nuclear defects were observed to be quite high in sperm with DNA fragmentation greater than 20% (15). In a study by Prisant et al., an increase in prolonged head defects was observed in patients with varicocele. They found deterioration in chromatin compactions and partial increases in chromosome aneuploidies in sperm with extended head defects (16).

In a study conducted by Kahraman et al. using megalohed sperm forms according to the Kruger solid evaluation; The fertilization rates of the control group were 60.2%, and the fertilization rates of megalohed sperm were 43.2%. Accordingly, it has been concluded that megalohed sperm causes low fertilization and pregnancy rates in couples with ICSI (17). In a study conducted by Rousso et al. with pyriform head sperm; Compared to the head part of a normal sperm, the neck, tail and cytoplasmic droplet defects of the pyriform head sperm were observed to be more intense, and this appeared to be a reason preventing fertilization (18). In a study conducted by Katz et al. with amorphous and pyriform head sperms, it was stated that sperm cells with the mentioned head defects exhibited slower motility than normal sperm cells. Lack of motility is one of the reasons that prevent sperm from reaching the fertilization area. Sperms with low motility cannot reach the ampoule, which is the fertilization site, and fertilize the ovum (19). In studies on prolonged head defects, it was observed in 5.9% of the semen of fertile men and 22% of the semen of subfertile men. In a study by Osawa et al., it was found that sperm with elongated head defects had low fertilization rates (20). In a study by Lee et al., chromosomal anomalies were also emphasized. In this study conducted with sperm with amorphous, round and elongated head defects, it was emphasized that the frequency of chromosomal anomalies was four times higher than in sperm with normal heads (21). It has been determined that round-headed spermatozoa lack the ability to activate or fertilize the oocyte.

Conclusion

As a result, sperm with defective morphology, especially those with head defects, have a very low fertilization rate. Normal head morphology has an important place in oocyte activation and fertilization. Head defects can develop in different ways depending on the structure of the head, acrosome and nucleus, and the higher the rate of defects, the lower the fertilization ability.



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COMPARATIVE ANALYSIS OF HIERARCHICAL DIVISIVE CLUSTERING ALGORITHMS FOR AUTOMATED CLASS HIERARCHY GENERATION

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ABSTRACT

This study investigates the effectiveness of hierarchical divisive clustering algorithms in automated class hierarchy generation, utilizing 51 real-world datasets from the OpenML repository. The focus is on comparing Divisive ANalysis (DIANA), Kmeans, and Kmedoids (Kmed) within the framework of automated hierarchy generation, where dissimilarity between classes is quantified by the Euclidean distance between class conditional means. The study employs Extreme Gradient Boosting (XGBoost) as the base classifier. The algorithms are assessed under various hierarchical classification (HC) schemes, including global classification (GC), local classification per parent node (LCPN), and local classification per parent node combined with flat classification (LCPN+F). The findings reveal distinct performance patterns among the algorithms, with DIANA, Kmeans, and Kmed with LCPN+F emerging as top performers, and GC demonstrating the weakest performance. Notably, the LCPN+F scheme significantly outperforms both LCPN and GC, highlighting the importance of hierarchical classification schemes in automated hierarchy generation. Furthermore, while DIANA, Kmeans, and Kmed exhibit nearly equivalent effectiveness in clustering the classes, DIANA shows potential advantages over Kmeans and Kmed when utilizing LCPN+F. These findings contribute to a deeper understanding of automated hierarchy generation in clustering analysis, offering insights for informed decision-making in HC tasks.

Keywords: Machine Learning, Divisive Hierarchical Clustering, Hierarchical Classification, Automated Hierarchy Generation.

INTRODUCTION

Hierarchical clustering serves as a fundamental technique in numerous applications across diverse domains. Extensive research has been conducted to compare various hierarchical clustering algorithms in different clustering scenarios, as evidenced by studies conducted by Ran et al., 2023 and Ezugwu et al., 2022. However, despite the significant attention given to hierarchical clustering algorithms, there remains a notable gap in the literature concerning the comparison of these algorithms specifically within the context of class hierarchy.

This study aims to address this gap by exploring the efficacy of hierarchical divisive clustering algorithms in the automated generation of class hierarchies. To achieve this objective, we undertake a comprehensive investigation utilizing 51 real-world datasets sourced from the OpenML repository. Our primary focus lies in the comparative analysis of three hierarchical divisive clustering algorithms: DIANA, Kmeans, and Kmed within the framework of automated hierarchy generation.

By systematically evaluating these algorithms in the context of class hierarchy generation, this research endeavors to provide valuable insights into their performance and suitability for hierarchical clustering tasks. The findings of this study hold the potential to enhance our understanding of the strengths and limitations of different hierarchical clustering approaches, thereby contributing to the advancement of clustering methodologies tailored to hierarchical data structures.



MATERIALS AND METHODS

Representing Classes

The objective of the study is to establish a class hierarchy by arranging classes in a coherent manner, leveraging the features of data instances associated with each class.

To achieve this, dimensionality reduction is first applied to the data instances. Dimensionality reduction techniques aim to reduce the number of features (dimensions) in the dataset while preserving important information. In this particular study, Linear Discriminant Analysis (LDA), proposed by Ronald Fisher in 1936 (Fisher, 1936), is used for dimensionality reduction.

LDA is a technique commonly used for feature extraction and dimensionality reduction, particularly in the context of classification tasks. It works by finding a linear combination of features that characterizes or separates classes in the dataset while minimizing the variance within each class and maximizing the variance between classes. This results in a lower-dimensional representation of the data that preserves the discriminative information between classes.

Once dimensionality reduction is applied, the class conditional means are computed for each class or category in the dataset. Class conditional means represent the average values of the reduced feature set within each class, providing insights into the distribution of features across different classes.

By using LDA for dimensionality reduction and computing class conditional means, the study aims to capture the relationships between classes and form a meaningful class hierarchy based on the reduced feature representations. This approach leverages statistical techniques to organize classes in a hierarchical structure that reflects the underlying relationships in the data.

Hierarchical Divisive Clustering

Hierarchical divisive clustering, also known as divisive clustering or divisive hierarchical clustering, is a method of clustering data points into a hierarchy of clusters in a top-down manner. Unlike agglomerative clustering, which starts with individual data points as separate clusters and merges them iteratively, divisive clustering begins with all data points in a single cluster and recursively divides them into smaller clusters.

Here's an overview of how hierarchical divisive clustering typically works:

1. Initialization: All data points are initially grouped into a single cluster.
2. Divisive Step: The entire dataset is divided into two or more clusters based on a chosen criterion. This criterion could be a distance metric (e.g., Euclidean distance) or a similarity measure (e.g., correlation coefficient). The goal is to partition the dataset into subsets that are more homogeneous within themselves and more different from each other.
3. Recursion: The divisive step is applied recursively to each resulting cluster from the previous step. Each cluster is divided further until a stopping criterion is met. This stopping criterion could be a predetermined number of clusters, a minimum cluster size, or a threshold level of dissimilarity.
4. Cluster Hierarchy: As the algorithm progresses, it creates a hierarchical structure, often represented as a dendrogram. The root of the dendrogram represents the entire dataset, and each leaf node corresponds to an individual data point. Intermediate nodes represent clusters formed at different levels of the hierarchy.

Hierarchical divisive clustering has several advantages:

- It provides a hierarchical structure that captures the relationships between clusters at different levels of granularity.
- It does not require specifying the number of clusters beforehand, as the hierarchy naturally emerges from the data.



- It can be useful for exploratory data analysis, as it allows for the examination of the dataset at various levels of detail.

However, hierarchical divisive clustering also has some limitations:

- It can be computationally expensive, especially for large datasets, as it involves recursively partitioning the dataset.
- The quality of the resulting clusters may depend heavily on the chosen criterion and the characteristics of the dataset.
- It may not scale well to high-dimensional data or data with complex structures.

Overall, hierarchical divisive clustering is a valuable technique for exploring the structure of datasets and identifying natural groupings of data points in a hierarchical manner.

DIANA:

DIANA is a hierarchical clustering method that proceeds by segmenting a dataset into clusters in a top-down manner, as described by Kaufman and Rousseeuw, 2009. Due to the vast number of possible ways to partition each cluster ($2^{n-1} - 1$), DIANA relies on heuristic strategies for efficient operation. In the DIANA approach, an object exhibiting the highest average dissimilarity is selected, and all objects more similar to this chosen object than to the remaining cluster are transferred to a new cluster.

Conceptually, DIANA's operation resembles more of a "hollowing out" process than a straightforward "dividing" process. At each iteration, an existing cluster (e.g., the initial cluster encompassing the entire dataset) is designated to accommodate a newly formed nested cluster. Objects gradually migrate to this nested cluster, thereby depleting the original cluster. Ultimately, a cluster contains solely nested clusters that have developed within it, without retaining any unassigned objects.

Formally, DIANA executes the following steps:

1. Initialization: Begin with an empty cluster, denoted as C , and assign the initial cluster of individual data points, $C_0 = \{1, 2, \dots, n\}$, to C .
2. Formation of Splinter Group: Identify the current cluster, C_* , comprising two or more objects with the greatest diameter. Determine the object, i^* , within this cluster that exhibits the highest dissimilarity compared to the rest of the cluster. Transfer i^* from its original cluster, C_* , to the newly formed splinter group, C_{new} .
3. Migration: Continuously migrate objects from C_* to C_{new} as long as C_* remains non-empty, and the average dissimilarity of i^* to C_* exceeds that to C_{new} .
4. Update: Upon completion of the migration process, incorporate C_{new} into C .
5. Convergence: Repeat steps 2 and 3 until the cardinality of C equals n .

In essence, the algorithm gauges the inclination of an object to depart from its current cluster, modulated by whether the object would be compatible with the splinter group. Objects exhibiting this behavior are likely to initiate their own splinter groups eventually.

Kmeans:

K-means clustering is a popular unsupervised machine learning algorithm used for partitioning data into a predetermined number of clusters. It is widely employed for clustering and data segmentation tasks across various domains such as image processing, customer segmentation, and document clustering.

The algorithm operates by iteratively assigning data points to clusters and updating the cluster centroids until convergence is achieved. The key steps involved in the K-means algorithm are as follows:

1. Initialization: Randomly select K initial cluster centroids from the dataset.



2. **Assignment:** Assign each data point to the nearest cluster centroid based on a distance metric, commonly the Euclidean distance.
3. **Update:** Recalculate the cluster centroids by computing the mean of all data points assigned to each cluster.
4. **Convergence:** Repeat steps 2 and 3 until the cluster assignments no longer change significantly or a predetermined convergence criterion is met.
5. **Finalization:** Once convergence is reached, the algorithm outputs the final cluster assignments and centroids.

Key characteristics and considerations of K-means clustering include:

- **K:** The number of clusters K needs to be specified before running the algorithm, and determining the optimal value of K can be a challenging task.
- **Centroid Initialization:** The choice of initial cluster centroids can impact the final clustering results. Common approaches include random initialization, K-means++, and kmeans initialization.
- **Cluster Compactness:** K-means aims to minimize the within-cluster sum of squares, leading to compact and spherical clusters. However, it may struggle with clusters of irregular shapes or varying densities.
- **Scalability:** K-means is computationally efficient and scales well with large datasets, making it suitable for clustering tasks involving a high number of data points.
- **Sensitivity to Outliers:** K-means clustering is sensitive to outliers, as they can significantly influence the centroid positions and cluster assignments.
- **Number of Iterations:** The algorithm may require multiple iterations to converge, and the number of iterations can affect both the runtime and clustering quality.

Overall, K-means clustering is a versatile and widely used algorithm for exploratory data analysis, pattern recognition, and data segmentation tasks, offering a straightforward approach to partitioning data into distinct clusters based on similarity.

Kmed:

K-medoids, also known as partitioning around medoids (PAM) (Kaufman and Rousseeuw, 2009), is a variation of the K-means clustering algorithm. Like K-means, it is an unsupervised machine learning algorithm used for partitioning data into a predetermined number of clusters. However, unlike K-means which uses cluster centroids to represent cluster centers, K-medoids uses actual data points within the dataset, known as medoids, as representatives of the clusters.

The key steps of the K-medoids algorithm are as follows:

1. **Initialization:** Select K initial medoids from the dataset.
2. **Assignment:** Assign each data point to the nearest medoid based on a chosen distance metric, typically the Manhattan distance or Euclidean distance.
3. **Update:** For each cluster, select the data point that minimizes the total dissimilarity (distance) to all other points in the cluster, and update the medoid to be this new data point.
4. **Convergence:** Repeat steps 2 and 3 until convergence is reached, i.e., when the medoids no longer change.
5. **Finalization:** Once convergence is reached, the algorithm outputs the final cluster assignments and medoids.

Compared to K-means, K-medoids has several advantages:



- **Robustness to Outliers:** K-medoids is less sensitive to outliers compared to K-means, as medoids are actual data points within the dataset and not affected by outliers to the same extent as centroids.
- **Ability to Handle Non-Euclidean Distances:** K-medoids can use various distance metrics beyond the Euclidean distance, allowing for more flexibility in handling non-Euclidean data.
- **Interpretability:** The medoids chosen as representatives of the clusters are actual data points, making them more interpretable and meaningful compared to centroids.

However, K-medoids also has some drawbacks:

- **Computational Complexity:** K-medoids can be computationally expensive, especially for large datasets, as it involves calculating pairwise distances between data points.
- **Dependency on Initial Medoids:** Like K-means, the quality of the clustering results in K-medoids can depend on the initial selection of medoids.

Overall, K-medoids is a valuable clustering algorithm for applications where interpretability and robustness to outliers are important, and where non-Euclidean distances need to be considered.

Hierarchy Exploitation:

Once a hierarchical structure is established for a dataset, it can be utilized in a classification system, typically achieved through two main methods: global classification (GC) and various local classification (LC) strategies (Silla and Freitas, 2011). In the GC approach, a single classifier is responsible for processing all class labels across the hierarchy, potentially overlooking valuable local information embedded in hierarchical relationships. On the other hand, LC methods strategically deploy classifiers at specific levels, nodes, or parent nodes within the hierarchy (referred to as LCL, LCN, and LCPN, respectively).

While the GC approach often suffers from complexity and lacks modularity due to its aggregation of data instances across all labels within the hierarchy, resulting in overlapping information, LC methods execute predictions in a top-down manner within the hierarchy. However, they face challenges related to error propagation, where inaccuracies in higher regions can affect predictions made in lower regions. To address these limitations, a novel approach known as LCPN+F has been introduced (Alagoz, 2023), aiming to combine the strengths of both GC and LC methods while mitigating their weaknesses. This study incorporates GC, LCPN, and LCPN+F as HC schemes for analysis.

Multi-Class Datasets Used for Experiment:

The study involves experimentation with 51 multi-class datasets sourced from the publicly available OpenML repository (Vanschoren et al., 2014), obtained using the Python package (Feurer et al., 2021). More details about the datasets can be found in Alagoz (2024).

Base Classifier:

In this study, XGBoost (Extreme Gradient Boosting), a renowned and robust machine learning library, is employed as the base classifier (Friedman, 2001). XGBoost is predominantly utilized for gradient boosting tasks and is recognized for its efficacy, rapid execution, and high performance in both classification and regression scenarios. It implements an optimized and scalable version of gradient boosting algorithms and is extensively employed in various machine learning competitions and real-world applications owing to its adeptness in handling large datasets proficiently and generating highly precise predictions. XGBoost integrates an array of regularization techniques to mitigate overfitting and facilitates parallel processing for expedited training. Consequently, XGBoost has become a fundamental tool in the machine learning community and is frequently utilized as a benchmark model for comparative analyses with other algorithms.



Performance Assessment and Statistical Analysis:

The evaluation of classification performance employs the F1 score, a widely used metric for binary classification tasks. For multi-class classification, the F1 macro score is utilized, which computes the F1 score for each class and then calculates the average, assigning equal importance to all classes. By incorporating both the F1 score and F1 macro score as evaluation metrics, the study thoroughly and rigorously assesses the classification performance of the selected classifiers.

To evaluate performance, a 10-run Monte Carlo validation approach is utilized. A graphical representation of classification performance across all scenarios is provided via a critical difference diagram, following the methodology outlined by Ismail Fawaz et al. (2019).

The null hypothesis, which posits equal performance among all algorithms, is examined using the Friedman test (Friedman, 1940), followed by pairwise post-hoc analysis (Benavoli et al., 2016) employing the Wilcoxon signed-rank test with Holm's alpha correction (Garcia and Herrera, 2008). A significance level of 5% is adopted for alpha correction.

RESULTS AND DISCUSSIONS

This study investigates hierarchical divisive clustering as a means of establishing class hierarchy, with a specific emphasis on comparing three prominent algorithms: DIANA, Kmeans, and Kmed. The evaluation is conducted within the framework of automated hierarchy generation, where the dissimilarity between classes is quantified by the Euclidean distance between class conditional means. The algorithms are evaluated in the context of HC employing GC, LCPN, and LCPN+F.

The findings are presented in Figure x, which illustrates a critical difference diagram. The diagram reveals the rankings of HC algorithms, with DIANA, Kmeans, and Kmed with LCPN+F grouped together in the top clique. Additionally, Kmeans, DIANA, and Kmed with LCPN form the second-ranking clique, along with Kmed with GC. At the lowest rank, Kmeans and DIANA with GC are placed.

Several notable observations emerge: i) HC utilizing LCPN+F shows preference over FC, although this difference lacks statistical significance. ii) When employing LCPN+F, DIANA is favored over Kmeans and Kmed, although without statistically significant differences. iii) The LCPN+F scheme significantly outperforms both LCPN and GC, with GC exhibiting the poorest performance.

Regarding the comparison between DIANA, Kmeans, and Kmed, their performance varies based on the scheme used. DIANA performs the best in the LCPN+F scheme, while Kmeans excels in the LCPN scheme, and Kmed performs the best in the GC scheme.

The observation that HC utilizing LCPN+F is preferred over FC, despite lacking statistical significance, suggests the potential superiority of HC schemes over FC in forming class hierarchies. This preference may be attributed to the ability of LCPN+F to capture more nuanced relationships between classes with integrating FC predictions with HC.

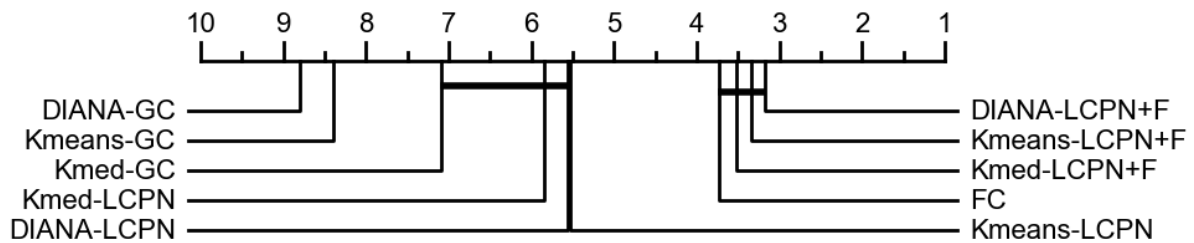


Figure x. Critical difference diagram depicting the rankings among HC algorithms, with the inclusion of FC in the rankings.

The clustering algorithms form cliques centered around LCPN+F and LCPN, indicating that the performance disparity is primarily attributed to the choice of the HC scheme. Notably, the substantial superiority of the LCPN+F scheme over both LCPN and GC, with GC demonstrating the weakest performance, highlights the significance of hierarchical classification schemes in automated hierarchy generation. This observation implies that integrating LCPN with FC results in more efficient class hierarchy exploitation compared to alternative hierarchical classification schemes. The inferior performance of GC implies that processing bulky class labels may undermine the ability to capture nuanced relationships between classes.

Conversely, the inclusion of DIANA, Kmeans, and Kmed in the same cliques implies their nearly equivalent effectiveness in clustering the classes. Therefore, they are almost equally preferable and can be interchangeably chosen for automated hierarchy generation tasks. However, if a preference were to be considered, the observation that DIANA is favored over Kmeans and Kmed when utilizing LCPN+F, albeit without statistically significant differences, suggests the potential benefits of DIANA in capturing hierarchical structures within the classes. The observation that the preference for clustering algorithms varies depending on the HC scheme underscores the nuanced performance of these algorithms within specific HC schemes.

Overall, the critical difference diagram and rankings offer valuable insights into the performance of HC algorithms and their effectiveness in forming class hierarchies, contributing to a deeper understanding of automated hierarchy generation in clustering analysis.

CONCLUSIONS

This study delved into hierarchical divisive clustering as a method for establishing class hierarchy, particularly focusing on the comparison of three prominent algorithms: DIANA, Kmeans, and Kmed. Within the framework of automated hierarchy generation, where dissimilarity between classes is quantified by the Euclidean distance between class conditional means, the evaluation revealed insightful findings.

The critical difference diagram, illustrating the rankings of HC algorithms, showcased the clustering algorithms' relative performance under different HC schemes. Notably, DIANA, Kmeans, and Kmed with LCPN+F emerged as top performers, suggesting their effectiveness in forming class hierarchies. In contrast, Kmeans and DIANA with GC were placed at the lowest rank, indicating weaker performance under this scheme.

Several notable observations emerged from the analysis:

- i) Hierarchical clustering employing LCPN+F exhibited a preference over FC, indicating the potential superiority of hierarchical classification schemes over FC in forming class hierarchies. This preference was attributed to the ability of LCPN+F to capture more nuanced relationships between classes, thereby enhancing the hierarchical structure.
- ii) The LCPN+F scheme significantly outperformed both LCPN and GC, with GC demonstrating the weakest performance. This highlights the importance of hierarchical classification schemes, particularly LCPN+F, in automated hierarchy generation.



iii) The inclusion of DIANA, Kmeans, and Kmed in the same cliques suggested their nearly equivalent effectiveness in clustering the classes. While they are almost equally preferable for automated hierarchy generation tasks, DIANA showed potential advantages over Kmeans and Kmed when utilizing LCPN+F, emphasizing its effectiveness in capturing hierarchical structures within the classes.

The nuanced performance of clustering algorithms within specific HC schemes underscored the importance of considering the interaction between clustering algorithms and hierarchical classification schemes in automated hierarchy generation.

In conclusion, the critical difference diagram and rankings provided valuable insights into the performance of HC algorithms and their effectiveness in forming class hierarchies. These findings contribute to a deeper understanding of automated hierarchy generation in clustering analysis, facilitating informed decision-making in hierarchical clustering tasks.

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CANONICAL TIME SERIES CHARACTERISTICS (CATCH22) FEATURES FOR ATRIAL FIBRILLATION DETECTION AND DIFFERENTIATION: ANALYSIS USING RANDOM FOREST CLASSIFICATION AND ABLATION STUDY

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ABSTRACT

Atrial fibrillation, characterized by irregular and rapid atrial activation, poses a significant health risk and often coexists with other supraventricular tachycardia types, complicating accurate detection and differentiation. This study employs canonical time series characteristics features derived from intracardiac electrograms to enhance atrial fibrillation detection. These features, spanning distribution, simple temporal statistics, linear and nonlinear autocorrelation, successive differences, fluctuation analysis, and more, are input to a Random Forest classifier.

Recordings from 44 patients, utilizing a 64-pole basket catheter, produce 2,816 unipolar intracardiac electrogram signal segments, each lasting 4 seconds. The classification performance, assessed through 10 Monte Carlo validations, yields a mean F1 score of 0.90. A subsequent ablation study reveals that feature groups associated with linear autocorrelation, successive differences, and others significantly contribute to classification accuracy, while distribution, simple temporal statistics, nonlinear autocorrelation, and fluctuation analysis play a comparatively lesser role.

Notably, the identified important feature categories align with measures derived from the autocorrelation function, power spectrum of Fast Fourier Transform, and periodicity measures. These features, related to cycle length, corroborate existing literature findings. This comprehensive analysis underscores the effectiveness of canonical time series characteristics features in discerning atrial fibrillation from other supraventricular tachycardias, offering valuable insights for therapeutic interventions and the monitoring of implanted devices or wearable technologies.

Keywords: Atrial Fibrillation, Intracardiac Electrogram Analysis, Machine Learning, Canonical Time Series Characteristics.

INTRODUCTION

Atrial Fibrillation (AF) is a common cardiac arrhythmia characterized by rapid and irregular heartbeats, posing not only a substantial risk factor over a lifetime but also significant health hazards such as stroke and heart failure (Weng et al., 2018). Classified under the broader category of supraventricular tachycardia (SVT), AF often coexists with other SVT types like Atrial Tachycardia (AT) and Atrial Flutter (AFL) (Haissaguerre et al., 1994; Katritsis et al., 1996; Palma et al., 2000; Jang et al., 2010). Timely and accurate identification of AF is crucial for effective management, preventing complications, and influencing clinical decisions regarding the use of pacemakers, defibrillators, and the interpretation of remote-monitoring tracings from implantable devices.

Advancements in data analysis techniques have led to extensive research focusing on cardiac electrophysiological signals to enhance data interpretation and expedite diagnostic decision-making. While Electrocardiograms (ECG) are widely used for detecting cardiac disorders due to their accessibility and low cost, recent studies, exemplified by Smith et al. (2019) and Hannun et al. (2019), demonstrate the efficacy of deep learning methods in AF detection, surpassing traditional ECG interpretation by physicians. However, ECGs collected from the body surface provide relatively coarse data when measuring tissue-level electrical activities.



In contrast, Electrogram (EGM) analysis, obtained through direct contact with cardiac tissue, offers a more refined understanding of fibrillatory activities, facilitating improved mapping and navigation for therapeutic actions such as ablation. Despite its invasive nature, simulated EGMs are often used for regularity and organization analysis due to the challenges associated with EGM collection. While earlier studies employed conventional machine learning (ML) and signal processing techniques for EGM analysis, recent endeavors have embraced deep learning. Nevertheless, in the context of AF treatment, a finer-level EGM analysis benefits significantly from a coarser-level interpretation, especially considering the coexistence of AF with other SVT types and its diverse characteristics in various atrial regions.

This study aims to enhance atrial fibrillation detection by employing Canonical Time Series Characteristics (catch22) features derived from intracardiac electrograms. These features, spanning distribution, simple temporal statistics, linear and nonlinear autocorrelation, successive differences, fluctuation analysis, and more, are input to a Random Forest (RF) classifier.

MATERIALS AND METHODS

Patient Population:

The dataset utilized in this investigation was graciously provided by Rodrigo et al. in 2022. This dataset comprised a patient cohort meticulously curated from the COMPARE registry (ClinicalTrials.gov Identifier: NCT02997254), consisting of individuals diagnosed with AF who were prospectively enrolled during ablation procedures for symptomatic AF that had not responded to at least one anti-arrhythmic medication. Within this registry, each patient underwent intracardiac EGM recording using multipolar 64-pole basket catheters. A comprehensive review of the registry was conducted by a panel of three cardiac electrophysiologists, who diligently classified each EGM tracing as either AF or AT.

For this study, a methodical selection of patients from the registry was undertaken to establish a balanced dataset of intracardiac recordings, encompassing both AF (N = 22) and AT (N = 22). It is crucial to emphasize that all participants involved in this study provided written informed consent, in accordance with protocols approved by the Human Research Protection Program. A summary of patient demographics is provided in Table 1.

Table 1. The demographic information of the patients participating in the study

	Patients (all)	Patients (AF)	Patients (AT)
Patient count	44	22	22
Age (in years)	59.2±11.5	59.7±12	58.7±11.1
Female	14(31%)	7(31%)	7(31%)
Weight	94.9±17.9	97.6±17.8	92.1±17.8

EGM Reading and Recording:

The dataset employed in this study constituted a subset of the dataset originally provided by Rodrigo et al. (2022). Specifically, the analysis encompassed N=2,817 EGM signals, with N=1,738 labelled as AF and N=1,079 as AT. The procedure for EGM collection and pre-processing is outlined as follows.

During the electrophysiology study, a 64-pole basket catheter (Abbott, Menlo Park, CA) was utilized, featuring electrodes sized at 2 mm and inter-electrode spacing set at 5 mm along the spline. Mapping was conducted comprehensively across both the right and left atria. Unipolar EGMs spanning 60 seconds were extracted from the electrophysiological recorder (Prucka, GE Marquette, Milwaukee, WI; Bard Electrophysiology, Billerica, MA) and filtered within the frequency range of 0.05–500 Hz.

For analysis purposes, unipolar EGMs with a duration of 4 seconds, approximately equivalent to 20 cycles of AF or AT, were utilized. This duration aligns with the standard practice of examining EGM



sequences in the frequency domain, with prolonged durations offering minimal enhancements in rhythm identification. The original EGMs, recorded at a sample frequency of 1 kHz (Bard) or 977 Hz (Prucka), were uniformly resampled to facilitate comparative analyses across datasets. To reduce dimensionality and considering that the physiological content of AF and AT EGMs lies below 200 Hz (Rodrigo et al., 2021), the EGMs were downsampled to 400 Hz utilizing a 200 Hz anti-aliasing filter. Ventricular artifacts were mitigated by subtracting the mean QRS complex, which was identified in three orthogonal ECG leads using a voltage threshold, and then averaged across a 1-minute period (Alhusseini et al., 2020).

Figure 1 displays sample EGM signals representing AF and AT. Clinicians rely on various EGM characteristics to differentiate AF from other arrhythmias, notably a higher rate in AF, quantified by metrics such as beats per second, dominant frequency (DF), or its inverse, cycle length (CL). Typically, AF exhibits a $CL < 200$ ms ($DF > 5$ Hz), whereas AT displays a $CL \geq 200$ ms. The EGM traces depicted in Figure 1 corroborate these observations, with AF showcasing dominant frequencies around 5.5 Hz, contrasting with approximately 4.5 Hz in the case of AT. Similarly, analysis of the autocorrelation function of the sample signals reveals distinct patterns: the spacing between maximums corresponds to the fundamental period, indicative of CL. However, some traces exhibit distortion, complicating the identification of dominant frequency or autocorrelation peaks. Such distortions may arise from deployment challenges encountered during catheter usage, including poor contact.

Canonical Time Series Characteristics Features:

In the realm of time series data analysis, particularly concerning cardiac electrophysiological signals, the extraction of various features plays a pivotal role. The Canonical Time Series Characteristics (referred to as catch22), introduced by Lubba et al. in 2019, embodies a collection of 22 time series features meticulously tailored for time-series analysis purposes. These features were thoughtfully curated from an extensive pool of over 7000 features available in the Highly Comparative Time Series Analysis (hctsa) toolbox, as presented by Fulcher et al. in 2013 and 2017. The hctsa toolbox stands as a comprehensive resource for time-series analysis, offering versatility in its application to cater to specific analytical objectives.

To distill a more streamlined set of canonical features, a hierarchical clustering technique was employed on the correlation matrix of features, showcasing superiority over random chance. The resulting clusters were subsequently organized based on balanced accuracy, evaluated through a decision tree classifier.

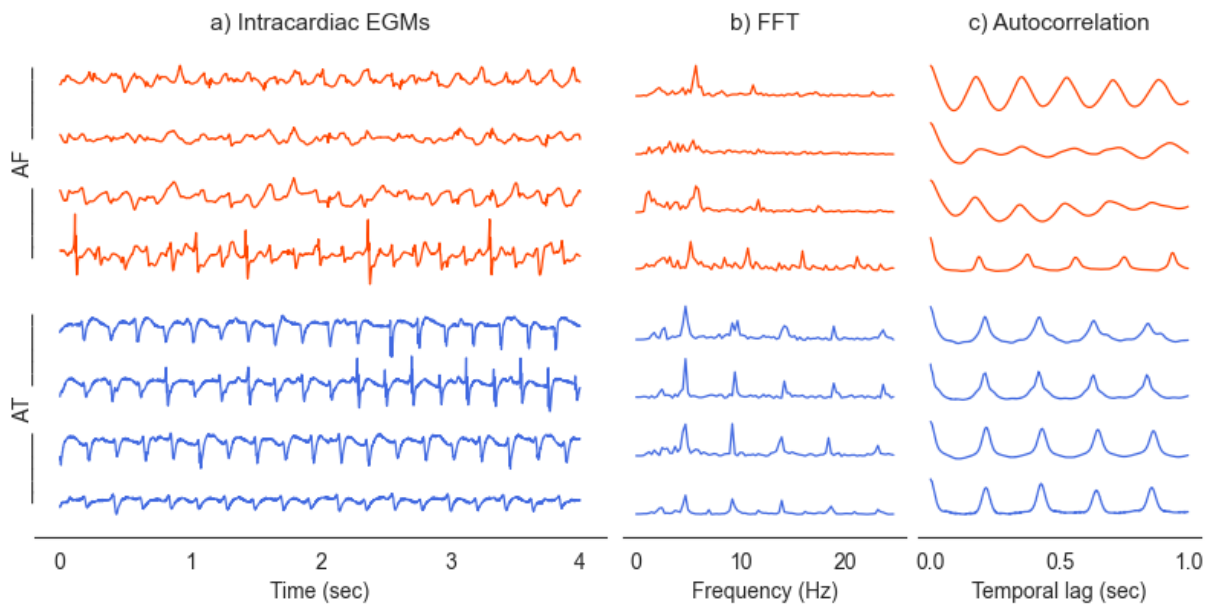


Figure 1. Sample EGM signals for AF and AT in time domain (a) and in frequency domain (b). Also, autocorrelation function for the sample signals are displayed (c).

Within each of the 22 formed clusters, a singular feature was meticulously chosen, considering outcomes related to balanced accuracy, computational efficiency, and interpretability.

The catch22 features encompass a diverse array of characteristics, spanning distributional properties, regularity, complexity, and more. Following lists selected features from the hctsa toolbox, accompanied by concise descriptions:

1. Distribution:
 - a. DN_HistogramMode_5: Represents the distribution's mode through a 5-bin histogram of z-scores.
 - b. DN_HistogramMode_10: Represents the distribution's mode through a 10-bin histogram of z-scores.
2. Simple temporal statistics:
 - a. SB_BinaryStats_mean_longstretch1: Identifies the longest duration of successive values surpassing the mean.
 - b. DN_OutlierInclude_p_001_mdrmd: Captures intervals between consecutive occurrences of extreme events above the mean.
 - c. DN_OutlierInclude_n_001_mdrmd: Captures intervals between consecutive occurrences of extreme events below the mean.
3. Linear autocorrelation:
 - a. CO_f1ecac: Indicates the point where the autocorrelation function crosses $1/e$ for the first time.
 - b. CO_FirstMin_ac: Marks the initial occurrence of the minimum value in the autocorrelation function.
 - c. SP_Summaries_welch_rect_area_5_1: Represents cumulative power within the lowest quintile of frequencies in the Fourier power spectrum.



4. Nonlinear autocorrelation
 - a. CO_trev_1_num: Measures time-reversibility, represented by $\langle (x_{t+1} - x_t)^3 \rangle t$.
 - b. CO_HistogramAMI_even_2_5: Computes automutual information with $m = 2, \tau = 5$.
 - c. IN_AutoMutualInfoStats_40_gaussian_fmfi: Finds the point of first minimum in the automutual information function.
5. Successive differences
 - a. MD_hrv_classic_pnn40: Calculates the ratio of successive differences surpassing 0.04σ [Mietus et al. (2002)].
 - b. SB_BinaryStats_diff_longstretch0: Identifies the longest duration of consecutive incremental decreases.
 - c. SB_MotifThree_quantile_hh: Shannon entropy of two successive letters in equiprobable 3-letter symbolization
 - d. FC_LocalSimple_mean1_ttauresrat: Change in correlation length following iterative differencing
 - e. CO_Embed2_Dist_tau_d_expfit_meandiff: Exponential fitting applied to consecutive distances in a 2-dimensional embedding space
6. Fluctuation analysis:
 - a. SC_FluctAnal_2_dfa_50_1_2_logi_prop_r1: Computes the fraction of slower timescale fluctuations exhibiting scaling behavior according to detrended fluctuation analysis.
 - b. SC_FluctAnal_2_rsrangefit_50_1_logi_prop_r1: Computes the fraction of slower timescale fluctuations exhibiting scaling behavior according to linearly rescaled range fits.
7. Periodicity:
 - a. SB_TransitionMatrix_3ac_sumdiagcov: Determines the sum of diagonal elements of the covariance matrix for transition probabilities between symbols in a 3-letter alphabet.
 - b. PD_PeriodicityWang_th0_01: Quantifies periodicity according to Wang et al. in 2007.

The "catch22" library has been implemented in Python.

Random Forest Classifier:

RF (Breiman, 2001) stands out as a potent ensemble learning technique employed extensively in both classification and regression tasks within the realm of machine learning. This method falls under the umbrella of tree-based algorithms, renowned for its exceptional accuracy, robustness, and adeptness in handling large datasets characterized by high dimensionality.

RF operates by amalgamating multiple decision trees to furnish predictions. During the training phase, it fabricates a multitude of decision trees and aggregates their outcomes via either mode (for classification) or mean prediction (for regression). Notably, each tree within the forest is crafted using a subset of the training data and a randomized selection of features. Decision trees are meticulously built by recursively partitioning the feature space into distinct regions, making pivotal decisions at each node contingent upon the feature values.

Key Features of RF encompass random feature selection, Bootstrap Aggregation (Bagging), voting, and the utilization of Out-of-Bag (OOB) error.

1. Random Feature Selection: At each node of every decision tree, a random subset of features is considered for splitting, enhancing the model's diversity by reducing inter-tree correlation.



2. **Bagging:** RF employs bootstrap sampling to generate multiple datasets from the original training data through replacement. Each decision tree is then trained on one of these bootstrapped datasets.
3. **Voting:** The mode (most frequent class) of predictions from individual trees is amalgamated to derive the final prediction.
4. **OOB Error:** RF capitalizes on OOB samples, which consist of data points not encompassed in the bootstrap sample utilized to train each tree. These samples are leveraged to estimate the model's performance sans the necessity for a separate validation set.

RF boasts several advantages, notably its resilience against overfitting in comparison to individual decision trees, particularly in the presence of noisy data. Moreover, it exhibits proficiency in handling voluminous datasets characterized by high dimensionality and an extensive array of input features. Additionally, RF offers insights into feature importance, facilitating effective feature selection.

However, RF is not devoid of limitations. It can be computationally demanding to train RF models and may necessitate augmented memory resources compared to simpler algorithms. The interpretability of RF models can pose challenges, particularly when dealing with an extensive ensemble of trees, and it may exhibit suboptimal performance on highly imbalanced datasets.

The implementation of RF is facilitated through the sklearn library, utilizing default parameters provided therein. Specifically, the default configuration includes 100 trees in the forest and employs the "gini" criterion to measure the quality of splits. It's important to acknowledge that RF operates as a stochastic classifier, meaning its performance can fluctuate across different runs, even when presented with the same training and testing sets. To ensure consistency in comparisons, the random state seed for all classifiers is standardized to the same number, specifically set to 42.

Classification Performance Assessment:

Monte Carlo cross-validation, a technique involving the random partitioning of the dataset into training and testing sets across multiple iterations, is employed for robust cross-validation. To ensure reproducibility of training and testing sets, the shuffling seed at each iteration is set to the iteration number. In this experimental setup, various training and testing sizes are explored to comprehensively evaluate classifier performance.

Cross-validation Process is implemented via Monte Carlo cross-validation where the dataset is randomly split into training and testing sets for multiple iterations. The shuffling seed, determined by the iteration number, ensures the reproducibility of the training and testing sets. Evaluation Metrics used are accuracy, F1 score, and area under the curve (AUC).

Accuracy quantifies the overall correctness of the classifier by measuring the ratio of correctly predicted instances to the total instances. It provides an intuitive assessment of the classifier's performance.

The F1 score is a metric that balances precision and recall, offering a single numerical measure of a classifier's performance. It is particularly useful in situations where there is an imbalance between classes, providing a comprehensive evaluation of both false positives and false negatives.

The AUC is a metric used to evaluate the performance of a binary classification model. It represents the area under the receiver operating characteristic curve, which plots the true positive rate against the false positive rate at various threshold settings. A higher AUC value (ranging from 0 to 1) indicates better model performance, with 1 representing a perfect classifier and 0.5 indicating performance equivalent to random guessing. AUC is widely used due to its robustness, threshold independence, and ability to summarize the model's discrimination ability across all possible threshold settings.

The choice of these metrics aims to provide a well-rounded understanding of classifier performance, capturing both the accuracy of predictions and the ability to deal with imbalances in class distribution. The utilization of Monte Carlo cross-validation enhances the reliability and robustness of the evaluation process.

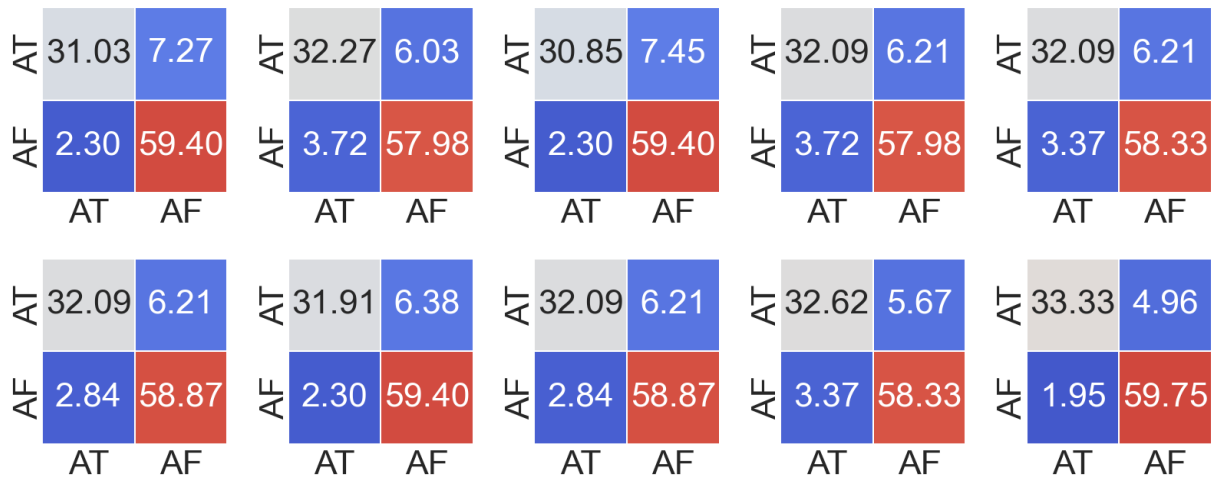


Figure 2. Confusion matrices resulted in each run of Monte Carlo cross validation. True labels are shown in x-axis and predicted labels are shown in y-axis. Cell annotations show values normalized to percentage of total test instance at each case.

RESULTS AND DISCUSSIONS

The study focuses on implementing a RF classifier using catch22 features to classify intracardiac EGM signals as either AF or AT. The performance of the RF classifier is compared between using catch22 features and raw EGM signals..

RF Classification Performance:

Classification results are displayed in Table 2. The results indicate that the RF classifier using Catch22 features achieved significantly higher performance metrics compared to using raw EGM signals. Specifically, the accuracy, F1 score, and AUC values increased from 0.83, 0.80, and 0.79 respectively with raw EGMs, to 0.91, 0.90, and 0.89 respectively with Catch22 features extracted. This demonstrates the effectiveness of Catch22 features in improving classification performance for intracardiac EGMs.

Table 2. Classification results using RF

	Accuracy	F1	AUC
Raw time series	0.8255±0.0142	0.8006±0.0171	0.7860±0.0165
Catch22	0.9051±0.0110	0.8977±0.0119	0.8907±0.0119

Furthermore, the median training time for the RF classifier decreased substantially when using Catch22 features compared to raw EGM signals. While the median training time was 10.1 seconds with raw values, it reduced to 0.7 seconds with Catch22 features. However, it's important to note that an additional 14.4 seconds of preprocessing time was required for feature extraction when using Catch22 features.

The confusion matrices resulting from Monte Carlo cross-validation runs (Figure 2) show that the RF classifier has a relatively low false negative rate (instances predicted as AT but were actually AF) of around 6%, and a slightly higher false positive rate (instances predicted as AF but were actually AT) of around 3%. The true positive rate (correctly predicted instances) for AF and AT was around 59% and 31% respectively, indicating that the RF classifier performs better at detecting AF compared to AT.



Ablation Study on Catch22 Features:

Catch22 comprises 22 features grouped into 7 categories. Ablation studies were conducted to discern the impact of features within each category, employing two methodologies: single-feature ablations and pairwise ablations..

Both single and pairwise ablation results are displayed in Figure 3. Single-feature ablations revealed notable performance decreases in both accuracy and F1 score, particularly when ablating the linear autocorrelation feature group. Conversely, ablations within the periodicity feature group resulted in a lesser decrease in comparison. Ablating successive differences features yielded a slight decrease in accuracy but a more noticeable decrease in F1 score. Notably, the most significant features identified through single ablations were linear autocorrelation, periodicity, and successive differences. Conversely, ablations within the simple temporal statistics feature group led to notable performance increases in accuracy, albeit negligible changes in F1 score.

Contradictory performance changes were observed in the distribution, nonlinear autocorrelation, and fluctuation analysis feature groups, with slight increases in accuracy but negligible differences in F1 score. Consequently, the most detrimental feature group was identified as simple temporal statistics.

Pairwise ablations echoed the findings from single ablations, highlighting significant decreases in accuracy and F1 scores during specific pair ablations, alongside notable increases in other pairs.

Alignment with Literature Findings:

The study's results align with previous literature findings regarding the importance of certain features in distinguishing AF. While literature emphasizes cycle length as a crucial feature (Isa et al., 2007; Rodrigo et al., 2022), this study identifies autocorrelation and periodicity features as paramount. These features, related to cycle length through identifying repeating patterns in signals, emerge as pivotal. In contrast, statistical features are deemed redundant due to their inability to capture temporal data point relations.

Overall, the findings from the RF classification analysis and ablation studies on Catch22 features provide valuable insights into the effectiveness of utilizing RF with Catch22 features for intracardiac EGM classification. The study underscores the significance of specific features and their impact on classification performance, contributing to advancements in cardiac arrhythmia diagnosis and treatment methodologies.

CONCLUSIONS

The study demonstrates the efficacy of employing RF classifiers augmented with catch22 features for intracardiac EGM classification tasks. The significant enhancement in classification performance metrics, including accuracy, F1 score, and AUC, underscores the utility of catch22 features in accurately distinguishing between AF and AT in intracardiac EGM signals.

The utilization of catch22 features not only improves classification performance but also significantly reduces the median training time, as evidenced by the substantial decrease from 10.1 seconds with raw EGMs to 0.7 seconds with catch22 features. This reduction in training time is crucial for enhancing the efficiency and scalability of intracardiac EGM classification algorithms, potentially facilitating real-time clinical applications.

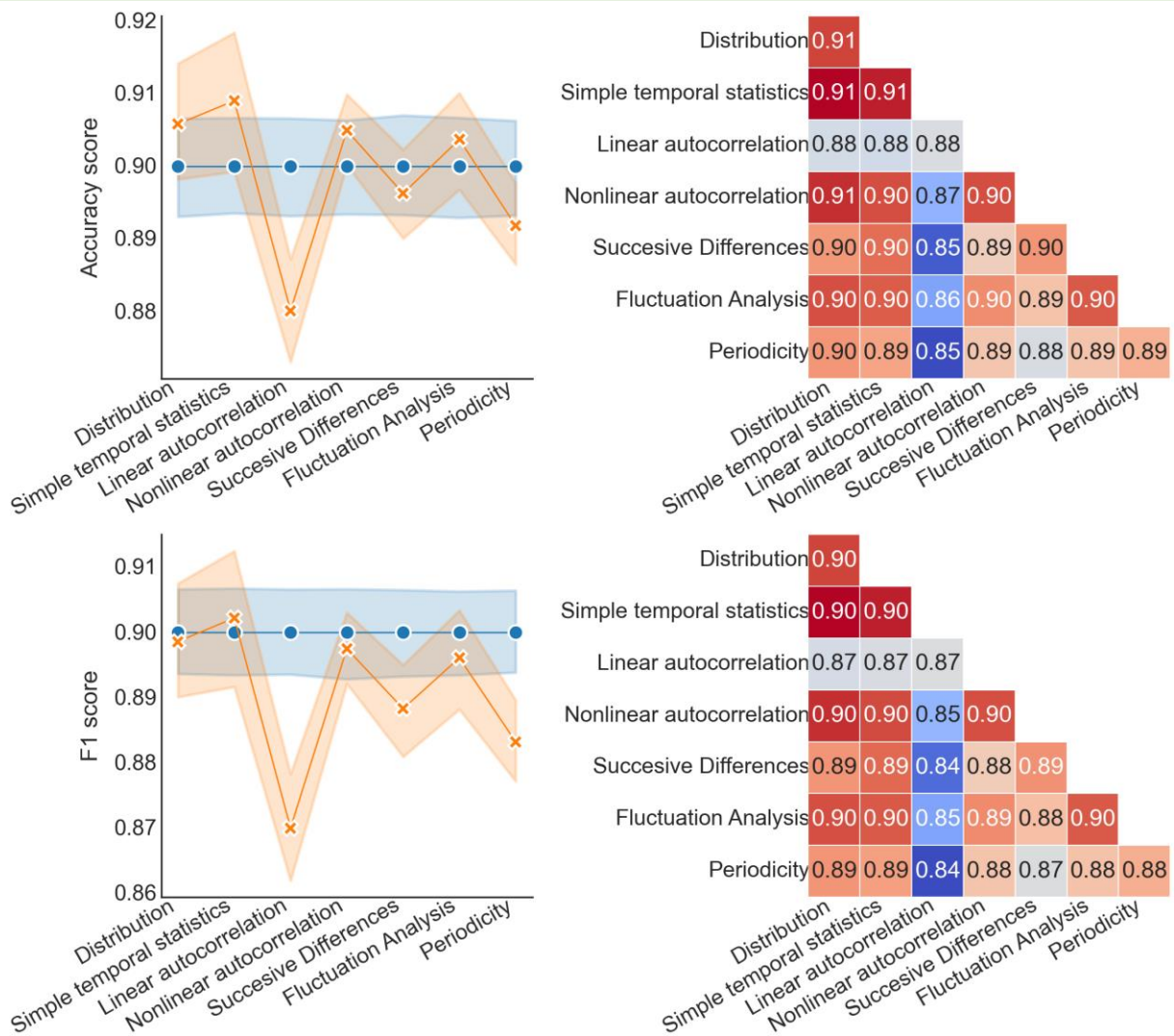


Figure 3. The plots on the left illustrate the fluctuation in performance resulting from the individual ablation of feature sets. The ablated categories are represented on the x-axis, while the mean scores (accuracy at the top, F1 at the bottom) are depicted on the y-axis. Shaded regions indicate the confidence intervals. On the right, heatmaps depict the alteration in performance when two feature sets are simultaneously ablated. Mean scores (accuracy at the top, F1 at the bottom) are annotated within each cell, providing a comprehensive overview of the dynamics of combined feature set ablation. Diagonal entries correspond to the mean scores when a category is individually ablated.



Ablation studies conducted on catch22 features reveal crucial insights into feature importance and their impact on classification performance. The identification of linear autocorrelation, periodicity, and successive differences as the most significant features highlights their pivotal role in accurately classifying intracardiac EGM signals. Conversely, the redundancy of simple temporal statistics underscores the importance of selecting relevant features for optimal classification outcomes.

The study's findings align with previous literature regarding the importance of specific features, such as cycle length, in distinguishing between AF and AT. The identification of autocorrelation and periodicity features as paramount further validates their significance in capturing key patterns within intracardiac EGM signals, contributing to the existing body of knowledge in cardiac arrhythmia classification.

The improved classification performance achieved through RF classifiers with Catch22 features holds promising implications for clinical practice. Accurate and efficient classification of intracardiac EGM signals can aid clinicians in timely diagnosis and treatment decision-making for patients with cardiac arrhythmias, ultimately leading to improved patient outcomes and enhanced quality of care.

Future research endeavors may focus on further refining classification algorithms by exploring additional feature engineering techniques and incorporating advanced machine learning models. Additionally, the integration of multi-modal data sources and the development of interpretable models could enhance the clinical utility of intracardiac EGM classification systems, paving the way for personalized medicine approaches in the field of cardiac electrophysiology.

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THE ECOLOGICAL AND HEALTH SIGNIFICANCE OF THE WIDE-SPREAD HAWTHORN (GENUS CRATAEGUS) PLANT IN THE GREAT CAUCASUS REGION

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ABSTRACT

The Great Caucasus region poses a special threat as an area rich in biological productivity and spectacular natural beauty of ecosystems. The Hawthorn (genus *Crataegus*), which is widespread in this region, stands out as a major ecological factor for this area. In this article, we examine the environmental diseases of plants that are widespread in the Great Caucasus region and the role that plants play in the surrounding ecosystems.

There is diversity among hawthorn species commonly found in the Greater Caucasus region (Azerbaijan). Ecological state and natural areal of some common hawthorn species grown in the Great Caucasus such as *Crataegus pontica* (Pontic hawthorn) with white flowers and red fruits, *Crataegus ambigua* (Uncertain hawthorn) with white flowers and red fruits, *Crataegus ursina* (Bear hawthorn) with white flowers and red fruits, *Crataegus pentagyna* (Five-toothed hawthorn) with white flowers and red fruits, *Crataegus orientalis* (Oriental hawthorn) with white flowers and small black fruits have been investigated. Flower colors, fruit sizes and general morphological characteristics have been compared. Application purposes and fields were revealed. Each species' adaptation condition was looked through for all parts of the Great Caucasus including climate and soil conditions of the region in different ecosystems. The Hawthorn's (genus *Crataegus*) advantages in plant medicine and local kitchen were studied for all natural zones and economic regions. Some ancient recipes have been given first in the investigation paper.

Key words: soil protecting feature, healing characteristic, application in kitchen

Introduction

The genus *Crataegus*, or hawthorn, contains a group of fruit-bearing plants, usually in the form of shrubs or small trees. The general botanical characteristics of plants belonging to the genus *Crataegus* including all parts of the plant were characterized. The hawthorn plant usually has oval or round leaves with regularly toothed edges (Anderberg, A. A., et al., 2007). Leaves may vary depending on the age and type of plant. Hawthorn flowers are usually white, pink or red. The small flowers are usually arranged in a bunch and bloom in spring. Young shoots of the hawthorn plant are usually smooth and green in color, but as they age, the bark can turn gray or gray-brown (Anderberg, A. A., et al., 2007). *Crataegus* species usually have many branches and trunks and can grow in the form of a bush or a small tree. Hawthorn flowers are usually arranged in a large umbrella-shaped flower head. Fruits are usually small, hard and apple-like fruit clusters. These fruits can usually be red, yellow or black in color. Hawthorn plant can generally be found in a wide ecological range from coastal regions to mountainous areas. In addition, it is durable and has the ability to adapt to various climatic conditions. Hawthorn is generally a sun-loving plant and grows well in well-drained soils (Anderberg, A. A., et al., 2007). It can be shaped by regular pruning and unwanted shoots can be kept under control. The genus *Crataegus* is known for its aesthetic value in the landscape, its ability to attract birds, and its ecological benefits. It may also have medicinal uses.



Hawthorn (*Crataegus*) is a traditionally used herbal remedy with a long history in medicine. The medicinal properties of this plant can vary between different species and variations. Hawthorn plays an important role, especially in supporting heart health (Barros, C., et al., 2012). The plant contains flavonoids, tannins and other components that are believed to have positive effects on the cardiovascular system. Some studies have shown that hawthorn extract can help lower blood pressure and alleviate hypertension. Hawthorn is rich in antioxidants and can help reduce cellular damage by fighting free radicals in the body. In some traditional uses, hawthorn is used to strengthen the circulatory system and increase blood circulation. The hawthorn plant is used in traditional medicine to cope with stress and insomnia due to its calming effects. Some research suggests that hawthorn extract may have anti-inflammatory properties and help fight inflammation. Hawthorn is used in some cultures to treat indigestion and may be preferred to support liver health (Barros, C., et al., 2012). In some cases, hawthorn is recommended for skin problems. Antioxidant properties can support the overall health of the skin. Before medical use, it is important to consult with a healthcare professional about interactions and possible side effects of hawthorn. Also, it is important that traditional information about the use of the plant is supported by different scientific research.

Although hawthorn (*Crataegus* genus) is generally considered safe, it can cause side effects in some cases. It is important to speak with a healthcare professional before using any herbal supplement, especially if someone has a chronic health problem (Barros, C., et al., 2012) or are taking regular medication. Some individuals may show allergic reactions to the hawthorn plant. Allergic symptoms may include skin rashes, itching, swelling and difficulty breathing. Hawthorn can cause stomach upset in some people. This condition can appear in the form of heartburn (Brusick, E. J. 2010), bloating or stomach pain. Hawthorn supplements may cause headaches or dizziness in some people. The severity of these effects may vary from person to person. Hawthorn may interact with hypertension medications or medications that affect blood clotting because it can lower blood pressure. Therefore, it is important that individuals who use regular medications consult a healthcare professional. There is insufficient information on the use of hawthorn supplements during pregnancy and breastfeeding. It is important to talk to a healthcare professional before using hawthorn during these times. In some cases, especially in individuals with heart illness, the use of hawthorn supplements is not recommended. Therefore, people with heart problems (Brusick, E. J. 2010) are advised to talk to their doctor first. It is important to speak with a healthcare professional before using any herbal supplement, especially for long-term use or chronic health problems. Also, if the ill man is using other medications that may interact with hawthorn, you should contact your healthcare professional to avoid possible interactions. The soil conservation properties of hawthorn (*Crataegus*) can be focused on ecosystem services, especially erosion control and soil stabilization. The hawthorn plant has an effective soil retention property that prevents soil erosion through its root system. It can reduce soil loss, especially on steep slopes and areas prone to erosion. The roots of the hawthorn plant firmly hold the soil and prevent erosion. In addition, the structure of the roots under the soil reduces the risk of erosion by strengthening the soil layer. The hawthorn plant has the capacity to absorb and store water through its underground root system. This feature helps the water stay in the soil longer by regulating the rainfall regime. The fallen leaves and fallen fruits of the plant add organic matter to the soil. It can increase soil fertility and strengthen soil structure. Hawthorn plant can regulate soil pH (Stansbury, R. L., et al. 1999). Some species thrive in acidic soils, while other species may prefer neutral or slightly alkaline soils. The hawthorn plant covers the soil surface by creating a natural vegetation cover. This reduces erosion and supports the habitat of living organisms below the soil. The hawthorn plant can regulate soil temperature through vegetation, especially in soils exposed to sunlight. Hawthorn's soil-protective properties play an important role in maintaining soil health and promoting sustainability by supporting a variety of ecosystem services.

Scope of the paper is to study ecological and health advantages of the plant which grow on the Great Caucasus. Due to the purpose the following **objectives** were proposed for the study process.

- Monitoring of Hawthorn's (genus *Crataegus*) soil protecting characteristics;
- Determination of healthcare opportunities of Hawthorn (genus *Crataegus*);
- Advantages of Hawthorn's (genus *Crataegus*) in the local cuisine.



Research Object and Materials

The study area is the well-known Great Caucasus Mountains, located in the territory of Azerbaijan, are a encompassing mountain system in the northwestern part of the country. The Great Caucasus is located in the northernmost part of Azerbaijan and generally forms a large natural border between the North-Western regions of Azerbaijan and Georgia. These mountain systems cover a wide area from Gabala and Gakh districts to Sheki and Gusar districts. The Greater Caucasus is known for its numerous peaks and bends in the territory of Azerbaijan, which are ideal for traveling. Among these peaks are Khinaluq, Garadag, Shahdag, Babadag and other similar heights. One of the highest peaks, Bazarduzu Mountain (4,466 meters) is located on the border of Azerbaijan and Russia and is of strategic importance for several countries. The Azerbaijani part of the Greater Caucasus is known for its natural presence and natural diversity of combined flora and fauna. This area has rare plant and animal species. This region, which covers North-West Azerbaijan, is protected by national parks and reserves. The Azerbaijani side of the Greater Caucasus has been the location of various cultures, empires and ethnic groups throughout history. It is possible to find many castles, ancient monuments and temples in this region. Khinalyg is famous for finding shovels and is a remarkable and cultural region famous for its kinship territories and plateau located in the foothills of the mountains.



Figure 1. Map of Great Caucasus Mountain

Study Method and Equipments

In the domain of remote sensing, the significance of employing multispectral imaging techniques is unparalleled. These methods deliver invaluable insights into the reflective characteristics of hawthorn plants across a spectrum of wavelengths, providing information on their health, photosynthetic activity, and overall vegetation condition. The examination of the Normalized Difference Vegetation Index (NDVI), a pivotal metric for appraising the photosynthetic activity of vegetation, yields valuable insights into the growth status of hawthorn plants. NDVI values, extrapolated from remote sensing data, assume a critical role in assessing the vitality of the plant. Thermal imaging emerges as a potent tool for discerning plant stress and appraising overall plant health. The application of remote sensing methods enables the identification of stress conditions in hawthorn plants, contributing to a comprehensive understanding of their well-being. Remote sensing facilitates the cartography of hawthorn population distribution. The observation of alterations in plant density and distribution through remote sensing data yields valuable insights into habitat utilization patterns and broader ecosystem characteristics. The use of remote sensing expedites the monitoring of environmental parameters Cetojević-Simin, D., et al. (2015) that exert a direct influence on the growth and distribution of hawthorn plants. These parameters, covering soil properties, water sources, and climate variables, provide a holistic perspective on the plant's ecological context. A spectrum of tools, encompassing satellite imagery, aerial vehicles, and drones, can be applied in remote sensing research. Deliberate consideration of the advantages and limitations of each tool is imperative for selecting the most fitting one for the study. Time series analysis significantly contributes to grasping the hawthorn growth cycle, seasonal variations, and long-term



trends. The application of remote sensing data over time augments the capability to monitor hawthorn plants effectively and capture dynamic changes in their environment Cetojević-Simin, D., et al. (2015).

There are several common species of hawthorn plant (*Crataegus* genus) in Azerbaijan. These plants are generally distributed in the northern and northwestern regions of Azerbaijan. *Crataegus monogyna* (Monochrome hawthorn) species is usually found in Europe and Asia, and it is almost common in the northern part of Azerbaijan. It is classified by its stems and deeply lobed leaves with blue or white flowers. The fruits are red or gray in color, edible or tasty, and are mainly used to make syrups and candies. *Crataegus pontica* (Dagestan hawthorn). This species exists in the rifts of the Greater Caucasus and the region of Dagestan. It was also confirmed in the western part of Azerbaijan. It is a larger and stronger tree and is distinguished by its black flowers and red fruits. It is considered beneficial for health with its fruits containing antioxidants and vitamins. *Crataegus azarolus* (Azarol hawthorn) is found in many regions of Azerbaijan and grows mainly in forested and riverine areas. The stem is red in color and surrounded by iron seeds. It is distinguished by its blue or white flowers and orange fruits. Fruits containing vitamin C and antioxidants are used to prepare marmalade and compote. These hawthorn species exist in different areas of Azerbaijan, and it is usually possible to collect them from the wild, plant them or buy them from home gardens. The nature and cultural use of these plants emphasizes their presence as a part of Azerbaijani culture and nature.



Figure 2. General Hawthorn (genus *Crataegus*) varieties spreaded in Great Caucasus

Hawthorn fruit (genus *Crataegus*) usually ripens in mid-spring and is ready to harvest. The ripening process usually starts in spring and continues until summer. In March and April, the hawthorn plant usually begins to bloom (Jansen, R. K., et al., 2008). White or pink flowers bloom. During this period, pollination takes place and an important stage for fruit development begins. After pollination, small green buds begin to form on the plants. These buds eventually turn into fruits. In May and June, the fruits begin to grow and take shape. In late summer, hawthorn berries ripen and change color. Ripe fruits can usually be red, yellow, black or purple in color. Fruits usually begin to sweeten and become more palatable. Hawthorn fruits are usually harvested in July and August. Ripe fruits can be easily picked by hand and bring out the flavors to the maximum.

Harvested fruits can be consumed fresh immediately, and can be dried and stored for various uses. Ripe hawthorn fruits can be eaten fresh, but can also be used to make jam, marmalade, syrup, tea and other food products. Also used in traditional medicine, hawthorn fruit has been associated with various health benefits. The ripening phase of hawthorn fruit usually lasts from early spring to late summer (Jansen, R. K., et al., 2008). Suitable climate and soil conditions are important for the plant to grow in a healthy way and bear fruit.

Result and Discussion

After the study some facts were defined dealing with Hawthorn (genus *Crataegus*) plant. As for climate and soil requirements, Hawthorn (genus *Crataegus*) generally prefers temperate climates, but many species can grow in a wide range of climates. It prefers well-drained soils and usually thrives in soils with a slightly acidic pH. It can be found naturally in different habitats such as forest clearings, valleys and coastal areas. It is widely found in Azerbaijan region. Pollen is usually carried by wind or insects. Bees, in particular, collect pollen from the flowers of the hawthorn plant. The fruits of this plant are often dispersed by birds, which plays an important role in the ecosystem. Ecological advantages of the plant are follow:



- Ecological Resistability;
- Soil Errosion Control;
- Water Quality Improvement;
- Supporting Biodiversity;
- Habitat and Ecosystem Improvement;
- Air Purification and Carbon Capture;
- Aesthetic and Landscape Value.

These characteristics show that the hawthorn (genus *Crataegus*) plant can contribute to environmental sustainability in ecosystems and various geographical regions.

At the same time the plant possesses huge medicinal usage, too. Hawthorn's most common medicinal use is to support cardiovascular health. It contains antioxidants, flavonoids and other components that can improve heart health (Brusick, E. J. 2010). It can regulate blood pressure and help regulate heart rate. Hawthorn is rich in antioxidants and anti-inflammatory compounds. These properties can support overall health by fighting free radicals in the body. According to some research, hawthorn may have sedative effects. Therefore, hawthorn-based supplements can help improve sleep patterns and cope with stress (Jansen, R. K., et al., 2008). Some types of hawthorn contain ingredients that can support the digestive system. It can be used as a natural solution to problems such as stomach ailments and indigestion.

Remember, it's important to talk to a health professional before using any herbal supplement or herb. Medical uses and interactions may vary depending on the personal health condition. Thus, the plant may serve:

- Cardiovascular health support;
- Antioxidant source;
- Cosy sleeping;
- Stomach ache and indigestion solution.

Hawthorn fruit is an ingredient used in various cuisines in addition to its health benefits.

For hawthorn jam (Phipps, J. B., O'Kennon, R. J., & Lance, R. W., 2003)., red or black fruits, sugar, water, lemon juice are needed. In order to prepare the jam, the hawthorn berries are washed and the seeds removed. Water's boiled together with sugar then the hawthorn berries are added to the boiling mixture and continue to simmer over low heat. The jam is cooked until it reaches the consistency of jam. When it's ready, lemon juice is added and mixed. After cooling, the jam is poured into jars.

For hawthorn compote fruits, sugar, water, cinnamon (optional) are needed. The hawthorn berries are washed and the seeds removed. The water is boiled with sugar in a pot. The hawthorn berries are added to the boiled mixture and boiling is continued until soft. Optionally, a little cinnamon can be added. When it cools down, may be refrigerated and served.

For hawthorn tea, its fruit, water are needed. The hawthorn berries are washed and the seeds are removed. The fresh or dried hawthorn berries are put in a cup. Hot water is added and let it brew for 5-10 minutes. Then the tea can be filtered and served in hot form.

For hawthorn dessert (Jansen, R. K., et al. 2008), its fruits, flour, sugar, butter are needed. The hawthorn berries are washed and the seeds removed. The fruits are fried in butter, sugar's added and it stired until slightly caramelized. Then, the hawthorn berries are added and cooked while being stired. Finally, some flour's added and it's cooked by being stired on low heat. When it becomes cool, the mass can be sliced and served onto the table. Thus, hawthorn fruit is a versatile ingredient that can be used in various cuisines with its sweet and sour taste. These recipes can be applied in any kitchen of the world depending on taste. So, the following delicious sweets may be prepared by utilizing hawthorn fruit:



- Hawthorn jam;
- Hawthorn compote;
- Hawthorn tea;
- Hawthorn dessert.

While summarizing the research, it should be mentioned that hawthorn (genus *Crataegus*) plant has great advantages in environmental protection, traditional medicine, and in world cuisine.

Conclusion

The investigation realized on the ecological and health significance of the wide-spread hawthorn (genus *Crataegus*) plant in the territory of Great Caucasus gave really excellent results. In three aspects the same plant is investigated and main features were defined. Thus, in order to save and protect ecosystem, human being's health, and to decorate cuisine with sweets, all varieties of wide-spread hawthorn (genus *Crataegus*) can be used widely. In forestation the plant is certainly applied.

Acknowledgment

The study was realized to give necessary information about hawthorn (genus *Crataegus*) plant to wide audience which is profitable to protect our health, nature and also to make tasty our cuisine.

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6th International Latin American Scientific Research Congress

İlgili makama;

6. Uluslararası Latin Amerika Bilimsel Araştırmalar Kongresi 1-3 Şubat 2024 tarihleri arasında Havana, Küba'da 17 farklı ülkenin akademisyen/araştırmacılarının katılımıyla gerçekleşmiştir. Kongre kapsamında sunumu yapılan 140 bildirinin 54 adeti Türkiye'den katılımcılar tarafından; 86 bildiri ise 17 ülkeden katılımcılar tarafından sunulmuştur. Kongre 16 Ocak 2020 Akademik Teşvik Ödeneği Yönetmeliğine getirilen "Tebliğlerin sunulduğu yurt içinde veya yurt dışındaki etkinliğin uluslararası olarak nitelendirilebilmesi için Türkiye dışında en az beş farklı ülkeden sözlü tebliğ sunan konuşmacının katılım sağlaması ve tebliğlerin yarıdan fazlasının Türkiye dışından katılımcılar tarafından sunulması esastır." değişikliğine uygun düzenlenmiştir.

Bilgilerinize arz edilir,

Saygılarımla,



Dr. Rafael Ricardo Rentería Ramos
Düzenleme Kurulu Üyesi

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Kurumumuzun Yönetim Kurulu 10 Ocak 2024 tarihinde saat 10.30’da “Bilimsel Diplomasi Projesi” görüşmeleri ile “Bilimsel Kongreler Düzenlenmesi” gündemleri ile toplanmış ve alınan (2 numaralı) karara istinaden aşağıda detayları yazılı olan bilimsel etkinliğin düzenlenmesine ve etkinliğe ilişkin resmi görevlendirme konusunda karar vermiştir.

Bilgi ve gereğini rica ederim



[Signature]

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