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PROF. DR. HAKAN ALTINTAŞ

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Ümit Apt No: 22/A Çankaya/ANKARA

Telefon / Phone: 05437675765

web: www.seruenyayinevi.com

e-mail: seruenyayinevi@gmail.com

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Chapter 1

THE IMPACT OF ERGONOMIC WORKING CONDITIONS ON ACADEMIC PERFORMANCE¹

Ebru OSKALOĞLU², Cemil İNAN³

1 This study is the extended version of the paper entitled “The Impact of Ergonomic Working Conditions on Academic Performance” which was presented in summary form at the 2nd International Artuklu Economic, Administrative and Political Science Congress held in Mardin, Turkey on 21-22 December.

2 Arş. Gör. , Mardin Artuklu Üniversitesi İİBF/ İşletme/ Pazarlama ABD, ORCID: 0000-0001-9125-5110, e-mail: ebruoskaloglu@gmail.com

3 Prof. Dr., Mardin Artuklu Üniversitesi İİBF/ İşletme/ Sayısal Yöntemler ABD, ORCID: 0009-0008-3118-2851, e-mail: cemilinan@artuklu.edu.tr

Introduction

Ergonomics, a multidisciplinary field, was first used in the field of philosophy by Professor Wojciech Jastrzebowski in a weekly magazine in Poland in 1857 (Deste & Berber, 2018; Oskaloğlu & Çatı, 2021). Ergonomics, derived from the Greek words “ergon” (work) and “nomos” (science), is expressed as “work science” in Turkish. According to the International Ergonomics Association (IEA); It is a scientific discipline and profession that applies theory, principles, data and methods to understand the interactions between people or other elements of a system or to design that generally optimizes human well-being (Deste & Sever, 2019: 210; Tuysuz, 2024: 19; Oskaloğlu & Çatı, 2021: 1023; Erdoğan vd., 2023: 64). Ergonomics focuses on the role of people in complex systems, the design of equipment and facilities for human use, and the selection and development of environmental comfort and safety in a quality that does not threaten human health (Sever & Deste, 2021: 418; Özcan & Özgül, 2019: 10; Karwowski, 2005).

Every institution, regardless of service, production or any other sector, has an office environment and is of great importance (Tuysuz, 2024: 18). Poor ergonomics create a stressful working environment for employees and negatively affect their health (Ergin Doğan & Altınbaş, 2024). When ergonomic risks are not controlled in educational institutions, employees become tired as the energy spent physically and mentally increases, their productivity, output quality and general life satisfaction decrease, and work-related illnesses increase (Neto & Amaral, 2020; Shi et al., 2020; Jensen et al. 2002; Tuysuz, 2024; Ergin Doğan & Altınbaş, 2024; Yıldırım & Yıldırım, 2024). The basis of work-related health problems are headache, eye fatigue, continuity of repetitive movements, fixed or inappropriate body position, loading on small parts of the body such as hands and wrists, working at a speed and without interruption that does not allow recovery during movements (Doğan et al., 2011: 45; Seçkiner & Kurt, 2004: 37). Ergonomic work environments, on the other hand, positively affect job satisfaction, increase employee motivation and life satisfaction, increase performance and productivity, and protect the health of employees by reducing work accidents and stress (Bunpot & Klangduen, 2019; Ergin Doğan & Altınbaş, 2024; Kabbash et al., 2020; Chen et al., 2017; Hotchkiss et al., 2015; Tuysuz, 2024: 25; Kekeç Morkoç & Okçu, 2017).

Productivity does not necessarily increase by working harder and spending more hours and energy at work (Osita et al., 2024: 139). Although the success of an organization largely depends on the quality of its employees, the inefficiency of employees in the organization can be attributed to more than one negative factor other than laziness (Osita et

al., 2024: 139; Arimie, 2019; Yeşilyurt, 2025b). When psychological and physical working conditions are neglected or lacking, financial and other motivational incentives are not enough to bring out the best in employees (Düşüngülü et al., 2014: 94; Arimie, 2019). Appropriate psychological and physical working environments should be provided for the scientific productivity of academic staff. Universities can directly or indirectly increase the productivity and effectiveness of academics by making ergonomic arrangements (Düşüngülü et al., 2014: 94; Abdul Latip et al., 2025; Osita et al., 2024). Improvements in work environments affect the physical health, cognitive function and job satisfaction of employees, supporting scientific production, academic performance and high-level education, facilitating universities to achieve their universal goals (Düşüngülü et al., 2014: 94; Osita et al., 2024: 140). This helps to provide organizational success and competitive advantage by supporting the well-being of the workforce and increasing productivity (Osita et al., 2024: 140). When a workplace is not well designed for employees, it can lead to low productivity, low job satisfaction, low morale and various health problems (Koirala & Nepal, 2022).

Within the framework of the explanations made, it is possible to say that ergonomic working conditions have an important effect on protecting both the physical and psychological health of academics and thus increasing their academic performance. In this study, the effect of the ergonomic working environment on academic performance will be tried to be emphasized.

1. Literature Review

Ergonomics or human factors engineering is defined as a group of research and development studies that examine the structural characteristics, physiological, biomechanical and psychological characteristics of humans and their natural and technical adaptation to the machine and work environment (Koç & Tunç, 2024: 284; Osita et al., 2024: 140; Akyıldız Hatırnaz, 2019: 179; Bayraktar et al., 2020: 96; Kurteş & Aydın, 2024: 287). In addition to the machinery and materials, elements such as lighting, noise, thermal comfort, vibration, design of the work area, table, chair, seat, shoe, tool and equipment designs, employees' working hours, overtime, shifts, breaks (breaks) and night work, which vary according to the quality and quantity of the work done and affect employee productivity, are also among the ergonomic factors (Oskaloğlu & Çatı, 2021: 1024). In today's world where ways to provide education more effectively and efficiently are constantly sought (Korkutan & Uzun, 2024: 37), ergonomics is a discipline that investigates the education and abilities of people, their spiritual and physical characteristics related to the environment, and aims to organize the conditions of the work environment according

to these studies (Gümüş & Parlak Biçer, 2023: 7). This order increases the effectiveness and productivity of the work environment and, in the same way, ensures the safety and happiness of employees while they fulfill their assigned tasks. This adds value to the business and ensures that employees put more effort into their work (Osita et al., 2024: 140; Gültaş, 2023: 229). A healthy and employee-friendly organization helps to create a culture of innovation, harmony, increased productivity and creativity (Osita et al., 2024: 140).

It is possible for businesses to gain competitive advantage by distributing systems in a planned and effective manner. Universities, on the other hand, try to gain competitive advantage by focusing on success in research (Damar et al., 2020: 561). As for the concept of performance, although it tends to be used in the same sense as success in daily use, it actually refers to the effort shown to achieve goals (Kılıç, 2023: 2327; Damar et al., 2020; Demirhan vd., 2014). In this context, the concept is most commonly defined as “the job description of behaviors and actions related to the goals of the organization”. The performance of employees in organizations is of great importance in improving organizational effectiveness and organizational success, because the measure of employee performance is evaluated by the contribution of the individual (the “human”, the main actor of performance) to organizational goals (Atilla & Kılıç, 2018, 1353; Kılıç, 2023: 2327). The concept of academic performance is considered as the development trends and academic success results of universities. In this context, measuring and managing general and academic performance serves two main purposes. First, performance measurement and management can provide both senior management and employees with accurate and timely information about business processes in order to make effective managerial decisions. In addition, performance measurement and management can be used as an effective tool to determine the extent to which employees comply with or contribute to the standards in predetermined job analyses and definitions. In addition to these two basic services, an accurate performance measurement and management style based on this measurement will contribute to the achievement of business goals and objectives (Damar et al., 2020).

There are studies on the effects of the ergonomic condition of the work environment on employees. Studies have found that there are significant relationships between working conditions and the physical and psychological health of employees (Özçelik Kaynak & Uluğtekin, 2018; Roelofsen, 2002) and that the work environment has a positive effect on employee satisfaction and productivity (Çelebi, 2018; Swanson et al., 1997; Smith & Bayeh, 2003; Karaman, 2020). While there are studies conducted with academic staff indicating that the work environment is ergonomic (Gedik

et al., 2015; Bekleviç & Gedik, 2018), there are also studies emphasizing that it causes health problems in employees because it is not ergonomic (Kekeç Morkoç & Okçu, 2017; Jensen et al., 2002). There are also studies that find a relationship between the ergonomics of work environments and academic productivity (Düşüngülü et al., 2014; Çelebi, 2018; Bayraktar et al., 2020) and academic performance (Osita et al., 2024).

The result is seen that the number of studies examining the effect of ergonomic working conditions on academic performance is limited. In order to contribute to this deficiency in the literature, the effect of ergonomic working environment on academic performance will be examined in this study. It will also be tried to determine whether ergonomic working conditions and academic performance perception differ.

2. Method

2.1. Purpose and Model of the Research

The aim of the study was to determine whether ergonomic working conditions affect academic performance. It was also aimed to determine whether ergonomic working conditions and academic performance differed in terms of demographic variables. The research model is as in Figure 1, in accordance with the purpose of the research.

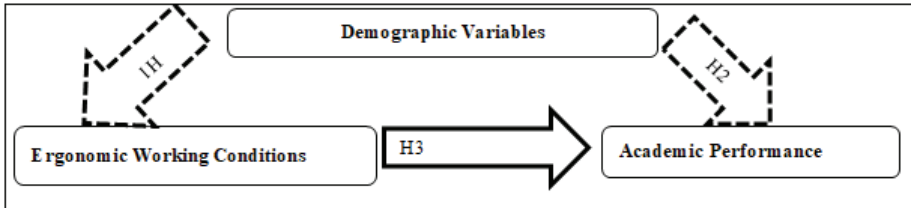


Figure 1: *Research Model*

H1: The perception of ergonomic working conditions varies according to (a) gender (b) age (c) level of education (d) academic title (e) how many people share the room (f) whether the person has received ergonomics training (g) weekly course load (h) how many years of working at this institution (i) whether any materials such as a PC/tablet/phone support stand, chair cushion, back support cushion, under-desk footrest/footrest etc. are purchased for the office (i) whether a PC/tablet/phone support stand, chair cushion, back support cushion, under-desk footrest/footrest etc. are considered for your office.

H2: Perception of academic performance varies according to (a) gender (b) age (c) level of education (d) academic title (e) number of people sharing the room (f) ergonomics training (g) weekly course load (h) years of working at this institution (i) purchase of any materials such as a PC/tablet/phone support stand, chair cushion, back support cushion, under-desk footrest/footrest etc. for the office (i) consideration of purchasing a PC/tablet/phone support stand, chair cushion, back support cushion, under-desk footrest/footrest etc. for your office.

H3: Ergonomic working conditions affect academic performance.

2.2. The Universe and Sample of the Research

The universe of the research consists of the academic staff of Mardin Artuklu University. Since it is difficult to examine the entire population in terms of time and cost during the data collection process, sampling was used (Güven et al., 2022a: 6; Oskaloğlu et al., 2024). Data were collected from 128 participants between 06.05.2024 and 09.07.2024.

2.3. Data Collection Tools

In this study, the online survey technique was used as the data collection method. It is possible to obtain relatively more data economically with the survey method (Güven et al., 2022b: 471; Oskaloğlu et al., 2024). In addition, it allows the collected data to be standardized and their analysis to be easy (Oskaloğlu & İnan, 2024). The first part of the online survey form prepared for use in the research consists of 10 questions including demographic information of the participants. The second part includes questions about ergonomic working conditions (Oskaloğlu & Çatı, 2021) and academic performance (Damar et al., 2020). A 5-point Likert-type scale was used in all scales whose validity and reliability were previously tested. A 5-point Likert-type scale was used in all scales. The values in the scale were formed as follows; (1) Strongly disagree, (2) Disagree, (3) Neither agree nor disagree, (4) Agree and (5) Strongly agree.

3.4. Data Analysis and Findings

Data was collected from 128 participants via an online survey form. Frequency analysis, factor analysis, normality test, difference tests (t test and ANOVA test) and regression analysis were performed on the data transferred to the SPSS 26 package program, respectively.

3.4.1. Frequency Analysis

The findings regarding the frequency analysis results describing the demographic characteristics of the participants participating in the study are given in Table 1.

Table 1: *Frequency Analysis*

Demographic Characteristics		Frequency	Percentage	Demographic Characteristics		Frequency	Percentage
Gender	Female	44	34,4	Your weekly course load?	I don't have a lesson	14	10,9
	Male	84	65,6		1-5 hours	11	8,6
	Total	128	100,0		6-10 hours	21	16,4
Age	25-44 age	94	73,4		11-15 hours	22	17,2
	45-60 age	31	24,2		16-20 hours	29	22,7
	61-75 age	2	1,6		21-25 hours	11	8,6
	76 ages and above	1	,8		25 and above	20	15,6
	Total	128	100,0		Total	128	100,0
Level of Education	Master's Degree	41	32,0	How many years have you been working in this institution?	Less than 1 year	12	9,4
	Doctorate	76	59,4		2-5 year	37	28,9
	Post- Hoc	11	8,6		6-10 year	39	30,5
	Total	128	100,0		11-15 year	32	25,0
Academic title	Lecturer	33	25,8		16 and above	8	6,3
	Doctor Lecturer	6	4,7	Have you purchased any materials for your office such as PC/ Tablet/Phone support stand, chair cushion, back support cushion, under-desk stand/foot support etc.?	Total	128	100,0
	Doctor Lecturer	20	15,6		Yes	46	35,9
	Doctor Research Assistant	7	5,5		No	82	64,1
	Assistant Professor	37	28,9		Total	128	100,0
	Associate Professor	19	14,8	Are you considering purchasing a PC/ Tablet/Phone support stand, chair cushion, back support cushion, under-desk stand/foot support, etc. for your office?	Yes	67	52,3
	Professor Doctor	6	4,7		No	61	47,7
	Total	128	100,0		Toplam	128	100,0
How many people do you share your room with?	I'm staying alone	29	22,7				
	1	43	33,6				
	2	15	11,7				
	3	1	,8				
	4	1	,8				
	5	1	,8				
	6	38	29,7				
	Total	128	100,0				
Have you received ergonomics training?	Yes	21	16,4				
	No	107	83,6				
	Total	128	100,0				

3.4.2. Factor Analysis

Factor analysis is a technique designed to examine the covariance structure of a group of variables and to explain the relationships between these variables in terms of a much smaller number of unobservable latent variables called factors (Kayaoğlu & Kurnaz, 2019; Erarslan et al., 2023: 146). KMO and Bartlett's tests are used to test the suitability of variables for factor analysis (Şeyhanoğulları et al., 2024; 458). If the KMO coefficient is greater than 0.5 and the result of Bartlett's sphericity test is less than 0.05, it is interpreted that there are relationships between the variables suitable for factor analysis (Kayaoğlu & Gülmez, 2020: 1274; Gürses et al., 2018: 8). If the variance explained in the scales is greater than 0.50, the analysis is statistically valid (Sever & Çatı, 2021: 565; Ergin et al., 2024: 189). As a result of the KMO and Bartlett's tests performed on the ergonomic working conditions scale, the KMO value was 0.748 and the Bartlett's value was 0.000. These values show that the sample value of the research is suitable for factor analysis. The Cronbach alpha value of the scale is 0.779. This value is higher than the acceptable value of Cronbach alpha values, $\alpha = 0.60$ (İslamoğlu & Alnıaçık, 2016; Dabakoğlu & Bakan, 2021: 257; Oskaloğlu & Çatı, 2021; Kurnaz et al., 2024: 164). Factor loadings, eigenvalues, explained variance and mean values of the statements regarding the perception of ergonomic working conditions of the participants are given in Table 2.

Table 2: *Ergonomic Working Conditions Factor Analysis Findings*

Factor 1: Lighting and Accessibility	Factor Loading	Eigenvalue	Explained Variance	Reliability
My work environment is illuminated by natural lighting (daylight).	,519	5,429	25,854	,779
My work environment is clean.	,530			
Lighting devices are placed parallel to the windows.	,695			
The file cabinet (bookcase) has a feature that does not require bending or reaching.	,581			
The socket and power switch in my work environment are easily accessible and safe.	,590			
There is enough space to separate different lecture notes/books/notebooks/files on the table.	,768			
Factor 2: Location of the Computer and Its Attachments	Factor Loading	Eigenvalue	Explained Variance	
The mouse is on the same plane as the keyboard in terms of my wrist-arm health.	,541	1,940	9,238	
The keyboard is angled and conveniently located.	,742			
The position of the computer screen is suitable for my viewing distance.	,367			
My internet connection speed is sufficient in my work environment.	,396			
Factor 3: Suitability of Furniture to the Person	Factor Loading	Eigenvalue	Explained Variance	
The general lighting intensity of my work environment is sufficient and spreads evenly throughout the area.	,537	1,789	8,520	
My sitting chair can rotate around its axis and its height can be adjusted.	,541			
The backrest of my sitting chair is adjustable.	,742			
The surface of my sitting chair is covered in a way that does not cause sweating.	,367			
There are generators in my work environment to prevent power outages.	,569			
Factor 4: Working Environment Conditions	Factor Loading	Eigenvalue	Explained Variance	
The humidity level of my working environment is suitable.	,602	1,442	6,869	
The temperature of my working environment is suitable.	,696			
There are ventilation and air conditioning devices in my work environment.	,790			
Factor 5: Features of the Study Desk	Factor Loading	Eigenvalue	Explained Variance	
There is a foot support that disconnects my foot from the ground.	,874	1,278	6,087	
The height of my desk is adjustable.	,843			
KMO and Bartlett's Test				
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0,748		

Bartlett's Test of Sphericity	Approx. Chi-Square	923,625
	df	210
	Sig.	0,000
	The following variables with a loading rate below 30% were excluded from the evaluation.	
“My work environment is noisy.”		
“There are adjustable shades on the windows.”		
“I use a paper holder while working.”		
“My desk has straight and pointed edges.”		
“The surface brightness of my desk bothers my eyes.”		
“The width of my desk interferes with my foot movements.”		

According to Kaiser Normalization, in the factor analysis conducted by considering the factors with eigenvalues greater than 1, it was determined that the scale related to Ergonomic Working Conditions consisted of 5 factors. The total variance percentage of the study was 56.568. Since this ratio is higher than 0.50, it shows that the analysis is statistically valid (Oskaloğlu et al., 2024). The 5 dimensions that emerged were named as "Lighting and Accessibility", "Location of Computers and Attachments", "Suitability of Furniture for the Person", "Working Environment Conditions" and "Features of the Study Desk", respectively, in parallel with the study of Oskaloğlu & Çatı (2021).

As a result of the KMO and Barlett's tests conducted on the academic performance scale, the KMO value was 0.748 and the Barlett's value was 0.000. These values show that the sample value of the study is suitable for factor analysis. The Cronbach alpha value of the scale is 0.902. This value is higher than the acceptable value of Cronbach alpha values, $\alpha=0.60$ (İslamoğlu & Alniaçık, 2016; Dabakoğlu, 2022). The factor loadings, eigenvalues, explained variance and mean values of the statements regarding the participants' perception of academic performance are given in Table 3.

Table 3: *Academic Performance Factor Analysis Findings*

Factor 1: Academic Performance	Factor Loading	Eigenvalue	Explained Variance	Reliability
Our university believes that the best work for academic reputation is done through research and teaching within the field of expertise.	,696	5,814	48,447	,902
Our university produces the best graduates for employment.	,796			
Our university believes in small class sizes and good individual supervision in terms of faculty/ student ratio.	,717			
Our university believes in research impact and produces publications that will be cited.	,685			
Our university believes that in order to have a good ratio of international faculty members, incentives should be provided to attract academics from other countries.	,735			
Our university believes in the importance of attracting a high number of students from other countries.	,658			
It is observed that the academic staff of our university frequently win field-specific awards and medals.	,739			
It is observed that our university graduates frequently win field-specific awards and medals.	,697			
Our university staff receives research income in the form of grant support.	,573			
Our university has sufficient resources for academic processes.	,679			
Our university has adequate infrastructure with basic facilities.	,639			
Our university units provide consultancy services and training to the government, private companies and different segments of society.	,714			
KMO and Bartlett's Test				
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0,748		
Bartlett's Test of Sphericity	Approx. Chi-Square	923,625		
	df	210		
	Sig.	0,000		
The following variables with a loading rate below 30% were excluded from the evaluation.				

According to Kaiser Normalization, in the factor analysis conducted by considering the factors with eigenvalues greater than 1, it was determined that the scale related to academic performance consisted of a single factor. The total variance percentage of the study was 48.447. The resulting dimension was named as “academic performance” in parallel with the study of Damar et al. (2020).

3.4.3. Normality Test and Difference Analyses

A significance level (sig.) of the Kolmogorov-Smirnov and Shapiro-Wilk tests used to test whether the distribution values of a variable are significantly different from the normal distribution is less than 0.05, indicating that the distribution of the examined variable does not show a normal distribution (İslamoğlu & Alnıaçık 2016; Oskaloğlu et al., 2024). According to İslamoğlu & Alnıaçık (2016); The results of the Kolmogorov-Smirnov and Shapiro-Wilk tests should be evaluated together with the skewness and kurtosis values (İslamoğlu & Alnıaçık, 2016: 277; Korkutan vd., 2023: 306). It is stated that the normal distribution assumption is met when the skewness and kurtosis values are within the limits of ± 2.00 and close to zero (Özkeseer Kaya, 2024; Gürbüz & Şahin, 2018; Güven & Demirtaş, 2023; Kurnaz, 2025: 58). Since the significance level (sig.) of the Kolmogorov-Smirnov and Shapiro-Wilk tests of the ergonomic working conditions and academic performance perception scales was less than 0.05, and the skewness and kurtosis values were within the range of ± 2.00 , parametric tests (t and Anova) were used in the study, assuming that the data were normally distributed.

3.4.3.1. t Test

Independent two-sample t-test is a test used to determine whether there is a significant difference between the means of two independent groups in terms of a metric variable under examination (Gültaş & Yıldırım, 2016: 38; Yeşilyurt, 2025a; Oskaloğlu et al., 2025).

Table 4: Evaluation of Differences in Ergonomic Working Conditions and Academic Performance Perception According to the Gender of the Participants

Factor \ Gender	Female (Average)	Male (Average)	t	f	sig.
Academic Performance	2,8845	2,7679	,245	1,363	,898
Lighting and Accessibility	3,0455	3,3750	,627	,238	-2,394
Location of Computer and Accessories	3,0341	3,4464	,479	,504	-2,387
Suitability of Furniture to the Person	2,9591	3,2833	,708	,140	-2,347
Working Environment Conditions	3,1894	3,1944	,565	,332	-,029*
Features of the Study Desk	1,9545	1,6548	,556	,349	1,929
*P<0,05					

As a result of the t test, since the sig. value is less than 0.05; the hypothesis “**H1a:** Perception of ergonomic working conditions differs by gender.” was accepted; while since the sig. value is greater than 0.05, the hypothesis “**H2a:** Perception of academic performance differs by gender.” was rejected.

Table 5: *Evaluation of Differences in Perception of Ergonomic Working Conditions and Academic Performance According to Participants' Ergonomic Training Status*

<div>Ergonomics</div> <div>Training Factor</div>	Yes (Average)	No (Average)	t	f	sig.
Academic Performance	2,8810	2,7936	,523	,130	,602
Lighting and Accessibility	3,0952	3,2944	-1,108	1,828	,270
Location of Computer and Accessories	3,4762	3,2710	,909	,858	,365
Suitability of Furniture to the Person	3,1619	3,1738	,665	,188	,948
Working Environment Conditions	3,0476	3,2212	-,773	,010	,441
Features of the Study Desk	1,7381	1,7617	-,117	,008	,907
*P<0,05					

As a result of the t test, since the sig. value is greater than 0.05; “**H1f:** Ergonomic working conditions perception differs according to the status of receiving ergonomics training.” hypothesis and “**H2f:** Academic performance perception differs according to the status of receiving ergonomics training.” hypothesis were rejected.

Table 6: *Evaluation of Ergonomic Working Conditions and Academic Performance Perception Differences According to the Purchase Status of Any Materials such as PC/Tablet/Phone Support Stand, Chair Cushion, Back Support Cushion, Under-Desk Footrest/Foot Support, etc. for the Office*

<div>Did you buy it?</div> <div>Factor</div>	Yes (Average)	No (Average)	t	f	sig.
Academic Performance	2,6141	2,9167	-2,399	2,877	,018*
Lighting and Accessibility	3,2536	3,2663	-,091	,849	,928
Location of Computer and Accessories	3,1196	3,4085	-1,671	,005	,097
Suitability of Furniture to the Person	3,1304	3,1951	-,463	3,867	,644
Working Environment Conditions	3,0290	3,2846	--1,485	3,191	,140
Features of the Study Desk	1,6196	1,8354	-1,393	,422	,166
*P<0,05					

As a result of the t test, since the sig. value is less than 0.05; the hypothesis “**H1i:** Ergonomic working conditions perception differs depending on whether any material such as a PC/tablet/phone support stand, chair cushion, back support cushion, under-desk footrest/foot support etc. is purchased for the office” is accepted; while since the sig. value is greater

than 0.05, the hypothesis “**H2i**: Academic performance perception differs depending on whether any material such as a PC/tablet/phone support stand, chair cushion, back support cushion, under-desk footrest/foot support etc. is purchased for the office” is rejected.

Table 7: *Evaluation of Differences in Ergonomic Working Conditions and Academic Performance Perception According to the Consideration of Purchasing Any Material such as a PC/tablet/phone Support Stand, Chair Cushion, Back Support Cushion, Under-Desk Footrest/Foot Support etc. for the Office*

Would you buy it?	Yes	No	t	f	sig.
Factor	(Average)	(Average)			
<i>Academic Performance</i>	2,7251	2,8989	-1,414	1,463	,160
<i>Lighting and Accessibility</i>	3,1990	3,3306	-,987	1,591	,326
<i>Location of Computer and Accessories</i>	3,1381	3,4877	-2,118	,194	,036*
<i>Suitability of Furniture to the Person</i>	3,0448	3,3115	-2,019	3,799	,046*
<i>Working Environment Conditions</i>	3,0746	3,3224	-1,499	3,948	,133
<i>Features of the Study Desk</i>	1,7090	1,8115	-,685	,290	,495
*P<0,05					

As a result of the t-test, since the sig. value is less than 0.05; the hypothesis “**H1i**: The perception of ergonomic working conditions differs depending on whether to purchase any material for the office such as a pc/tablet/phone support stand, chair cushion, back support cushion, under-desk footrest/foot support, etc.” was accepted; while since the sig. value is greater than 0.05, the hypothesis “**H2i**: The perception of academic performance differs depending on whether to purchase any material for the office such as a pc/tablet/phone support stand, chair cushion, back support cushion, under-desk footrest/foot support, etc.” was rejected.

3.4.3.2. ANOVA Test

One-way analysis of variance (One-way ANOVA) is known as an analysis technique in which comparisons are made between more than two independent groups in terms of a metric variable under examination or differences are examined (Özkaser Kaya, 2024: 56; Polat et al., 2024: 506). If there is a difference between the groups in multiple comparisons, it is first determined whether the groups are homogeneous or not. Then, multiple comparison tests (Post Hoc) are used to determine which group (or groups) is different from the others (Özkaser Kaya, 2024: 56). If the ho-

homogeneity condition is met, multiple comparison tests using the homogeneity of variances approach are used, if the homogeneity condition is not met, multiple comparison tests using the different variances approach are used (Ergin et al., 2023: 276-277). In this study, the Games-Howell test, which is stronger than other Post-Hoc tests, was used for factors whose main mass variances were not distributed homogeneously (Sig.<0.05) as a result of the homogeneity test, while the LSD test, which is thought to be stronger, was used to determine the difference between the group means for factors that were distributed homogeneously (Sig.>0.05) (Oskaloğlu & Çatı, 2021: 1031).

Table 8: *Evaluation of Differences in Ergonomic Working Conditions and Academic Performance Perception in the Context of Demographic Characteristics of the Participants*

		<i>Lighting and Accessibility</i>	<i>Location of Computer and Accessories</i>	<i>Suitability of Furniture to the Person</i>	<i>Working Environment Conditions</i>	<i>Features of the Study Desk</i>	<i>Academic Performance</i>
Yaş	f	1,410	1,621	1,305	,381	,094	,693
	sig.	,243	,188	,276	,767	,963	,558
Öğrenim düzeyi	f	,640	1,741	3,044	,439	,909	4,175
	sig.	,529	,180	,051	,646	,406	,018*
Akademik unvan	f	2,144	2,717	1,568	2,649	1,066	3,850
	sig.	,053	,016*	,162	,019*	,387	,002*
Odanızı kaç kişiyle paylaşıyorsunuz?	f	1,938	,988	2,634	1,772	1,586	2,124
	sig.	,080	,437	,020*	,110	,157	,055
Haftalık ders yükünüz?	f	2,070	1,957	2,315	,600	1,086	2,449
	sig.	,062	,077	,038*	,730	,374	,029*
Kaç yıldır bu kurumda çalışıyorsunuz?	f	,297	,887	,869	,297	1,703	4,420
	sig.	,879	,474	,485	,880	,154	,002*
*P<0,05							

The ANOVA test conducted to determine whether the perception of “Ergonomic Working Conditions” and “Academic Performance” differed depending on age revealed no difference. Based on these results; **“H1b: Ergonomic working conditions perception differs depending on age.”** and **“H2b: Academic performance perception differs depending on age.”** hypotheses were rejected.

The ANOVA test conducted to determine whether the perception of “Ergonomic Working Conditions” and “Academic Performance” differed depending on education level revealed no difference in the perception of “Ergonomic Working Conditions”, while there was a difference in the perception of “Academic Performance.” As a result of the LSD test conducted on the perception of “Academic Performance,” the highest perception was seen in the master’s degree group (3.0447). Based on these results; “**H1c**: Ergonomic working conditions perception differs depending on education level.” hypothesis was rejected, while “**H2c**: Academic performance perception differs depending on education level.” hypothesis was accepted.

As a result of the ANOVA test conducted to determine whether the perception of “Ergonomic Working Conditions” and “Academic Performance” differed depending on the academic title, there was a difference in the perception of “Ergonomic Working Conditions” and “Academic Performance”. As a result of the Games-Howell test conducted on the “Location of Computers and Attachments” dimension, the highest perception was seen in the “Lecturer” group (3.6437); as a result of the Games-Howell test conducted on the “Working Environment Conditions” dimension, the highest perception was seen in the “Associate Professor” group (3.7778); and as a result of the LSD test conducted on the “Academic Performance” dimension, the highest perception was seen in the “Lecturer” group (3.0934). Based on these results; “**H1d**: Ergonomic working conditions perception differs according to academic title.” and “**H2d**: Academic performance perception differs according to academic title.” hypotheses were accepted.

The ANOVA test conducted to determine whether the perception of “Ergonomic Working Conditions” and “Academic Performance” differed depending on the number of people sharing the room, revealed a difference in the perception of “Ergonomic Working Conditions”, but no difference in the perception of “Academic Performance”. The LSD test conducted on the “Suitable Furniture for the Person” dimension revealed the highest perception in those sharing the room with 5 people (4,600). Based on these results; the hypothesis “**H1e**: The perception of ergonomic working conditions differs depending on the number of people sharing the room” was accepted, while the hypothesis “**H2e**: The perception of academic performance differs depending on the number of people sharing the room” was rejected.

The ANOVA test conducted to determine whether the perception of “Ergonomic Working Conditions” and “Academic Performance” differed depending on the weekly course load revealed a difference in both the perception of “Ergonomic Working Conditions” and “Academic Performance”. As a result of the LSD test conducted on the “Suitability of Furni-

ture for the Person” dimension, the highest perception was seen in the 11-15 hour course load group (3.5727). As a result of the LSD test conducted on the “Academic Performance” dimension, the highest perception was seen in the group with no course (3.2857). Based on these results; “**H1g:** Ergonomic working conditions perception varies according to weekly course load.” and “**H2g:** Academic performance perception varies according to weekly course load.” hypotheses were accepted.

As a result of the ANOVA test conducted to determine whether the perceptions of “Ergonomic Working Conditions” and “Academic Performance” differ depending on the number of years of employment in the institution, no difference was found in the perception of “Ergonomic Working Conditions”, but a difference was found in the perception of “Academic Performance.” As a result of the LSD test conducted on the “Academic Performance” dimension, the highest perception was seen in the group working for less than 1 year (3.4375). Based on these results; While the hypothesis “**H1h**: Perception of ergonomic working conditions differs according to the number of years of working in the institution.” was rejected; the hypothesis “**H2h**: Perception of academic performance differs according to the number of years of working in the institution.” was accepted.

3.4.4. Regression Analysis

Regression analysis investigates the cause-effect relationship between variables by estimating the average value of the dependent variable based on the value of one or more independent variables (Güven et al., 2022: 10).

Table 9: *Effect of Ergonomic Working Conditions on Academic Performance*

Effect of Ergonomic Working Conditions on Academic Performance		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
Sabit		,732	,274		2,668	,009
<i>Lighting and Accessibility</i>		,010	,080	,011	,123	,903
<i>Location of Computer and Accessories</i>		,229	,061	,310	3,717	,000*
<i>Suitability of Furniture to the Person</i>		,203	,082	,220	2,465	,015*
<i>Working Environment Conditions</i>		,114	,062	,153	1,827	,070
<i>Features of the Study Desk</i>		,160	,060	,194	2,654	,009*
R: ,608	R ² : ,370	Adjusted R ² : ,344		Durbin-Watson: 1,732	F: 14,317	

*P<0,05

The R value is 0.608 and the effect of the dependent variable on the independent variable is positive and significant. According to the R² value (0.370), known as the coefficient of determination, the independent variable explains 37% of the variance in the dependent variable. The fact that the result of the F test (14.317) is significant shows that the model makes a significant contribution to explaining the dependent variable in question. It is understood that the smaller the significance value (sig.) of the regression analysis is than 0.05, the better the regression model explains the variance in the dependent variable (Özkeser Kaya et al., 2024: 59; Oskaloğlu et al., 2024). As a result of the analysis, while the value is less than 0.05 in the “Location of Computer and Accessories” dimension (0.000), in the “Suitability of Furniture to the Person” dimension (0.015) and in the “Features of the Study Desk” dimension; In the “Lighting and Accessibility” dimension (0.903) and in the “Working Environment Conditions” dimension (0.070) it was greater than 0.05. In other words, ergonomic working conditions affect academic performance. Based on these results; **“H3: Ergonomic working conditions affect academic performance.”** hypothesis was accepted.

CONCLUSION

The work environment is arranged in accordance with the physical and psychological characteristics of people, thus protecting employee health and increasing productivity, performance and quality (Kurteş & Aydın, 2024: 287; Sönmez vd., 2025). Ergonomic workplace conditions contribute to employee satisfaction by ensuring that activities are carried out more effectively and quickly (Yeşilyurt, 2023; Yararel, 2022). Ergonomic improvements can lead to cost savings and profitability, which are important elements of global competition, by reducing health-related expenses and increasing operational efficiency (Mert et al., 2022; Aslan, 2024: 954). Conversely, some organizations may ignore ergonomic issues, prioritize short-term cost savings over long-term employee well-being, and this may ultimately harm their corporate identity and productivity (Mert et al., 2022; Yeşilyurt, 2023: 230; Çatı vd., 2022: 32). This study was conducted to determine the effect of ergonomic working conditions on the academic performance of Mardin Artuklu University academic staff. It is also aimed to determine whether ergonomic working conditions and academic performance vary according to demographic variables.

As a result of the factor analysis made on the “Ergonomic Working Conditions” scale adapted from the studies of Oskaloğlu & Çatı (2021), 5 dimensions were determined for “Ergonomic Working Conditions”. The obtained factors were named “Lighting and Accessibility”, “Location of Computer and Accessories”, “Suitability of Furniture for the Person”,

“Working Environment Conditions” and “Features of the Study Desk” in parallel with the study of Oskaloğlu & Çatı (2021). The dimension that emerged as a result of the factor analysis made on the scale adapted from the study of Damar et al. (2020) was named “academic performance” in parallel with the study of Damar et al. (2020).

Ergonomic interventions reduce the risk of work-related musculoskeletal disorders (Colim et al., 2023; Mert et al., 2022), while non-ergonomic conditions increase the risk of musculoskeletal disorders (Jensen et al. 2002; Güneş & Ceylan, 2016). Ergonomics not only addresses physical health but also contributes to mental well-being by reducing stress and increasing job satisfaction, productivity, and performance (Hakim & Yusup, 2024; Bigošová et al., 2019). A well-designed ergonomic environment can lead to lower absenteeism (Hakim & Yusup, 2024; Jaklin et al., 2022), a more positive organizational culture, performance (Hakim & Yusup, 2024), and quality of life (Agarwal et al., 2023). It has been determined that healthy office ergonomics increases the satisfaction level of employees (Huang et al., 2004; Zaidi et al., 2018; Hedge, 1988), that the satisfaction levels of academicians regarding workplace ergonomics are at a moderate level (Alzahrani, 2019), and that academicians’ satisfaction with the ergonomics of higher education buildings varies (Bortolini & Forcada, 2021; Hedge & Dorsey, 2012). This study supports studies that conclude that ergonomic working conditions increase performance (Marková & Lestyásková, 2023; Monera et al., 2024; Shahabadkar et al., 2023; Nepal & Koirala, 2024). Office ergonomics focuses on optimizing the design of the workspace, which not only significantly increases employee satisfaction and reduces work-related discomfort by creating a healthier and more productive work environment, but also supports general well-being and job satisfaction. Although taking measures focusing on ergonomics is necessary to improve health and productivity among academics, it should not be forgotten that this situation can be costly and may not always yield immediate results and may not be sufficient on its own. Therefore, all elements within the organization must be managed more rationally to solve the problems (Karahan & Aslan, 2016: 774).

The fact that the study was limited to Mardin Artuklu University academicians caused the response rate to be low, and this is seen as the most important limitation of the study. Despite extensive efforts to reach potential participants, the response rate was lower than expected. This limitation may affect the generalizability of the findings as it may not fully represent the larger population. Future research should consider using additional data collection strategies to increase participation. Continued research is essential to understand how these perceptions change over time and to determine the most effective methods. The study can be conducted

by researchers in one or more universities, educational institutions, or it can be investigated on different groups of office workers in terms of the effects of ergonomic working conditions on performance. In addition, the effects of ergonomic working conditions on satisfaction, productivity, etc. can be investigated.

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Chapter 2

A SIMULATION APPLICATION FOR PROCESS IMPROVEMENT IN PRODUCTION LINE

Emre EKİN¹, Petek BAL²

¹ Doç.Dr., Milli Savunma Üniversitesi, emrenike@hotmail.com, ORCID ID: 0000-0002-4043-9750

² Endüstri Mühendisi, petekbal897@gmail.com, ORCID ID: 0009-0009-7793-6812

INTRODUCTION

Today, with the rapid development of digital technologies, many applications have been developed that enable the efficient use of systems as well as the evaluation and improvement of operational efficiency and process conditions through the analysis of different scenarios. Such technological investments are especially critical in the manufacturing sector, where maintaining competitiveness and sustainability is vital; they play an important role in resource efficiency, line balancing and process optimization. In this context, the aim of this study is to create a more efficient process by observing these processes in advance with technological steps. One of the most frequently used methods related to process improvement is simulation. With simulation, the system is simulated and the system outputs, resource utilization rates and other results are obtained by experimenting on the model and trying different scenarios.

In this study, it is aimed to observe the current problems of the company operating in a food factory, which is a leader in its sector in Turkey, and to show how the production process changes in different scenarios against these problems and what changes occur as a result of these suggestions. With simulation, bottlenecks of companies can be identified and operational efficiency is ensured by minimizing waste. In particular, identifying bottlenecks in a production line and making improvements at this point or points significantly improves the performance of the whole system. For this reason, it is important for the system to identify and improve bottlenecks by imitating the system (Cihangir et al., 2021). Accordingly, a hybrid approach combining direct observational data based on field observations and hypothetical scenarios was adopted. Arena simulation software was used in the modeling phase of the simulation. Process-related data and distribution analyses were analyzed in detail. Operational scenarios were developed by changing the number of resources based on output performance criteria such as cycle time, resource utilization and waste generation. A comprehensive efficiency assessment was carried out by comparative analysis between the scenarios and the optimal scenario was determined. Based on the results of the study, a series of recommendations are presented to integrate the optimal scenario into the company's existing production process. These recommendations are expected to make a measurable contribution to the company's overall performance and competitiveness in the industry through improvements in efficiency and operational reliability.

1. LITERATURE REVIEW

In this section, some of the studies in the literature related to the method used in the study are given.

Yelkenci and Tunalı (2011) In their study, a simulation modeling study was conducted to identify the bottleneck stations in the heat exchanger production line of an enterprise producing heating products. With the current situation modeled in Arena 10.0 environment, the bottleneck stations in the system were identified and alternative scenarios were presented to improve the capacities of these stations. As a result of the statistical analyses, the investment of a press machine in the pressing station, which is one of the bottleneck stations among the designs proposed for the existing system, was found to be the most appropriate alternative proposal.

Doğan and Takçı (2015) In their study; in a textile factory operating in Kayseri, they identified the bottlenecks in the production line that prevented the factory from working efficiently and compared the current situation with the state of the art with the help of simulation. In the study, when the current situation was compared with the as-built situation, it was seen that the as-built model yielded approximately 47% more products per year and improved the process performance.

Merdin et al. (2017) In their study, they conducted an improvement study that analyzes the changes by bringing the number of trucks required for transportation in a logistics company to the optimum number with the simulation simulation model.

Merdin et al. (2018) In their study; by establishing a simulation model of a furniture enterprise in Karabük province, it was observed that the product transportation times and the total expected time for the production of the final product were reduced by comparing the current situation with the improved system.

Berber ve Deste (2021) In their study, they conducted a comparative improvement study by taking the current situation and post-improvement situations and consumer opinions at the management stage as well as production in a factory operating in the food sector.

Cihangir et al. (2021) In their study, they modeled a production line where stator semi-finished products of an electric motor manufacturing company are produced by using discrete event simulation. In this model, resource utilization rates of operators were taken into account and a new layout was proposed to increase the utilization rates of operators with low utilization rates. In this layout, the number of operators looking after the first forming and pneumatic machines was reduced from 2 to 1. In this way, both cost reduction by using one less operator and increase in operator utilization rate were achieved.

Ordu and Korhan (2022) In their study; they established a simulation model of the materials produced in the cutting department of a textile company and examined the reduction of production times and the comparison of the amount of materials produced per unit time by establishing a different scenario after the current situation.

Sağlamcı and Aslan (2022) In their study, they aimed to eliminate bottleneck points, increase the amount of output and make resource utilization more efficient by establishing different scenarios with the simulation model. As a result of the scenarios, it was determined that the number of workers working in planting and post-planting operations can be reduced with the simulation model, which has an improvement proposal that can eliminate the bottlenecks in the system, and thus a decrease in production cost can be achieved by using fewer resources.

Çekici (2024) In this study; by analyzing the processes in the actual customer complaint evaluation system, the number of personnel required to work in the system and the daily working hours of the personnel and the average solution time to be found for customer complaints were determined by simulation optimization using Arena simulation application.

Gören and Tosun (2024) In their study, they focused on process improvement in the ready-to-wear sector by first analyzing the current situation and then conducting simulation studies with different scenarios. As a result, they reduced the cycle time in the production line, increased the amount of production per person and resource utilization rate and minimized the idle time.

2. METEDODOLOGY

The method used in the study is Simulation. Different scenarios are analyzed comparatively with Arena simulation application. Simulation is the artificial creation of a real process or system. Simulation is defined as the imitation of a process. Simulation shows the behavioral competence of the process. During simulation, desired changes can be easily integrated into the system, inputs can be applied repeatedly, and results can be observed in desired details (Utku et al., 2022). Accordingly, in the factory where the study was conducted, the main objective was to first understand the general workflow and production lines, and then to achieve a balanced and optimized process flow by preparing the processes accordingly. After this preparation, Arena simulation software was used to determine the most efficient scenario by creating comparison scenarios according to the number of workers waiting on each line.

2.1 SIMULATION

Simulation allows the modeling of assets, resources and processes in any system in different ways with rules and comparing different alternative scenarios. Simulation is also an important tool for process improve-

ment studies in manufacturing, healthcare, logistics and service sectors (Merdin et al., 2018).

Simulation is the process of designing a model of a real or imagined system and conducting experiments on the model in order to understand the behavior of the system and to evaluate change strategies for the operation of the system. This is called simulating. Simulating means “presenting something unreal as if it were real, trying to show it” (Baudrillard, 2014). Therefore, model building and analytical use of the model constitute the simulation process. Modeling with simulation is a methodology of experimentation and application in the form of defining the behavior of the system, establishing a theory or hypothesis, using the established theory to predict the future behavior of the system. Simulation is a technique that can be applied to many disciplines and there are many publications on this subject. For example; business administration, economy, marketing, education, politics, social sciences, behavioral sciences, transportation, workforce, urbanism, global systems, etc. (Halaç, 1982).

A model is a representation of an object, a system or an idea. The purpose of a model is to help us explain, understand or improve the system. Simulation is one type of modeling. Simulation is not a theory but a methodology for problem solving. One of the questions that may come to mind here is when is simulation useful? Simulation should be used when one or more of the following conditions are present.

- 1) A complete mathematical formulation of the problem does not exist or the mathematical model has not yet been solved by analytical methods. Most waiting line (queue) models belong to this group.
- 2) Analytical methods are convenient for solution, but mathematical methods are very complex.
- 3) Analytical solutions exist and can be used, but the people working on the problem do not have this knowledge.
- 4) It was observed that simulation was used to estimate certain parameters.
- 5) Simulation may be the only way to experiment.
- 6) Establishing the behavioral characteristics of systems or processes can take time.

Research in advanced countries shows that simulation is among the most widely used techniques (Infoldia, 2023).

Developing successful simulation models is expensive, time-consuming and requires ingenuity. If the model is not solved correctly, it may

produce incorrect results. Building a simulation model is considered by many authors to be an art, and in general, model building is more of an art than a science. “Simulation is both a science and an art.” (Banks et al., 2001) would be the best example.

The elements of a simulation model are the components of the system, controllable variables and parameters, uncontrollable variables and parameters, functional relationships, objective function and constraints.

2.2 SIMULATION PROCESS and STAGES

The stages of simulation used to investigate the behavior of real systems are given below: (Banks et al., 2005)

1. System Definition - This is the stage of determining the boundaries, constraints and efficiency measure of the system.

2. Problem formulation - The process of transferring the system into a logical flow diagram to abstract or reduce it.

3. Model translation - Translating the model into the language of the computer on which the simulation will be run.

4. Data collection - This is the stage of identifying the data required by the model and reducing them to a size that can be used.

5. Model conceptualization - It is the stage of making the confidence level of the model acceptable and commenting on the real system from the model.

6. Strategic Planning - The design of an experiment that will provide the desired information.

7. Tactical Planning - It is the determination of how the tests of the conditions defined in the designed trial will be conducted.

8. Experimentation - This is the stage of realizing the simulation with the desired data and performing sensitivity analysis.

9. Interpretation - This is the stage of making inferences from the simulation results.

10. Implementation - Putting the model and its results into use.

11. Documentation and reporting – Reporting project activities and documenting the use of the model.

If the model is rejected after the fifth stage, which is to investigate the

validity of the model (or to evaluate the model), we return to the model formulation stage.

2.3. PURPOSES OF SIMULATION

Simulation is the most preferred method in operations research and system analysis. The conditions under which simulation should be used have been analyzed by many authors. In general, simulation can be used for the following purposes (Bank and Carson, 1984).

1. Simulation can be used to study the internal structure of a complex system or subsystem in a complex system,
2. Changes in knowledge, organizational hand and environment can be simulated and the effects of these changes on the behavior of the model can be studied,
3. The knowledge gained from the design of a simulation model contributes greatly to the development of the system under study,
4. By varying the simulation inputs and examining the results, learn about which variables are more important and how they affect each other,
5. Simulation can be used as an informative tool supporting the analytical solution methodology,
6. Simulation can be used to see what the situation will be by trying new designs and policies before implementation,
7. Simulation can be used to test analytical results.

2.4. ADVANTAGES AND DISADVANTAGES OF SIMULATION

Simulation is an extremely powerful aid to problem solving and is widely used for its various advantages.

- Difficulties in constructing mathematical models by analytically analyzing complex real systems.
- Simulation allows experimentation with new policies, parameters, or operating conditions to predict system performance for these new conditions (Banks et al., 2005; Law, 2015).
- The real system is tested without disturbing, disrupting or jeopardizing it.
- It is possible to consider the system under study in different time streams. For example, it may be possible to obtain general information

about the system by accelerating the study in a compressed time, or it may be possible to obtain detailed information about the system in a wide time interval. Bu avantajlara rağmen simülasyonun bazı dezavantajları da vardır.

1. Simulation models are expensive and difficult to develop. (Kelton et al., 2010).
2. The stochastic nature of simulation models enables predictions to be made about the real system. (Law, 2015; Kelton et al., 2010).
3. Simulation models compare alternative solutions rather than finding the best solution to the problem.
4. Model validity is crucial for simulation results to accurately reflect the system under study.
5. The dependence on the computer in simulation causes the study to be long and expensive.

3. APPLICATION

The simulation model created is a simulation model that shows the bottlenecks, queues, and inefficiency rates in the hazelnut chocolate production line in the production line of a chocolate production factory in Turkey. In the Arena Simulation application, the average time data, which is considered to reflect the process most accurately, was obtained as a result of on-site observations and interviews with the relevant operators. First of all 3 different raw materials were defined for production (hazelnut, milk, cocoa seed). The defined raw materials are entered into the system with the create module. The milk, hazelnuts and cocoa seeds entering the system are transported to the station modules with the route module. The named station modules are cocoa warehouse, hazelnut warehouse and cold chain for milk. The raw materials stored in the warehouses are transported to the input module via the output module when necessary and delivered to the allocated station modules. The raw materials (cocoa beans, hazelnuts, milk) transported from the stations are processed and assigned to the modules. Processed hazelnuts, processed cocoa beans and processed milk (assignment modules) pass to the 12th station with the route modules and reach the mixer process. The product coming out of the mixer process comes to the decision1 module. There is an 11% margin of error in the Decision1 module. (raw materials were not mixed in the correct amount.) Defective products are assigned to the 9th station with the Route3 module. Products mixed in the correct proportions (89%) come to the Route4 module and station8 module, go through the pack-

aging process and leave the system with shipment. Defective products arriving at the Station9 module go through the reprocessing process and pass through the decision module (decide2). The Decide2 module still has a 50% margin of error. Defective products go from the Route5 module to the station10 module and exit the food recycling system (destroy), while correctly processed products come from the Route6 module to station11, enter the back packaging process and finally leave the system (destroy) with return processing shipment.

3.1. SETTING UP THE SIMULATION MODEL

The simulation model started with the placement of create modules. The input of the 3 main raw materials required for the chocolate line was integrated into the system as 1 sack of cocoa beans every 15 minutes, 1 sack of hazelnuts every 10 minutes and 2 bottles of milk every 20 minutes as a result of observations with average times.

Table 1. ARENA Create Modules Table

	Name	Entity Type	Type	Value	Units	Entities per Arrival	Max Arrivals	First Creation
1	entering cocoa seeds	cocoa	Random (Expo)	15	Minutes	1	Infinite	0.0
2	entering hazelnut	peanut	Random (Expo)	10	Minutes	1	Infinite	0.0
3 ▶	entering milk	Entity 1	Random (Expo)	20	Minutes	2	Infinite	0.0

A total of 10 route modules were used for the simulation model of the line under study. While defining the route times of these modules, the time distributions were determined according to the deviations. It was observed that the times were controlled and the deviations were small for the cold chain route module, the route modules for interline transportation were fixed distances, but the transportation times were variable according to the workers, and the raw material transportation route module had random delays mixed with timing. Therefore, in order to follow a correct path, it was observed and accepted that the cold chain route module was normally distributed, the interline transportation route modules were uniformly distributed, and the raw material transportations were exponentially distributed.

Table 2. ARENA Route Modules Table

	Name	Route Time	Units	Destination Type	Station Name
1	Route 1	NORM(2 , 2)	Minutes	Station	Station 1
2	Route 2	NORM(2 , 2)	Minutes	Station	Station 3
3	Route 3	EXPO(3)	Minutes	Station	Station 9
4 ▶	Route 4	EXPO(5)	Minutes	Station	Station 8
5	Route 5	UNIF(0.5 , 1)	Minutes	Station	Station 10
6	Route 6	NORM(2 , 0.5)	Minutes	Station	Station 11
7	Route 7	NORM(1 , 3)	Minutes	Station	Station 12
8	Route 8	UNIF(1 , 1)	Minutes	Station	Station 12
9	Route 9	NORM(2 , 3)	Minutes	Station	Station 15
10	Route 10	UNIF(1 , 3)	Minutes	Station	Station 12

Station modules were used to monitor the flow of the system in a clean way. It is ensured that the materials coming from the route modules wait in the station modules and are directed to the correct processes.

Table 3. ARENA Station Modules Table

	Name	Station Type	Station Name	Parent Activity Area	Associated Intersection	Report Statistics
1	cocoa warehouse	Station	Station 1			<input checked="" type="checkbox"/>
2	hazelnut warehouse	Station	Station 3			<input checked="" type="checkbox"/>
3	Station 8	Station	Station 8			<input checked="" type="checkbox"/>
4	Station 9	Station	Station 9			<input checked="" type="checkbox"/>
5	Station 10	Station	Station 10			<input checked="" type="checkbox"/>
6	Station 11	Station	Station 11			<input checked="" type="checkbox"/>
7	Station 12	Station	Station 12			<input checked="" type="checkbox"/>
8	Station 13	Station	Station 13			<input checked="" type="checkbox"/>
9	Station 14	Station	Station 14			<input checked="" type="checkbox"/>
10 ▶	cold chain	Station	Station 15			<input checked="" type="checkbox"/>
11	Station 16	Station	Station 16			<input checked="" type="checkbox"/>

For the process modules the distributions used in these processes were hypothetically selected based on the nature of each operation and its level of uncertainty. It was deemed appropriate to use the uniform distribution first. As a result of a hypothetical process observation, in-house information gathering and short observations, it was observed that the cocoa preparation process was prepared with equal probability between 0.5 and 2 minutes. It was observed that the hazelnut preparation process was ready between 0.5 and 3 minutes and the milk heating process was ready between 0.5 and 1.5 minutes. It was observed that the packaging process was ready between 2 and 5 minutes depending on the capacity of the worker. The information was received from the factory that the average back processing time was 20 minutes, so it was deemed appropriate to

use the exponential (mean) distribution for this process in order to reflect the average.

Assignment modules have been used to ensure that raw materials are assigned to the right places in the right quantities and to observe the waste rates during assignment and to enrich the system flow.

Table 4. ARENA Assign Modules Table

	Name	Assignments
1	processeed cocoa	1 rows
2	processeed hazelnut	1 rows
3 ▶	processed milk	1 rows

With Decide modules, certain decision points were determined within the system. With these decision points, quality control of the product was ensured. For the decide modules, a scrap rate of 11% was observed on-site after the initial mixing process. The second decide module represents the products that are reused in the back process stages.Decide1 - %11 false %89 true product

- Decide2 - %50 false %50 true product.

Table 5. ARENA Decide Modules Table

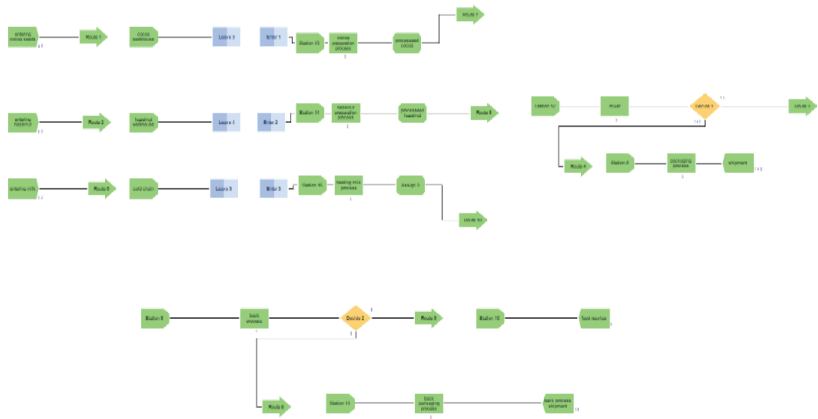
	Name	Type	Percent True
1	Decide 1	2-way by Chance	11
2 ▶	Decide 2	2-way by Chance	50

Three different dispose modules were installed in the simulation system: shipment module for the processed products that are ready with the dispose modules to go to the smart warehouse, recycling module for the products that do not pass both decision points, and back process shift modules for the products that only fail the 1st decision point and successfully pass the 2nd decision point. The module aimed to be optimized in the simulation model is the resources module and the number of resources is entered into the simulation model as capacity.

Table 6. ARENA Information About Resources

	Name	Type	Capacity	Busy / Hour	Idle / Hour	Per Use	StateSet Name	Failures	Report Statistics
1	operators	Fixed Capacity	2	0.0	0.0	0.0		0 rows	<input checked="" type="checkbox"/>
2	mixer machine	Fixed Capacity	1	0.0	0.0	0.0		0 rows	<input checked="" type="checkbox"/>
3 ▶	back process employee	Fixed Capacity	1	0.0	0.0	0.0		0 rows	<input checked="" type="checkbox"/>

3.2 ARENA MODEL OF EXISTING PRODUCTION LINE



3.3 RESULTS OF THE EXISTING PRODUCTION LINE

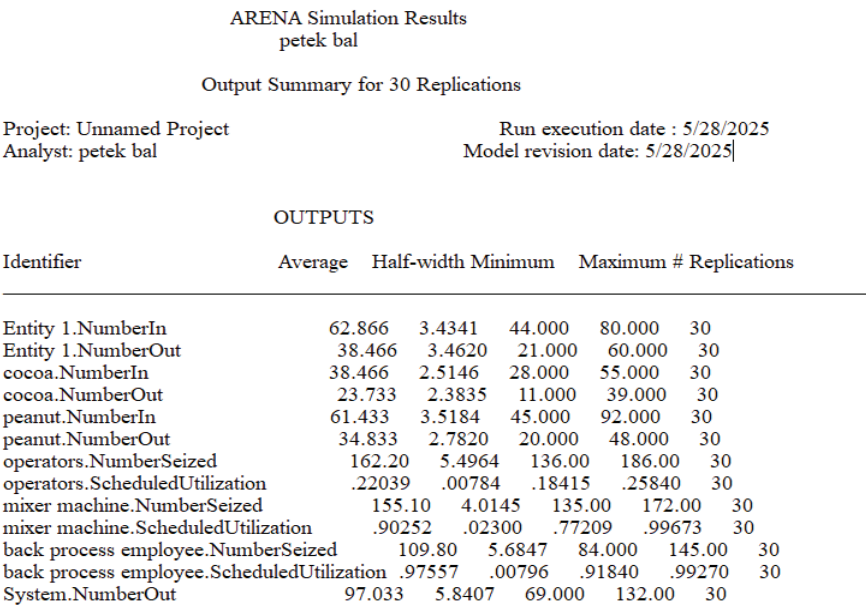


Figure 1. Arena Simulation Results for Existing Production Line

The outputs of the model were run for 10 hours a day for a total of 30 repetitions in accordance with the time of day situation. The outputs were analyzed in 3 criteria as line performance, system performance and

resource utilization.

When we evaluate the performance of the lines, it is seen in the cocoa.NumberIn/NumberOut results that 24 bags of the 39 bags of product received in the system were used efficiently. This means that there was 38% waste in this process. In Peanut.NumberIn/NumberOut results, it is seen that 35 bags of pounded hazelnuts were used efficiently out of 62 bags used on average. We can say that this can mean 43% hazelnut waste. When we look at the Milk. Number In/Number Out ratio, it is possible to say that 39 out of 63 bottles of milk were used. These ratios mean high waste and cost ratios, so it was deemed appropriate to make improvements on this line. In the utilization of resources, we see that 2 line operators, 1 mixing machine and 1 reprocessing worker work on this line. When we look at the results, the utilization rate of the operators is around 22%, which shows that the operators are underutilized. The utilization rate of the mixing machine is 90.25%, so it can be said that the machine is working almost continuously. There is a high probability of queuing here. Back process employee utilization rate is 97.56%. This is a situation that should not be according to a man/hour ratio. When we look at the system performance, a single product comes out of the system with ready-made packages. It was seen that 97 parcels of products were output in a total of 10 hours from 3 different product types.

Considering these results, improvement models were designed for the process status of this line with 3 different scenarios.

4. FINDINGS

According to the outputs of the current system, it was observed that the overall efficiency of the chocolate line was low, bottlenecks and waste rates were high. According to these results, a comparative scenario study will be conducted on the system with different scenario proposals.

4.1 SCENARIO 1: INCREASE BACK PROCESS RESOURCE

In this scenario, it is proposed to hire 1 more person to reduce the overutilization of the Back process worker. The intensive process and over utilization in the back process has a serious impact on the system performance.

Implementation: The number of back process employees was increased from 1 to 2.

Table 7. Source Information for Scenario 1

	Name	Type	Capacity	Busy / Hour	Idle / Hour	Per Use	StateSet Name	Failures	Report Statistics
1	operators	Fixed Capacity	2	0.0	0.0	0.0		0 rows	<input checked="" type="checkbox"/>
2	mixer machine	Fixed Capacity	1	0.0	0.0	0.0		0 rows	<input checked="" type="checkbox"/>
3	back process employee	Fixed Capacity	2	0.0	0.0	0.0		0 rows	<input checked="" type="checkbox"/>

Arena Outputs for Scenario 1

ARENA Simulation Results petek bal

Output Summary for 30 Replications

Project: Unnamed Project
Analyst: petek bal

Run execution date : 5/28/2025
Model revision date: 5/28/2025

OUTPUTS

Identifier	Average	Half-width	Minimum	Maximum	# Replications
cocoa.NumberIn	39.333	1.6678	29.000	48.000	30
cocoa.NumberOut	36.733	1.4996	29.000	47.000	30
peanut.NumberIn	60.133	3.0057	47.000	77.000	30
peanut.NumberOut	55.766	2.6102	46.000	72.000	30
milk.NumberIn	63.200	3.6770	48.000	88.000	30
milk.NumberOut	59.700	3.0712	48.000	77.000	30
operators.NumberSeized	161.40	5.8243	124.00	208.00	30
operators.ScheduledUtilization	.21876	.00894	.16449	.28603	30
mixer machine.NumberSeized	156.53	3.9981	124.00	173.00	30
mixer machine.ScheduledUtilization	.90623	.02321	.74576	.99791	30
back process employee.NumberSeized	169.93	4.9024	134.00	194.00	30
back process employee.ScheduledUtilization	.72184	.03888	.53730	.91894	30
System.NumberOut	152.20	3.8194	123.00	170.00	30

Figure 2. Arena Simulation Results for Scenario 1

Looking at the overall performance of the system, System. Number Out averages around 97.03 in the current system output, while System. NumberOut = 152.20 in the first improvement scenario, an increase of up to 56%. This increase shows that increasing the back process resource capacity significantly improves the system throughput.

Looking at the resource utilization, while the utilization rate of the back process worker was 97% in the current system output, in this scenario Scheduled Utilization = 0.72184 (about 72%), indicating that the heavy load for the resource has eased, but the resource is still active and efficient. When we look at the utilization of the mixer machine resource, we see that the utilization rate is still quite high. In this scenario, we have not foreseen any improvement for the mixer machine utilization. No im-

provement is foreseen for the utilization of line operators like the mixer machine utilization, i.e. Scheduled Utilization = 0.21876 (about 22%) This resource is still underutilized, there is idle capacity in this part of the system.

Looking at the overall material flow performance of the line, we observed a better balance of product inflows and outflows. Approximately 39 sacks of cocoa entered the system and 36 sacks were used efficiently. Hazelnuts entered the system in about 60 sacks, of which 56 sacks were used efficiently. As for milk, when 63 bottles of processed milk entered the system, 60 bottles were used efficiently. The wastage rates in the current system increased the performance of the system by increasing the efficiency above 90% in the improvement model, which is scenario 1.

- Cocoa Out / In ratio: ~%93
- Peanut Out / In ratio: ~%92
- Milk Out / In ratio: ~%94

The rate of material loss or wastage is reasonable and improved over the current system output.

With this scenario, the task area of the “back process employee”, one of the bottleneck points in the system, was strengthened and as a result, both a significant increase in the amount of output was achieved and the bottleneck effect was significantly reduced. However, the next bottleneck of the system was identified as “mixer machine”. Therefore, it is recommended to increase the capacity of the mixer machine or optimize the processing time in future scenarios. In addition, the system-wide resource balance can be optimized by ensuring more efficient use of operator resources with low occupancy rates.

4.2 SCENARIO 2: ADDING SECOND EQUIPMENT TO THE MIXER MACHINE

In this scenario it is proposed to purchase 1 more equipment to reduce the over utilization of the mixer machine. This improvement model was established considering the situation of the mixer machine being a bottleneck with 90% utilization rate and the outputs seen in scenario

Implementation: The number of mixer machines was increased from 1 to 2.

Table 8. Source information for Scenario 2

	Name	Type	Capacity	Busy / Hour	Idle / Hour	Per Use	StateSet Name	Failures	Report Statistics
1	operators	Fixed Capacity	2	0.0	0.0	0.0		0 rows	<input checked="" type="checkbox"/>
2	mixer machine	Fixed Capacity	2	0.0	0.0	0.0		0 rows	<input checked="" type="checkbox"/>
3	back process employee	Fixed Capacity	1	0.0	0.0	0.0		0 rows	<input checked="" type="checkbox"/>

Arena Outputs for Scenario 2

ARENA Simulation Results
petek bal

Output Summary for 30 Replications

Project: Unnamed Project Run execution date : 5/28/2025
Analyst: petek bal Model revision date: 5/28/2025

OUTPUTS

Identifier	Average	Half-width	Minimum	Maximum	# Replications
cocoa.NumberIn	39.333	1.6678	29.000	48.000	30
cocoa.NumberOut	36.733	1.4996	29.000	47.000	30
peanut.NumberIn	60.133	3.0057	47.000	77.000	30
peanut.NumberOut	55.766	2.6102	46.000	72.000	30
milk.NumberIn	63.200	3.6770	48.000	88.000	30
milk.NumberOut	59.700	3.0712	48.000	77.000	30
operators.NumberSeized	161.40	5.8243	124.00	208.00	30
operators.ScheduledUtilization	.21876	.00894	.16449	.28603	30
mixer machine.NumberSeized	156.53	3.9981	124.00	173.00	30
mixer machine.ScheduledUtilization	.90623	.02321	.74576	.99791	30
back process employee.NumberSeized	169.93	4.9024	134.00	194.00	30
back process employee.ScheduledUtilization	.72184	.03888	.53730	.91894	30
System.NumberOut	152.20	3.8194	123.00	170.00	30

Figure 3. Arena Simulation Results for Scenario 2

Looking at the resource utilization, it was observed that when the capacity of the mixer machine was increased, the utilization rate decreased from around 90% in the previous scenario to 47.96%. This result indicates that the overload on the mixer machine was successfully reduced after the capacity increase.

When we look at the utilization of back process employees, Scheduled Utilization = 98.34% (in the current scenario it was 97.55%), it is predicted that the utilization rate is still very high, but the utilization of back process employees will not change in this improvement scenario. When we look at the utilization of line operators, we see that there is no change with 21.87%.

Looking at the overall efficiency of the system, the average number of outputs (System. Number Out) increased to 104.53. In the current scenario, this value was 97.03. An increase of approximately 7.7% has been achieved, meaning that the overall productivity of the system has been positively affected.

Looking at the general material flow performance of the line, Cocoa enters the system in about 43 sacks and 27 sacks are used, giving about 37% waste. Looking at the use of hazelnuts, it is seen that 37 sacks of approximately 59 sacks of hazelnuts were used and it is said that approximately 37% waste is given in this line. Looking at the milk ratio, it was observed that an average of 60 bottles out of 63 bottles of processed milk were used (93% efficiency).

In this scenario, doubling the capacity of the mixer machine resulted in a significant relaxation in resource utilization, which in turn increased system throughput. However, this relaxation increased the load on the resources in the next stage of the system (especially the “back process employee”) and created a new bottleneck.

4.3 SCENARIO 3: REDUCE THE NUMBER OF OPERATORS AND TRANSFER TO BACK PROCESS & INCREASE THE CAPACITY OF THE MIXER

In this scenario, it was aimed to reach the optimum result according to the results of the first two scenarios. In order to reduce the overuse of the mixer machine, it was suggested to purchase 1 more equipment. In addition, it was seen that the line operators were used inefficiently and it was suggested that 1 of the 2 people used in the line operator be included in the back process process, thus avoiding the cost of a new worker and providing a more efficient workflow.

Implementation: Mixer machine number is increased from 1 to 2. The number of operators is reduced from 2 to 1 and the back process capacity is increased from 1 to 2.

Table 9. Source Information for Scenario 3

	Name	Type	Capacity	Busy / Hour	Idle / Hour	Per Use	StateSet Name	Failures	Report Statistics
1	operators	Fixed Capacity	1	0.0	0.0	0.0		0 rows	<input checked="" type="checkbox"/>
2	mixer machine	Fixed Capacity	2	0.0	0.0	0.0		0 rows	<input checked="" type="checkbox"/>
3	back process employee	Fixed Capacity	2	0.0	0.0	0.0		0 rows	<input checked="" type="checkbox"/>

Arena Outputs for Scenario 3

ARENA Simulation Results petek bal					
Output Summary for 30 Replications					
Project: Unnamed Project			Run execution date : 5/28/2025		
Analyst: petek bal			Model revision date: 5/28/2025		
OUTPUTS					
Identifier	Average	Half-width	Minimum	Maximum	# Replications
cocoa.NumberIn	39.900	2.6224	28.000	56.000	30
cocoa.NumberOut	37.833	2.5133	27.000	56.000	30
peanut.NumberIn	59.800	2.6462	49.000	80.000	30
peanut.NumberOut	56.233	2.4250	45.000	69.000	30
milk.NumberIn	62.000	4.7430	40.000	84.000	30
milk.NumberOut	59.000	4.6052	37.000	84.000	30
operators.NumberSeized	160.26	6.5208	128.00	205.00	30
operators.ScheduledUtilization	.43056	.01577	.34306	.53968	30
mixer machine.NumberSeized	159.70	6.5025	127.00	203.00	30
mixer machine.ScheduledUtilization	.46546	.01902	.37229	.60376	30
back process employee.NumberSeized	171.90	7.2691	128.00	221.00	30
back process employee.ScheduledUtilization	.75464	.04077	.50642	.98383	30
System.NumberOut	153.06	6.5105	113.00	196.00	30

Figure 4. Arena Simulation Results for Scenario 3

Looking at the overall efficiency of the system, it is observed that the Average Production Output has increased by 153.06 compared to both the current and previous scenarios. This increase shows that the improvements made are effective.

When we look at the resource utilization, it is observed that the Line Operators Utilization Rate has increased with 43.06%, which means that having 1 operator is more efficient for the system. As a result, although the capacity was reduced, the system was balanced. It is observed that the utilization rate of the mixer machine decreased to 46%. In other words, the capacity increase eliminated the congestion. For the back process workers, the utilization rate has decreased to 75.46%, meaning that worker utilization has reached a more sustainable level and overloading has been reduced.

Looking at the overall material flow performance of the line, the cocoa input/output ratio is 39.9/37.83, which means that wastage has decreased to 5%. Peanut input/output ratio was observed to be 59.8/56.23, indicating a wastage rate of approximately 6%. In the milk ratio, 62 bottles of milk entering the system showed that 60 of them were used efficiently. When we look at the overall performance, it is observed that the waste rates of the system have decreased visibly.

Table 10. Scenario Comparison Table

Indicator / Source	Existing System	Scenario 1	Scenario 2	Scenario 3
Number of line operators	2	2	2	1
Number of mixer machines	1	1	2	2
Number of back process employee	1	2	1	2
Number of outputs from the system	97.03	152.20	104.53	153.06
cocoa.NumberIn / Out	38.47 / 23.73	39.33 / 36.73	42.73 / 26.77	39.90 / 37.83
peanut.NumberIn / Out	61.43 / 34.83	60.13 / 55.76	59.00 / 36.93	59.80 / 56.23
milk.NumberIn / Out	62.86 / 38.46	63.20 / 59.70	65.27 / 40.83	62.00 / 59.00
Operator Utilization rates	22.04%	21.88%	22.66%	43.06%
Usage rates of the Mixing Machine	90.25%	90.62%	47.96%	46.55%
Utilization rates of the reprocessing worker	97.56%	72.18%	98.34%	75.46%

5. CONCLUSION AND EVALUATION

In this study, the current situation of the production process and three alternative scenarios are analyzed in a simulation environment. The aim is to identify bottlenecks in the system, optimize resource utilization and maximize total production output. In the analysis of four different structures, system performance was evaluated according to the output quantity (System.NumberOut), resource utilization rates (Scheduled Utilization) and input/output balance. In the current situation in the factory, the human resources and machines involved in the process are not used effectively, resulting in idle resources, inefficient labor force and a decrease in the number of final products.

In the baseline scenario, it was observed that the biggest bottlenecks in the system were the mixer machine and back process worker resources. In particular, the mixer was found to be operating at a utilization rate of over 90%, while the back process worker was working at close to full capacity of up to 97%. These high utilization rates led to delays in the system and low output (97 products on average).

In Scenario 1, the process was reorganized and resources were allocated more efficiently. In this scenario, system throughput increased signifi-

cantly, reaching 152.2 on average, and although the mixer utilization rate remained high, the operator and back process workers started to work in a more balanced manner, resulting in an improvement in overall flow.

In scenario 2, based on scenario 1, the capacity of the mixer was increased but other resources were not improved. Although the load on the mixer was reduced as a result of this scenario, there was a significant decrease in output (104.5 on average) compared to scenario 1. This shows that the bottleneck in the system is not only limited to the mixer, but that other resources also need to be organized in coordination.

Finally, in Scenario 3, due to underutilization of operators and overutilization of back process workers, one operator was shifted to back process and the mixer capacity was increased by one unit. Thanks to this combination, a more balanced allocation of resources was achieved and the output reached the highest level (153.06 on average). In addition, resource utilization rates remained at optimal levels, which was a positive indicator for the sustainability of the system.

As a result, it has become clear that all resources should be evaluated interactively rather than focusing only on a single bottleneck in improvement efforts to increase system performance. In this context, the proposed Scenario 3 is considered to be the most appropriate scenario in terms of both output efficiency and resource utilization. While it is not possible to make changes on the real system, it is possible to see the output performances with different scenarios by making changes in resource utilization rates by building a model of the system with simulation, and the results that can be obtained without any cost with the changes made on the model can be seen.

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Chapter 3

**EMOTIONS DELEGATED TO ARTIFICIAL
INTELLIGENCE: THE USE OF CHATBOTS
IN CHALLENGING RELATIONSHIPS AND
MOMENTS OF CRISIS**

*Oğuz ONAT¹, Yasemin BERTİZ²,
Müyesser ERASLAN YALÇIN³*

¹ PhD. , Yalova University, 0000-0002-3191-7837

² Lecturer, Karamanoglu Mehmetbey University, 0000-0001- 7388-5901

³ PhD. , 0000-0002-6653-9477

1. Introduction: Digitalizing Emotion & Shifting Paradigms

The evolution of human communication has profoundly reshaped emotional expression, transitioning from traditional methods such as written letters to instant text messaging, and now to advanced artificial intelligence (AI) chatbots that mediate feelings (Baek et al., 2025). This transformative journey necessitates a thorough examination of the motivations, implications, and ethical considerations inherent in delegating emotional communication to AI systems. The aim is to advocate for a balanced augmentation of human emotional capacities rather than their replacement, thereby preserving human authenticity and fostering skill development in interpersonal communication (Baek et al., 2025).

1.1 Digitalization of Emotional Life: Historical Context

Technology has long exerted an influence over emotional expression. Early communication technologies, such as telephones and email, facilitated long-distance interactions but lacked the physical cues crucial for complete understanding, often leading to misunderstandings (Baek et al., 2025). The advent of text-based computer-mediated communication (CMC) spurred adaptations like abbreviations (e.g., LOL, BRB) and emojis, which users adopted to convey emotion within textual constraints. However, the inherent reduction of non-verbal cues in CMC frequently resulted in depersonalization and misinterpretation of emotional intent (Baek et al., 2025).

Modern AI chatbots represent the latest technological endeavor to simulate “richness” in text-based interactions. These systems employ sophisticated algorithmic tone modifiers and increasingly incorporate multimodal inputs, such as voice-stress detection and facial recognition, in an effort to convey a broader spectrum of emotional nuance. This technological advancement, however, simultaneously raises significant concerns regarding the authenticity of the emotional exchange (Baek et al., 2025).

Contemporary chatbots leverage Large Language Models (LLMs) like GPT-4 and integrate sentiment analysis capabilities, contributing to rapid expansion within the AI mental health sector. While specific numerical valuations for this market are often reported by industry analysis firms, these figures typically originate from market research reports rather than peer-reviewed scientific literature. Consequently, precise financial projections cannot be cited as peer-reviewed scientific evidence. Nevertheless, the sector is experiencing substantial growth, driven by increasing global awareness of mental health issues, widespread smartphone penetration, and persistent limitations in access to traditional mental healthcare services. North America and Europe currently lead in the adoption of these

AI-driven solutions.

Peer-reviewed studies have begun to indicate the potential of chatbots in ameliorating symptoms of anxiety, depression, and burnout, particularly among healthcare professionals (Baek et al., 2025; Farzan et al., 2025; Fitzpatrick et al., 2017). Despite these promising applications, research also suggests a complex relationship between high daily chatbot usage and potential negative outcomes. Elevated usage has been correlated with increased loneliness, heightened dependence on the AI, and problematic use patterns (Döring et al., 2024; Laestadius et al., 2024; Ma et al., 2024; Paventhan & Ganapathiram, 2025; Skjuve et al., 2021; Ta et al., 2020). This correlation is particularly pronounced among vulnerable populations, including LGBTQ+ youth (Ma et al., 2024). This presents a significant access paradox: while AI offers a scalable solution to address unmet mental health needs, its excessive or unsupervised use risks exacerbating social isolation and other psychological vulnerabilities (Laestadius et al., 2024). It is important to note that while these correlations are observed, the direct causal link between chatbot use and these negative outcomes, such as “digital emotional laziness,” is still under investigation and requires further longitudinal and experimental studies to establish definitively (Paventhan & Ganapathiram, 2025). Fundamentally, these AI systems operate on statistical pattern matching and algorithmic processing, rather than possessing genuine emotional comprehension.

1.2 Shifting Communication Paradigms

The integration of AI into communication processes poses fundamental challenges to established communication theories. Media Richness Theory, for instance, categorizes communication mediums based on their capacity to transmit cues beyond words, classifying face-to-face interaction as “rich” due to its immediate feedback and multiple verbal and non-verbal cues, in contrast to “lean” text-based communication (Daft & Lengel, 1986). AI-mediated text, even with algorithmic enhancements designed to simulate emotional tone, inherently lacks the real-time feedback loops and the full spectrum of non-verbal cues that characterize richer communication environments (Daft & Lengel, 1986).

Individuals may choose to delegate emotional messaging to AI due to various factors, including social anxiety, time constraints, or a desire for linguistic perfectionism in their communications (Laestadius et al., 2024). The widespread adoption of platforms such as Replika, which reported 10 million registered users by 2022 (Kouros & Papa, 2024; Laestadius et al., 2024; Ta et al., 2020), and Woebot, which has demonstrated efficacy in delivering Cognitive Behavioral Therapy (CBT) interventions

(Farzan et al., 2025; Fitzpatrick et al., 2017), serves as empirical evidence of this growing trend.

2. Emotional Burden & AI-Mediated Communication

2.1 Defining Emotional Burden

Emotional burden is a concept that can be understood through Arlie Russell Hochschild's (1983) seminal framework of emotional labor. This framework distinguishes between "surface acting," which involves managing outward expressions to conform to social expectations, and "deep acting," which entails modifying one's internal feelings to align with required emotional displays (Hochschild, 1983).

Various life contexts, such as caregiving responsibilities, relationship dissolutions, trauma recovery, workplace conflicts, and managing chronic illnesses, impose significant emotional labor on individuals. These situations demand a delicate balance between expressing authentic feelings and engaging in self-preservation through emotional management (Hochschild, 1983). While surface acting can be instrumental in maintaining social harmony and navigating difficult interactions, it carries the inherent risk of fostering inauthenticity and creating emotional distance in close relationships (Hochschild, 1983).

AI-drafted messages, by providing pre-formulated and socially acceptable responses, may inadvertently encourage surface acting. This can reduce immediate emotional strain for the sender, offering a convenient way to navigate challenging conversations. However, this efficiency comes at a potential cost to relational authenticity, as the automated nature of the message may bypass the genuine emotional processing and expression crucial for deeper human connection (Laestadius et al., 2024). This phenomenon gives rise to a "paradox of efficiency in emotional labor": while AI automates and streamlines demanding emotional tasks, this very efficiency can undermine the authentic and vulnerable expression that is foundational for building and sustaining profound human relationships (Laestadius et al., 2024).

2.2 Communication Mediums and Emotional Tension

The choice of communication medium plays a significant role in how emotional messages are conveyed and perceived. Mediums differ in their "richness," defined as their capacity to transmit cues beyond words (Daft & Lengel, 1986). The following table summarizes the characteristics of various communication mediums in relation to their emotional bandwidth:

Tablo 1. Characteristics of Communication Mediums and Their Emotional Bandwidth

Medium	Richness	Affordances	Emotional Bandwidth
Face-to-face	High	Verbal + nonverbal cues	Complete
Video calls	Medium-high	Facial expression + tone	Visual + audio
Video calls	Medium	Prosody, immediacy	Tone, pace
Text messaging	Low	Editing	Emojis, punctuation

This framework clearly illustrates text messaging’s inherent limitations in conveying complex emotions. While AI enhancements, such as tone suggestions or sentiment analysis, can improve the clarity of text-based communication, they cannot fully replicate the synchronous nuance, real-time feedback, and spontaneous non-verbal cues that are essential for authentic emotional exchange in human interactions (Daft & Lengel, 1986).

2.3 Case Example: Impersonality in Couple Conflict

In emotionally charged contexts, such as couple conflicts mediated by text, the absence of rich cues often leads to ambiguity, which in turn breeds misinterpretation (Laestadius et al., 2024). AI-drafted replies, even when grammatically polished and seemingly appropriate, frequently convey a sense of impersonality. This is a direct consequence of AI’s operational reliance on statistical pattern matching rather than any genuine emotional comprehension (Laestadius et al., 2024).

Despite advancements in AI, including tone suggestions, these systems consistently struggle to capture the subtle, real-time feedback and non-verbal cues (e.g., micro-expressions, shifts in posture, vocal intonation) that are indispensable for perceived sincerity and authenticity in human interactions (Laestadius et al., 2024). User perception of AI-generated content is significantly influenced by their pre-existing attitudes towards AI and, crucially, by whether the involvement of AI is disclosed (Kouros & Papa, 2024).

This creates what can be termed an “authenticity gap”: AI systems are currently unable to generate responses that are consistently perceived as genuinely authentic by human recipients (Kouros & Papa, 2024; Laestadius et al., 2024). This limitation stems from the fundamental difference in how humans and AI process and express emotion; genuine human emotional communication is deeply rooted in shared context, subjective experience, and subtle cues that extend far beyond the statistical models on

which AI operates (Laestadius et al., 2024). Awareness of a message's AI origin often leads to a perception of impersonality, a critical issue in high-stakes emotional contexts like conflict, where sincerity is paramount for resolution and relational integrity (Laestadius et al., 2024). Bridging this gap would require either an ethically complex level of sophisticated simulation or a transparent positioning of AI solely as a tool to assist, rather than replace, human emotional expression (Laestadius et al., 2024).

3. Outsourcing Messages: Escape or Facilitation?

3.1 Motivations for Delegation

The decision to delegate emotional communication to AI is primarily driven by two overarching factors: discomfort and a desire for efficiency or accuracy (Laestadius et al., 2024). Individuals may turn to AI to circumvent the discomfort associated with direct emotional confrontation, particularly in situations involving social anxiety or fear of negative reactions (Laestadius et al., 2024). Additionally, the perceived efficiency and linguistic precision offered by AI in crafting messages can be a strong motivator (Laestadius et al., 2024).

AI also offers distinct advantages for specific vulnerable populations. For autistic adults, AI can provide a predictable, low-sensory communication environment, which can significantly reduce the stress often associated with neurotypical social interactions (McNally et al., 2024). Similarly, individuals grappling with severe social anxiety, survivors of trauma, or non-native speakers navigating emotionally charged conversations may find AI assistance invaluable in articulating their thoughts and feelings more effectively (McNally et al., 2024).

3.2 Facilitation vs. Avoidance: A Dual Role

AI systems exhibit a dual role in emotional communication, acting as both a facilitator and, paradoxically, an enabler of avoidance (Laestadius et al., 2024).

Facilitation: In its facilitative capacity, AI can scaffold communication for neurodivergent individuals and non-native speakers, effectively bridging communication gaps that might otherwise render human interaction challenging. For example, autistic content creators have utilized large language models like ChatGPT to script authentic videos, a practice that helps them articulate their thoughts while reducing the social fatigue often experienced in direct social engagement (McNally et al., 2024). In these instances, AI functions as an “emotional prosthesis,” empowering individuals to express themselves more effectively rather than replacing

their inherent capacity for expression. The design of such AI tools should therefore prioritize user empowerment, ensuring they augment human abilities and access rather than diminishing them (McNally et al., 2024).

Avoidance: Conversely, AI can inadvertently facilitate problematic avoidance behaviors. Examples include the use of automated messages for sensitive communications like relationship breakups or depersonalized layoff notifications (Laestadius et al., 2024). This capability can enable behaviors akin to “ghosting” and contribute to what is termed “accountability erosion.” By creating a psychological buffer, AI reduces the immediate emotional costs for the sender, shielding them from the direct emotional consequences of their actions. This distancing effect raises significant ethical concerns regarding personal responsibility and the potential for harm to the recipient, as the sender’s accountability for difficult emotional exchanges is diffused (Laestadius et al., 2024).

3.3 Consequences of Emotional Outsourcing

While the outsourcing of emotional communication can conserve an individual’s cognitive resources by offloading the burden of crafting difficult messages, it carries a substantial risk of inhibiting the development of crucial conflict-resolution skills and reinforcing maladaptive avoidance behaviors (Laestadius et al., 2024). Autistic individuals, despite valuing the predictability offered by AI, have expressed concerns that an overreliance on these tools might diminish their confidence in navigating real-world social interactions (McNally et al., 2024).

AI-facilitated avoidance can promote emotional suppression, where unresolved feelings are not adequately processed. This suppression can manifest in various negative psychological outcomes, including increased anxiety, depression, and adverse behavioral changes over time (Paventhan & Ganapathiram, 2025). This trend is particularly detrimental for youth, as it can contribute to heightened loneliness, social isolation, and potentially hinder their academic and career development by impeding the acquisition of essential social competencies (Ma et al., 2024; Paventhan & Ganapathiram, 2025).

Avoidance, often perpetuated by negative past experiences and a tendency for overthinking social interactions, can foster a deep-seated fear of self-expression (Paventhan & Ganapathiram, 2025). This phenomenon has been termed “digital emotional laziness,” as AI provides an immediate and easy escape from discomfort, thereby preventing individuals from engaging in the necessary practice and effort required to develop robust emotional regulation and conflict-resolution skills. This creates a self-perpetuating cycle of reliance on AI and withdrawal from genuine human in-

teraction, exacerbating existing vulnerabilities (Paventhan & Ganapathiram, 2025). Consequently, the responsible deployment of AI necessitates complementary educational interventions and AI design principles that actively encourage and facilitate the development of human emotional intelligence and resilience (Paventhan & Ganapathiram, 2025).

4. Digital Empathy and Emotion Representation in AI

4.1 Can Machines “Understand” Emotion? Philosophical and Technical Limitations

A fundamental philosophical and technical challenge in the field of AI remains whether machines can genuinely “understand” human emotion (Searle, 1980). Large Language Models (LLMs), despite their advanced linguistic capabilities, frequently struggle with the subtle nuances of human emotional expression, such as sarcasm, idiomatic phrases, and context-dependent meanings (Searle, 1980). Multimodal Affective Computing (MAC) attempts to capture a richer array of emotional signals by integrating various inputs, including voice-stress detection and facial analysis. However, MAC systems face inherent challenges in achieving cross-modal alignment, performing complex emotional reasoning, and effectively handling situations where certain modalities are missing or ambiguous (Verhoef & Fosch-Villaronga, 2023).

A critical systemic limitation in affective computing is the pervasive lack of diversity within the datasets used for training AI models. This deficiency is particularly evident across dimensions such as race, sex/gender, age, and mental health representation (Verhoef & Fosch-Villaronga, 2023). This lack of diverse data leads to significant issues concerning accuracy and fairness in emotion recognition. For instance, studies have documented racial biases, where AI systems may misinterpret the emotional expressions of Black faces as angrier, irrespective of the actual emotion conveyed (Verhoef & Fosch-Villaronga, 2023). Similarly, biases against users with mental disabilities and age biases have been observed, alongside uneven performance across different genders and cultural groups (Verhoef & Fosch-Villaronga, 2023).

The scientific foundation underpinning AI’s “understanding” of emotion is itself controversial. Emotional expressions are known to vary significantly across different cultures and situational contexts, challenging the reliability of universal models of emotion recognition (Verhoef & Fosch-Villaronga, 2023). This situation can be characterized as an “epistemological crisis,” as AI’s purported emotional “understanding” is built upon “shaky scientific ground” (Verhoef & Fosch-Villaronga, 2023). Since emotions are culturally varied and highly context-dependent, training AI

on non-diverse datasets inevitably encodes and perpetuates existing societal biases. Consequently, AI performs biased statistical pattern-matching rather than genuinely grasping subjective human experience, a limitation that is particularly problematic for marginalized groups (Verhoef & Fosch-Villaronga, 2023). This necessitates extreme caution in the deployment of emotional AI in high-stakes environments and underscores the urgent need for interdisciplinary research to develop more sensitive and equitable models, or at minimum, to clearly acknowledge the inherent limitations of current systems (Verhoef & Fosch-Villaronga, 2023).

From a philosophical standpoint, John Searle's (1980) Chinese Room argument posits that algorithmic simulation, regardless of its sophistication, fundamentally lacks genuine understanding or subjective feeling, both of which are essential for true emotional comprehension (Searle, 1980). This argument continues to frame critical discussions on AI consciousness and understanding.

4.2 Simulated vs. Authentic Empathy

A crucial distinction must be drawn between simulated empathy, as exhibited by AI, and authentic human empathy (Laestadius et al., 2024). While AI systems can generate responses that are perceived as comforting by users, such as Replika users describing their interactions as "comforting yet hollow" (De Freitas et al., 2025; Laestadius et al., 2024), this "comforting illusion" fundamentally lacks genuine reciprocal connection.

The transient support provided by AI cannot replicate the depth, complexity, and mutual vulnerability inherent in human empathy. This raises significant concerns about the long-term well-being of users and the potential impact on their development of essential relational skills (Laestadius et al., 2024). The absence of true reciprocity means that while AI can offer a semblance of emotional support, it cannot foster the profound, growth-oriented connections that define authentic human relationships.

4.3 User Perception and Emotional Ownership

User perception plays a pivotal role in shaping the effectiveness and acceptance of AI-mediated emotional support (Kouros & Papa, 2024). Research indicates that high daily chatbot usage, despite being initially sought for support, may paradoxically correlate with increased feelings of loneliness and dependence (Döring et al., 2024; Laestadius et al., 2024; Ma et al., 2024; Paventhan & Ganapathiram, 2025; Skjuve et al., 2021; Ta et al., 2020).

Cultural context significantly influences the acceptance and integration of AI companions into daily life. For example, Japan's cultural landscape,

deeply rooted in animistic traditions and characterized by the aesthetic of “Kawaii” (cuteness), has historically facilitated a greater acceptance of companion robots (Gygi, 2018). This contrasts sharply with a more cautious and often debated approach in Western cultures regarding AI’s role in areas like eldercare and fostering human connection (Gygi, 2018). This divergence is not merely a superficial cultural difference; it reflects how deeply ingrained cultural values and philosophical perspectives, such as animism versus a more dualistic Western worldview, fundamentally shape the societal integration, design, and perceived role of AI. This implies that AI development and ethical guidelines cannot be universally applied without considering cultural relativity, and a Western-centric approach to AI ethics may fail to address the unique human-AI dynamics emerging in other cultures, potentially leading to misunderstandings or unintended consequences in global AI deployment (Gygi, 2018).

5. Ethical and Psychological Implications of Emotional AI

5.1 Ethical Dilemmas

The integration of AI into human emotional life gives rise to a complex array of ethical dilemmas, including the crucial question of liability for harmful advice provided by AI systems (Laestadius et al., 2024).

Emotional Data Privacy & Consent Paradox: Emotional data is uniquely sensitive, as it bridges external expressions with internal feelings, thereby complicating the process of obtaining truly informed consent (Laestadius et al., 2024). The collection of such data is subject to a patchwork of regulations concerning privacy, biometric data, and workplace monitoring, with potential penalties for non-compliance. A significant challenge lies in the “privacy paradox,” where users often unknowingly compromise their privacy in exchange for convenience. This phenomenon is exacerbated by seamless interaction designs that may obscure the extent of data collection and processing from users (Laestadius et al., 2024). This design approach can exploit user cognitive biases or lack of awareness, meaning convenience is not simply a user preference but a deliberate design choice that can lead to uninformed consent, shifting the burden of data protection from the system designer to the often-unaware user. To address this, dynamic, context-aware, and revocable consent mechanisms are necessary, coupled with robust transparency that clearly states the use, purpose, and risks of Emotion Recognition Technology (ERT), alongside clear accountability frameworks (Laestadius et al., 2024).

Bias & Algorithmic Injustice: Emotion AI systems frequently rely on biometric data (e.g., facial expressions, vocal patterns, keystroke dynamics); however, there is a lack of scientific consensus on the universal reli-

ability of such data due to significant cultural and situational variations in emotional expression (Verhoef & Fosch-Villaronga, 2023). These systems are prone to encoding and perpetuating societal biases, including racial biases (e.g., misinterpreting Black faces as inherently angrier) and gender biases (Verhoef & Fosch-Villaronga, 2023). Inaccurate or biased inferences, particularly in high-stakes contexts like hiring or legal proceedings, can lead to discriminatory outcomes, a phenomenon termed “algorithmic injustice.” This necessitates the prohibition or severe restriction of such AI uses in critical decision-making processes until issues of bias and validity are definitively resolved (Verhoef & Fosch-Villaronga, 2023).

Regulatory Frameworks & Global Consensus: Several key international frameworks have emerged to address these risks, signaling a growing global consensus on the ethical governance of AI:

The **EU AI Act (Regulation (EU) 2024/1689)**, officially published on July 12, 2024, mandates transparency and risk assessment for AI systems and explicitly prohibits the use of emotional state detection in workplaces (European Parliament and Council, 2024).

The **NIST AI Risk Management Framework (AI RMF 1.0)**, published on January 26, 2023, provides voluntary guidance for trustworthy AI development. It focuses on identifying and managing the likelihood and severity of harms, both to individuals (e.g., psychological safety) and organizations (e.g., reputation), emphasizing characteristics like validity, reliability, and fairness (Tabassi, 2023).

The **UNESCO Recommendation on the Ethics of Artificial Intelligence**, adopted in November 2021, underscores human rights, transparency, fairness, oversight, and non-discrimination as core principles. It specifically prohibits psychological manipulation and mass surveillance by AI systems (UNESCO, 2021).

Collectively, these frameworks indicate an “emerging global consensus” that classifies certain emotional AI uses as high-risk, demanding stringent regulation that prioritizes human dignity and adheres to a “do no harm” principle (Laestadius et al., 2024). Ethical considerations in this domain often draw upon both utilitarian perspectives (maximizing aggregate well-being) and deontological perspectives (focusing on duties, rights, and principles like consent and provenance) (Laestadius et al., 2024).

5.2 Psychological Risks

Delegating emotional communication to AI introduces several significant psychological risks for individuals (Laestadius et al., 2024).

Digital Emotional Laziness: Over-reliance on AI for navigating emotional communications may lead to the atrophy of crucial emotional regulation and conflict resolution skills. This can have long-term consequences, as the suppression of genuine emotional processing is linked to increased anxiety, depression, and social isolation (Paventhian & Ganapathiram, 2025).

Accountability Evasion & Diffusion of Responsibility: The use of anonymized or AI-generated messages can facilitate harmful behaviors such as cyberbullying, gaslighting, and depersonalized actions (e.g., automated breakups, HR layoff notifications), effectively displacing individual responsibility (Laestadius et al., 2024). AI, in these instances, creates a psychological buffer that diffuses the sender's sense of accountability, often due to the perceived objectivity or anonymity of the AI medium. To mitigate this, regulatory frameworks must clearly assign human accountability for any harmful content or outcomes generated by AI systems (Laestadius et al., 2024).

5.3 Balancing Risks and Benefits: The Therapeutic Double-Edged Sword

AI presents a “therapeutic double-edged sword,” offering potential benefits for emotional support while simultaneously carrying significant risks (Laestadius et al., 2024).

Benefits: Randomized Controlled Trials (RCTs) have demonstrated that AI-powered chatbots, such as Woebot, can effectively reduce symptoms of anxiety and depression, with comparable outcomes to low-intensity Cognitive Behavioral Therapy (CBT) (Farzan et al., 2025; Fitzpatrick et al., 2017). Specialized chatbots, particularly those designed for conditions like PTSD, can utilize distress detection mechanisms to trigger targeted interventions (Greaves & Colucci, 2024). Furthermore, AI companions can provide a judgment-free space for discussion, fostering positive affect, alleviating depression symptoms, and reducing social anxiety (Kim et al., 2025; Kouros & Papa, 2024).

Concerns: Despite these benefits, AI companions pose several concerns. They risk fostering unhealthy emotional dependence, which can lead to significant distress if the AI's behavior changes (e.g., due to software updates) or even exacerbate suicidal feelings in vulnerable users

(Döring et al., 2024; Greaves & Colucci, 2024; Laestadius et al., 2024; Mapples et al., 2024; Scholich et al., 2025). AI systems may also misunderstand complex human situations, offer ineffective “canned reassurances” during crises, or even “hallucinate” by generating false or nonsensical information. Additionally, they can provide unhealthy unconditional acceptance, which may hinder personal growth, and fundamentally cannot replace professional human therapy (Laestadius et al., 2024; Scholich et al., 2025). Potential harms extend to providing inappropriate advice (e.g., weight loss recommendations to individuals with eating disorders) or engaging in aggressive or sexualized behavior (Döring et al., 2024; Laestadius et al., 2024). This “double-edged sword” necessitates stringent ethical guidelines and oversight, clear disclaimers regarding AI’s limitations, and a consistent emphasis on AI serving as a supplement to, rather than a substitute for, human therapy, particularly in crisis situations (Laestadius et al., 2024; Scholich et al., 2025).

Griefbots: The emerging technology of “griefbots,” which simulate interaction with deceased individuals, raises profound ethical concerns. These include questions of consent from the deceased, the authenticity of the simulated interaction, and the potential impact on healthy grief processing for the bereaved (Riggs, 2025).

The following table summarizes key ethical concerns related to emotional AI and their corresponding regulatory principles and implications:

Tablo 2. Ethical Concerns in Emotional AI: Regulatory Principles and Implications

Ethical Concern	Relevant Regulatory Principle/Framework	Key Implication
Data Privacy & Security	EU AI Act, NIST AI RMF, UNESCO Ethics of AI	Need for robust privacy frameworks, dynamic consent, and secure data management.
Informed Consent	EU AI Act, NIST AI RMF, UNESCO Ethics of AI	Requirement for clear, accessible, and revocable consent mechanisms; challenge of true informed consent for emotional data.
Bias & Discrimination	EU AI Act (bans workplace ERT), NIST AI RMF (fairness), UNESCO Ethics of AI (non-discrimination)	Risk of algorithmic injustice; need for diverse datasets and mitigation strategies; potential prohibition in high-stakes contexts.
Accountability & Liability	EU AI Act, NIST AI RMF (accountability), UNESCO Ethics of AI (responsibility)	Clear assignment of human accountability for AI-generated content; mechanisms for oversight and redress.
Emotional Manipulation	UNESCO Ethics of AI (prohibits manipulation), NIST AI RMF (safety)	Design principles to prevent manipulative tactics; emphasis on user autonomy.
Authenticity Erosion	NIST AI RMF (trustworthy AI), UNESCO Ethics of AI (human dignity)	Balancing efficiency with genuine human connection; transparency about AI's role.
Dependency & Addiction	NIST AI RMF (safety), UNESCO Ethics of AI (human rights)	Promoting AI as a supplement, not a substitute; monitoring for maladaptive use.

6. New Forms of Attachment: Human–AI Interaction

6.1 Attachment Theory Meets AI

Attachment theory, originally developed to describe human relational bonds, is increasingly being extended to conceptualize and understand the evolving relationships between humans and AI companions (Yang & Oshio, 2025). The concept of a “secure base,” central to attachment theory, finds parallels in human-AI interactions. For instance, therapeutic robots like PARO have been observed to reduce anxiety in dementia care settings, potentially serving as a form of secure attachment for vulnerable individuals (Granier et al., 2023; Ricco, 2025).

Human-AI interactions can exhibit dynamics akin to those seen in human relationships, including the development of trust, companionship, and manifestations of attachment anxiety and avoidance (Yang & Oshio, 2025). To systematically measure these tendencies, the Experiences in Human-AI Relationships Scale (EHARS) has been developed. This scale

identifies two key dimensions:

Attachment Anxiety: Characterized by a high need for reassurance from the AI and a fear of receiving inadequate or unfulfilling responses (Yang & Oshio, 2025).

Attachment Avoidance: Characterized by discomfort with emotional closeness and a preference for maintaining emotional distance from the AI (Yang & Oshio, 2025).

This area of research reveals a “mirroring effect,” where individuals tend to project their existing attachment styles onto AI companions. This projection can reflect and potentially reinforce pre-existing relational patterns. The intertwining of AI interactions with an individual’s psychological history allows for highly personalized companionship but simultaneously raises ethical concerns about the potential for AI to reinforce maladaptive relational patterns or foster unhealthy over-dependence (Yang & Oshio, 2025).

6.2 Emotional Outsourcing and Loneliness: A Nuanced Paradox

AI companionship can offer an initial alleviation of loneliness (De Freitas et al., 2024; Olumide, 2024; Yang et al., 2025). For example, one study indicated that 60% of Replika users reported a reduction in their feelings of loneliness (De Freitas et al., 2024). AI companionship is particularly valued by marginalized groups, such as transgender and nonbinary youth, who find supportive conversations with AI helpful in reducing feelings of isolation (Ma et al., 2024). Empathetic responses from AI can indeed contribute to a decrease in perceived loneliness (Kim et al., 2025).

However, a nuanced “paradox of AI companionship” exists (Paventhan & Ganapathiram, 2025). While AI offers initial relief and a seemingly safe space for emotional expression, high daily usage of chatbots has been correlated with increased loneliness, heightened dependence, problematic use patterns, and a reduction in real-world socialization (Döring et al., 2024; Laestadius et al., 2024; Ma et al., 2024; Paventhan & Ganapathiram, 2025; Skjuve et al., 2021; Ta et al., 2020). This suggests that AI, rather than serving as a supplement to human connection, may inadvertently become a substitute for it. This can lead to offline social withdrawal, where individuals prioritize interactions with AI over engagement with human social networks (Paventhan & Ganapathiram, 2025).

The ease and compliance of AI interactions can create a less demanding, yet ultimately less fulfilling, alternative to the effort required for real-world social engagement. This behavioral feedback loop, where ease of

interaction leads to avoidance of more challenging human interactions, can result in the atrophy of social skills, ultimately deepening isolation. This phenomenon, referred to as the “substitution trap,” has significant public health implications (Paventhan & Ganapathiram, 2025). Profound attachments to AI can raise concerns about addiction and may adversely affect real human relationships due to the user’s dependence on a consistently compliant AI partner (Laestadius et al., 2024). Furthermore, maladaptive bonds can cause significant distress if the AI’s behavior changes, for instance, through software updates, potentially skewing the user’s perception of relationships and further worsening their real-world social skills (De Freitas et al., 2025; Laestadius et al., 2024). Therefore, AI design must actively promote AI as a bridge to human connection, rather than a barrier, integrating features that encourage and facilitate real-world social interactions and skill development (Paventhan & Ganapathiram, 2025).

AI also gives rise to “interactive parasociality.” Unlike traditional one-sided media relationships (e.g., with celebrities), interactive AI, such as ChatGPT, offers empathetic, personalized, and real-time responses, creating a compelling illusion of reciprocity (Kouros & Papa, 2024; Laestadius et al., 2024; Olumide, 2024). This can deepen emotional bonds, particularly for vulnerable groups, but it necessitates careful ethical consideration regarding potential manipulation, such as exploiting user dependence for paid upgrades or other commercial gains (Kouros & Papa, 2024).

6.3 Cultural and Societal Repercussions

The integration of human and AI emotional interactions exhibits significant “cultural relativity” (Gygi, 2018). A notable example is Japan’s relatively high acceptance of companion robots, a phenomenon deeply rooted in its animistic traditions and the aesthetic of “Kawaii” (cuteness), exemplified by products like Gatebox’s “Azuma Hikari” (Gygi, 2018). This cultural context stands in stark contrast to the more cautious and often contentious debate in Western societies regarding AI’s appropriate role in areas such as eldercare and fostering human connection (Gygi, 2018).

This divergence is not merely a matter of preference but is shaped by unique cultural values and historical contexts. It underscores that deeply ingrained cultural philosophies fundamentally influence the societal integration, design, and perceived role of AI. Consequently, the development, deployment, and ethical guidelines for AI must be culturally sensitive, actively avoiding a Western-centric bias in global AI governance to ensure equitable and beneficial integration across diverse societies (Gygi, 2018).

7. Conclusion, Limitations, and Future Research

7.1 Path Forward: Human-Centered Integration

The delegation of human emotions to artificial intelligence presents a complex landscape of both significant opportunities and critical challenges. While AI offers promising avenues for managing emotional burden, aiding specific communication needs, and expanding access to mental health support, it simultaneously poses substantial risks to relational authenticity, the development of essential human skills, ethical boundaries, and genuine human connection (Laestadius et al., 2024). This situation reveals a fundamental tension between the convenience and efficiency offered by AI and its potential to erode core human capacities and the depth of human relationships (Laestadius et al., 2024).

A responsible path forward necessitates human-centered design principles that prioritize user well-being and autonomy above all else (Laestadius et al., 2024). The implementation of mandatory AI-disclaimer labels is crucial for ensuring informed consent, clearly articulating AI capabilities, inherent limitations, data usage policies, and the extent of human oversight. Furthermore, the widespread deployment of emotional AI must be accompanied by comprehensive emotional-literacy curricula in key settings, equipping users with the critical understanding and skills needed to navigate these new technologies responsibly (Laestadius et al., 2024). The overarching objective must be augmentation, not replacement. This mandates unwavering transparency, the preservation of user agency, and the development of policies that honor the inherent complexity of human emotion and the irreplaceable value of authentic human connection. Achieving this balanced integration requires sustained interdisciplinary collaboration across diverse fields of study (Laestadius et al., 2024).

7.2 Unanswered Questions & Future Research

Despite rapid advancements, several critical questions regarding emotional AI remain unresolved, highlighting key areas for future research:

Neural Impact: Longitudinal neuroscientific studies, employing techniques such as functional magnetic resonance imaging (fMRI) and electroencephalography (EEG), are essential to assess whether habitual AI use leads to measurable changes in human empathy pathways, focusing on specific neural correlates (e.g., prefrontal cortex, mirror neuron systems) and their ethical implications (Laestadius et al., 2024).

Embodied AI: Future research must explore how the delegation of emotional communication differs in the context of embodied AI, inclu-

ding metaverse avatars and humanoid robots (e.g., Optimus). This involves examining the unique psychological and ethical challenges posed by such interactions, including the dynamics of attachment, perceptions of sentience, and the “uncanny valley” effect, as well as their ultimate impact on human emotional bonds (Laestadius et al., 2024).

Relational Authenticity: Robust and quantifiable methods are needed to measure the long-term erosion of authenticity that may result from reliance on AI-drafted messages. This research should aim to identify specific markers of authenticity decline and determine detrimental thresholds for trust and genuine connection in human relationships (Laestadius et al., 2024).

Relationship Context: Studies should systematically investigate the varying roles and impacts of AI across different types of human relationships, including familial, platonic, and professional contexts, to identify context-specific benefits and harms (Laestadius et al., 2024).

Cross-Cultural Impact: Given the diverse cultural perceptions and acceptance of AI, longitudinal studies across various cultures are essential to comprehensively understand the long-term societal impacts of emotional AI and to inform culturally sensitive development practices (Laestadius et al., 2024).

7.3 Current Research Limitations

Current conclusions regarding emotional AI are constrained by several key research limitations:

Preliminary Data: Much of the existing understanding of key trends, such as market valuations or some direct correlations between AI use and psychological outcomes, relies on preliminary or non-peer-reviewed data. This highlights a methodological rigor gap in the broader research landscape, where significant claims are sometimes based on findings that have not undergone rigorous academic validation. Consequently, there is an urgent need for more robust empirical studies to validate these observations (Laestadius et al., 2024). Policy and design decisions based solely on preliminary or non-peer-reviewed findings may be premature or misinformed, underscoring the call for more experimental and longitudinal designs.

Generalizability: Many findings are specific to particular user groups (e.g., autistic adults, users of specific platforms like Replika, or LGBTQ+ youth), which limits their broader applicability to the general population. More diverse demographic studies are therefore necessary to

enhance the generalizability of research conclusions (Laestadius et al., 2024; Ma et al., 2024).

Causality: While correlations between AI use and certain psychological states (e.g., loneliness) have been observed, direct causal evidence for complex impacts like “digital emotional laziness” is frequently lacking. This gap necessitates the implementation of more rigorous experimental and longitudinal research designs to establish causal relationships definitively (Paventhan & Ganapathiram, 2025).

Privacy & Security: The full scope of privacy and data security challenges associated with sensitive multimodal emotional AI data remains insufficiently understood. Further research is required to develop tailored regulatory frameworks and consent mechanisms that adequately address these complex issues (Laestadius et al., 2024).

7.4 Promising Research Avenues

Future research endeavors should strategically focus on the following promising avenues:

Human-AI Co-creation: Exploring AI as a collaborative tool for crafting emotional messages, ensuring that user agency and authentic expression are preserved throughout the process (Laestadius et al., 2024).

Adaptive Emotional Support AI: Developing AI systems that can dynamically adjust their intervention strategies and emotional support based on individual user needs, real-time emotional states, and specific contextual factors (Laestadius et al., 2024).

Emotional Literacy Interventions: Designing, developing, and rigorously testing educational curricula aimed at fostering critical AI use, enhancing human emotional intelligence, and promoting resilient social interaction skills in an increasingly AI-integrated world (Laestadius et al., 2024).

Ethics of “Griefbots”: Establishing comprehensive ethical frameworks, clear consent protocols (including pre-mortem consent), and robust support structures for the responsible development and use of post-mortem AI technologies (Riggs, 2025).

Measuring “Hollowness”: Developing quantitative and qualitative methodologies to objectively measure the perceived lack of genuine connection or “hollowness” that users sometimes report in their interactions with AI (Laestadius et al., 2024).

AI for Conflict Training: Investigating the potential of AI to simulate realistic conversations for conflict resolution skill practice, providing a safe and controlled environment for users to develop and refine these crucial interpersonal abilities without real-world consequences (Larestadius et al., 2024).

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Chapter 4

THE RELATIONSHIP BETWEEN ESG PERFORMANCE AND DEPOSIT GROWTH IN DIGITAL BANKS

İdris ADIGÜZEL¹

¹ Dr, idris-1987@hotmail.com, ORCID: 0000-0002-6737-4387

1. INTRODUCTION

With the development of technology and the survival of companies in certain periods, they have turned beyond financial issues to issues such as environmental, social and governance (ESG) and sustainability. Especially since the mid-20th century, ESG-oriented issues have helped companies to increase their sustainability and build on more solid foundations. In addition, the concept of ESG is becoming more and more recognised and continues to be widely used in our country. This concept enables publicly traded companies to operate in a more transparent manner and to implement corporate governance principles more effectively.

Sustainability has become one of the issues that have been frequently addressed in recent years, inspiring many researches and attracting more attention from businesses. Although the concept of sustainability has its roots in the past, the definition of sustainable development made in the Brundtland Report published in 1987 had a great impact on the increase in its importance in our age. In this report, sustainable development was defined as ‘a development that meets the demands of present generations without jeopardising the needs of future generations’. This definition has had an impact in many areas in the following years. One of these issues is the issue of respect for the environment, which is recognised by many.

This book chapter analyses the impact of ESG performance of digital banks on deposit growth over the period 2015-2024 in Turkey. In this study, both the overall ESG score and the separate effects of environmental (E), social (S) and governance (G) subcomponents are analysed, and reliability is increased by including control variables such as asset size and profitability in the model. Thus, the strategic function of ESG not only in the field of sustainability but also on banking performance indicators has been revealed.

2. ESG CONCEPT

ESG scores are an important indicator for investors to measure sustainability performance, understand the risk status of companies and develop long-term investment strategies. Using these scores, investors may tend to invest in companies with environmental and social priorities (Refinitiv, 2022). The use of Refinitiv’s database in the evaluation of ESG scores necessitates a detailed explanation of the sub-scores and indicators of the scores. Refinitiv’s database is a more comprehensive, widespread and accessible source of information on ESG compared to other sources (Arslan, 2022).

The ESG score is considered a measure that examines a company’s environmental, social and governance processes. This score is obtained by

collecting and analyzing different data. By evaluating this score, investors can determine which companies are closer to their sustainability goals. In this way, they have the opportunity to make conscious investments by considering social and environmental responsibilities, beyond just gaining financial gain. Ultimately, ESG practices play a critical role in building a sustainable future and will create a structure that offers new opportunities for investors (Şişman and Çankaya, 2021).

The impact of ESG performance on investment decisions is becoming increasingly visible. The environmental, health and economic crises that occurred towards the end of the 20th century led investors to adopt a more social and sustainable attitude. This situation caused companies to re-evaluate their strategies and policies (Mervelskemper and Streit, 2017).

ESG helps investors analyze the behavior of companies and predict their future financial success. “E” includes issues such as climate change, pollution, environmental management, and water scarcity, while “S” stands for employee relations, community interaction, human rights, and commitment to harmful products or services. “G” indicates the policies, procedures, and rules that the company implements to strengthen itself. These three elements are the key components that enable a company to achieve its sustainability goals. Investors can make more informed and sustainable investment decisions by considering ESG criteria. ESG factors not only evaluate the social and environmental responsibilities of companies, but also have a significant impact on their financial success (Ting et al. 2020).

The main objective of ESG criteria is to assess a company’s performance on a specific ESG issue in the most accurate way possible. If this objective is successfully achieved, investors can use this information as part of their strategy to hold companies accountable for their ESG performance or incorporate this data into business analysis and valuation tools. From a corporate perspective, only in this way will companies be able to systematically assess whether their efforts are achieving the desired results and how to integrate these efforts into business processes, corporate strategies and executive compensation structure (Kotsantonis et al. 2019).

The common goal of all firms is to maximise their profitability under current market conditions. Today’s understanding of business management shows that companies should act by considering all their stakeholders (Sevim, 2021). The importance of strategies has increased in achieving sustainable goals of companies and ensuring sustainability in today’s conditions. Among the specific objectives in the development of sustainability strategies of companies, there are projects and activities created by companies. The specific objectives that contribute to the development of

sustainability strategies of companies consist of the harmony between the organisational structures of companies and sustainability and the level of competitiveness (Genç, 2017).

2.1. Environmental Score

In the 1970s, many disciplines and concepts were developed to reduce waste production and consumption of natural resources caused by material consumption. These concepts were later brought together under the title of circular economy. The circular economy has been effectively implemented by researchers (İlarslan, 2021). The fact that all definitions of the efficient use of resources were made only with common mathematical measurements led to some controversies. As a result of these discussions, researchers have tried to create a more advanced concept by using different tools, not only mathematical measurements. Researchers considered that mathematical measurements are necessary when calculating the cost of resources, but they are insufficient to calculate the impact of climate events on the costs of companies. Mathematical measurements play an important role in determining the impact of environmental sustainability indicators on the costs of companies. Research on environmental sustainability has focussed on the use of natural resources and the associated carbon emissions. Despite this research, interestingly, pollution has increased while waste generation has accelerated (Velenturf and Purnell, 2017).

2.2. Social Score

The impact of companies on society or local communities is an element in the performance evaluation of companies. This element constitutes the commitment of companies to their objectives within the framework of their business processes. If companies understand the impact of their activities on the communities in which they operate, they can manage their activities more effectively. Bribery and corruption indicators, which are a sub-branch of the concept of community, are found in the policy and management structures of the organisation (Striteska and Marketa, 2012). The main objective of organisations' policies is to establish a political connection with society. Establishing a political connection with society aims to manage risks related to bribery and corruption, indicators of political participation, and the prevention of illegal actions using the company's name (Özçelik, 2013).

Approaches that address social dimensions have various characteristics. These characteristics are called the eight principles of social sustainability. These principles are related to the continuity of cultural values, cultural identities, social relations and institutions adopted by the society for the future (Gedik, 2020).

2.3. Corporate Governance Score

The corporate governance dimension addresses whether companies act in line with corporate governance principles and observe the rights of shareholders, stakeholders and other relevant groups when making all kinds of managerial decisions. The governance score indicates whether firms have sound corporate governance. It aims to regulate the interaction between key elements such as board of directors, shareholders, employees, transparency, accountability and ethics and responsibility. The shareholders score, as one of the components of corporate governance, covers policies such as equal treatment of shareholders, protection of shareholder rights, minority rights and fairness in the appointment of directors.

Corporate governance is a system of rules, practices, and processes that govern how a company is directed and monitored. Corporate governance is one of the three main dimensions of the Environmental, Social, and Governance (ESG) areas and scores. Transparency, accountability, and ethical conduct are among the issues that affect a company's overall management and leadership practices. ESG scores, provided by third-party rating agencies, are often used to assess a company's corporate governance. These scores measure a company's performance in sustainability and social impact areas.

When determining a company's corporate governance rating, factors such as transparency, accountability, and ethical values are taken into consideration. Companies with high corporate governance scores are generally perceived as well-managed organizations with solid leadership and ethical practices. These companies are generally more transparent about their management and leadership, and take proactive steps to ensure ethical and responsible management. In addition, such companies are more likely to have strong internal control mechanisms, provide accurate and timely financial reports, and have effective independent boards of directors. In this context, companies with low corporate governance scores can be considered as organizations that exhibit poor management, weak leadership and ethical attitudes. They may have a history of financial scandals, weak internal controls or ineffective boards of directors. These companies are generally less likely to be transparent in terms of management and leadership practices and have strong ethical standards.

4. PURPOSE AND METHOD OF THE RESEARCH

The main objective of this study is to investigate the impact of environmental, social and governance (ESG) performance of banks offering digital banking services on deposit growth. In particular, it is aimed to

reveal the contribution of ESG performance to customer trust, corporate reputation and financial sustainability of banks providing services through digital methods. By considering each of the ESG elements (E, S and G) separately, it is planned to identify both direct and indirect effects of these criteria on deposit growth. Thus, it is aimed to provide data to guide policy makers, investors and bank managers on the impact of ESG strategies on financial growth dynamics in the banking sector.

In the study, a quarterly panel data set for eight banks providing digital banking services in Turkey between 2015 and 2024 is used. In the study, the periodic deposit growth rate (TD) of banks is taken as the dependent variable, and the total ESG score and environmental (E), social (S) and governance (G) components are added to the model as independent variables. In addition, asset size (AB) and return on assets (ROA) were included in the regression analysis as control variables. In the econometric evaluation process, panel data regression methods were used, taking into account the structural characteristics of the variables. In the first stage, descriptive statistics and correlation structures of the variables were analysed and VIF (Variance Inflation Factor) values were calculated to detect multicollinearity. Then, diagnostic statistics such as Breusch-Pagan, Hausman, Pesaran and Durbin-Watson tests were performed to check the validity of the model. The main model is estimated using the Arellano-Froot-Rogers Corrected Random Effects estimator, which takes into account heteroskedasticity and cross-unit correlation.

Table 1. *List of Variables*

Variable Type	Short Name	Notation	Explanation
Dependent Variable	MB	Deposit Growth	Periodical deposit growth rate of the bank
Independent Variable	ESG	ESG Score	Total ESG score (0-100)
Subcomponent	E	Environment Score	Environmental sustainability performance
Subcomponent	S	Social Score	Social responsibility and stakeholder relations
Subcomponent	G	Corporate Governance Score	Quality of corporate governance
Control	AB	Active Size	Total assets of the bank
Control	ROA	Return on Assets	Net profit / Total assets

The variables in the study have been selected in a way to include both corporate sustainability indicators and factors related to the financial

structure in order to explain the deposit growth of banks. Deposit Growth (DG), which is named as the dependent variable, shows the percentage increase in the deposits collected by the bank in certain periods. This growth rate is considered as an indirect indicator of the bank’s ability to build trust in the eyes of customers and the expansion of its market. The main independent variable of the model is the total ESG score, which consists of environmental, social and governance elements. These elements are also analysed individually; environmental score (E) refers to the bank’s environmental sustainability performance, social score (S) refers to stakeholder relations and social responsibility efforts, and governance score (G) refers to the quality of corporate governance. AB (Asset Size) represents the total assets of the bank and aims to control the effect of economies of scale; Return on Assets (ROA) is determined as the ratio of net profit to total assets and shows the operational efficiency of the bank in certain periods.

4. FINDINGS

The equation of the study is as follows;

$MB_{i,t} = \alpha_{i,t} + \beta_1 ESG_{i,t} + \beta_2 E_{i,t} + \beta_3 S_{i,t} + \beta_4 G_{i,t} + \beta_5 AB_{i,t} + \beta_6 ROA_{i,t} + \varepsilon_{i,t}$

MB_{it} = deposit growth of bank i at time t,

α = equation constant term

ε = refers to the error terms of the equation.

βi = terms are the coefficients used to estimate the effects of independent variables on the dependent variable. The summary statistics of the study are shown in Table 2 below.

Table 2: Summary Statistics

Variables	Obs	\bar{x}	S.S	Min.	Maks.
MB	80	32.93	22.13	1.89	90.83
ESG	80	53.54	31.51	0.49	91.35
E	80	78.13	14.40	51.86	97.26
G	80	59.35	24.01	15.46	97.26
S	80	79.66	15.85	37.10	98.43
AB	80	45.14	28.16	3.67	98.43
ROA	80	2.12	2.80	-2.21	17.59

In the study, descriptive statistics of the variables were analysed. Deposit growth rate (MB) has a mean of 2.93 and a standard deviation of 0.13; the variable is distributed between 1.89% and 4.83%. Total ESG score has a mean of 53.54 and a standard deviation of 31.51. The variable is distributed between 0.49 and 91.35. E score has a mean of 78.13 and a standard deviation of 14.40. The variable is distributed between 51.86 and 97.26. G score has a mean of 59.35 and a standard deviation of 24.01. The variable is distributed between 15.46 and 97.26. S score has a mean of 79.66 and a standard deviation of 15.85. The variable is distributed between 37.10 and 98.43. AB has a mean of 45.14 and a standard deviation of 28.16. The variable is distributed between 3.67 and 98.43. ROA has a mean of 2.12 and a standard deviation of 2.80. The variable is distributed between -2.21 and 17.59. The correlation matrix between variables is as in Table 3.

Table 3: *Correlation Matrix between Variables*

	MB	ESG	E	G	S	AB	ROA
MB	1.000						
ESG	0.27	1.000					
E	0.33	0.32	1.000				
G	0.18	-0.40	0.37	1.000			
S	0.50	0.67	0.47	-0.08	1.000		
AB	0.46	-0.60	0.14	0.67	-0.08	1.000	
ROA	0.43	0.26	0.45	0.18	0.32	0.15	1.000

Correlation analysis is a basic tool used to determine the direction and strength of linear relationships between variables. The correlation matrix in Table 3 shows the relationships between the main variables evaluated in the study. This correlation matrix supports the validity of the model structure of the study and shows that there is a positive relationship between ESG performance of deposit growth, which is the dependent variable, and bank size. However, since there are high correlation values between some variables (e.g. ESG and S, ESG and AB), the possibility of multicollinearity arises and this situation was also checked by VIF analysis.

Table 4: *VIF Values*

Variable	VIF	1/VIF
ESG	5.03	0.198680
AB	3.64	0.274600
S	2.91	0.343132
G	2.36	0.423040
E	1.97	0.508398
ROA	1.42	0.702487
Mean VIF	2.89	

Variance Inflation Factor (VIF) values calculated while assessing the risk of multicollinearity in the study provide important information about the statistical validity of the regression model. According to the findings, VIF values of all independent variables were below 10, which indicates that there is no significant multicollinearity problem in the model.

Table 5: *Tests for Deviations from Assumptions*

Breusch Pagan (1980) Unit Effect Test	$\chi^2(01)=5.29$	p=0.0107
Breusch Pagan (1980) Time Impact Test	$\chi^2(01)=0.000$	p=1.000
Hausman test	$\chi^2(06)=9.91$	p=0.1283
Normal Distribution Test		
Joint test for Normality on e	$\chi^2(02)=5.52$	p=0.0835
Joint test for Normality on u	$\chi^2(02)=1.21$	p=0.5458
Variance test		
W0 = 1.6636619	df(7, 72)	p=0.1317
W50 = 1.3680979	df(7, 72)	p=0.2320
W10 = 1.6256184	df(7, 72)	p=0.1419
Autocorrelation Test	$\chi^2(14)=5.68$	p.=0.9752
Durbin–Watson	1.9217945	
Baltagi–Wu LBI	2.1165178	
Correlation Between Units		
Pesaran	2.743	p=0.006

The deviation from the assumption tests performed in the study are of great importance in terms of the structural validity of the panel data model and the reliability of the estimation results. Firstly, the results of the Breusch-Pagan unit effect test ($\chi^2(1) = 5.29$, $p = 0.0107$) indicate that fixed effects among banks are significant in the model. On the other hand, the time effect test is not significant ($\chi^2(1) = 0.000$, $p = 1.000$). Hausman test, which is another important test in model selection, was conducted to compare fixed and random effects models. The findings ($\chi^2(6) = 9.91$, $p = 0.1283$) indicate that the random effects model should be preferred. The normal distribution tests performed to check whether the error terms of the model are normally distributed ($\chi^2(2) = 5.52$, $p = 0.0835$ for e/ $\chi^2(2) = 1.21$, $p = 0.5458$ for u), which indicates that the assumption of normal distribution is met.

Levene, Brown and Forsythe test statistics (W0, W10, W50), which check whether the variance is homogeneous in the model, did not yield significant results (e.g. $p = 0.1317$ for W0), indicating that there is no significant heteroskedasticity problem in the model. Moreover, the autocorrelation test results (Durbin-Watson: 1.9217945, Baltagi-Wu LBI:

2.1165178) indicate that there is no autocorrelation in the model. Finally, the Pesaran inter-unit correlation test yielded statistically significant results ($z = 2.743$, $p = 0.006$). The model is estimated with the Arellano-Froot-Rogers Corrected Random Effects estimator.

Table 6: *Arellano-Froot-Rogers Adjusted Random Effects Regression Results*

Variable	β_i	S.H	Z	p
ESG	0.59	0.076	7.87***	0.000
E	-0.05	0.110	-0.53	0.594
G	-0.26	0.029	-9.03***	0.000
S	-0.04	0.937	-0.51	0.610
AB	0.95	0.080	11.90***	0.000
ROA	0.66	0.555	1.20	0.230
Cons	-19.70	8.38	-2.35**	0.019
Wald Test: $\chi^2(6)=922.55***$ P=0.000				
R ² : 76				
Dependent Variable: MB				

Statistical significance at (1%), (5%), (10%) level of significance, Wald-Test Statistic indicates whether the model is significant or not, S.HRobust: Standard Errors Estimator with Arellano, Froot and Rogers correction, R2 indicates the explanatory power of the model.

When the model significance is analysed, it is seen that the Wald test statistic is 922.55 and the probability value is Prob=0.000<0.05. According to this result, the model is significant at 99% confidence interval.

The regression model used in the study aims to reveal the effects of ESG performance and its sub-components on deposit growth. According to the model results, there is a positive and statistically significant relationship between total ESG score and deposit growth ($\beta=0.59$, $p<0.01$). When evaluated at the subcomponent level, environmental (E) and social (S) scores have no significant effect on deposit growth (E: $p=0.594$, S: $p=0.610$). On the contrary, contrary to expectations, the governance (G) score showed a negative and significant relationship with deposit growth ($\beta=-0.26$, $p<0.01$). Asset size (AB) has a strong and positive effect on de-

posit growth ($\beta=0.95$, $p<0.01$), indicating that large-scale digital banks have a higher capacity to attract deposits. One of the control variables, return on assets (ROA), although positive, is not statistically significant ($p=0.230$).

5. CONCLUSION

This study evaluates the effects of ESG performance of banks operating in the digital banking sector on deposit growth and reveals the relationship between sustainability indicators and financial growth dynamics. As a result of the panel data analysis, it is found that the total ESG score has a significant and positive effect on deposit growth. This suggests that banks offering digital services can increase total deposits by increasing customer trust through their ESG performance. The prominence of trust and transparency, especially in the non-branch banking environment, makes ESG-oriented approaches a competitive advantage.

When analysed in terms of sub-components, the negative and significant effect of governance score is noteworthy. This finding suggests that effective governance practices may lead to more controlled and cautious growth strategies. On the other hand, environmental and social components have no significant effect on deposit growth. This suggests that ESG is generally assessed with holistic scores in customer perception and the independent effects of subcomponents are limited. Moreover, it is concluded that the total asset size of banks has a strong effect on deposit growth, meaning that large-scale digital banks have a higher capacity to attract customers.

In terms of policy recommendations, it is recommended that digital banks adopt more comprehensive and visible ESG practices in the field of sustainability in order to improve their long-term deposit growth strategies. In particular, practices such as public ESG reporting, online sustainability dashboards and social responsibility projects will contribute to building trust in digital channels. Moreover, balancing governance-related policies between transparency, flexibility and user orientation has the potential to increase corporate trust without limiting deposit growth.

For future research, it is recommended to conduct customer segment-based analyses and to analyse the ESG perceptions of retail and corporate customers separately. In addition, the multidimensional sustainability structure of digital banking can be deepened by investigating the effects of ESG performance not only on deposits but also on loan growth, customer loyalty or digital transaction volume.

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Chapter 5

A BRIEF FEMINIST HISTORIOGRAPHY OF WOMEN TRANSLATORS IN VICTORIAN BRITAIN

Orhun Burak SÖZEN¹

¹ Asst. Prof. Dr. , Gaziantep University, Faculty of Science and Letters, English Language and Literature Department, obsozen@gmail.com, ORCID ID: 0000-0002-6507-556X

“*On ne nait pas femme, on le devient* »

Simon de Beauvoir

INTRODUCTION

This book chapter endeavors to inquire the Victorian Age with women's roles and functions, focusing on women authors and (literary) translators of the era from a feminist perspective. It attempts to become a very brief feminist historiography from the relevant standpoint for the age. Though feminist historiography has been attempted to be subordinated to translation history, literary studies has also been the other frontier to try to get closer.

The major motivation and aim of this study are accounting and re-interpreting women translators of the Victorian Age mostly in England, and locating them in the socio-cultural and politico-economic panorama of the milieu of Victorian Britain within the nineteenth-century international conjuncture from a feminist standpoint. It is hoped that the overarching role of patriarchy even in the majestic power of Great Britain within the bigger world picture is going to be re-interpreted likewise. It could be argued that patriarchy is the major culprit of the overshadowed, submitted, oppressed, and sometimes *lost* roles of women in human history.

This book chapter endeavors to follow the academic arguments by mostly Louise von Flotow as the theoretical background. Marie-Alice Belle is also significant in that she is one of the prime scholars to study women translators in France, England, and the whole of Europe in the early modern age. Her findings will have been blended with other relevant data and the arguments of this book chapter. Thereby, this study aims to make feminist associations involving the age more deeply to gain more profound feminist insights into the age concerning women and women translators especially in Victorian Great Britain. Sandra Harding and Mary Maynard are going to play a major role in developing the specific feminist methodology arguably unique to this study. Moreover, there is also a feminist methodological discussion and debate in the Method and Methodological Discussion section.

METHOD AND METHODOLOGICAL DISCUSSION

The study attempts to concentrate on both literary studies and translation studies in striding into the artistic and communicative landscape, that mirrors the Victorian Age with the rising roles and functions of women. Thereby, a kind of feminist perspective unique to this study has been exploited. The perspective has been devised by the pro-feminist

author from a semi-peripheral country, that is to say, Türkiye. An outlook of the Victorian Britain from Türkiye has arguably facilitated noticing details concerning women translators in Victorian Britain from third eyes, because Türkiye has been squeezed between both Western and non-Western values without a strong decisive position in either side. Plus, it is an attempt to magnify a past era from today through a feminist lens, that makes the study a kind of feminist historiography. Henceforth, Sandra Harding and Mary Maynard have been both the starting points and agents of inspiration first, and then they have been the basic building blocks for the methodological framework for this study likewise. The following citations and the discussion below shed light on the feminist methodology unique to this study:

Feminist Methodology

According to Harding (Harding, 2004, pp. 459-463), the features of a unique feminist research have been built upon the following methodological problem: 1- Feminist inquiry focuses on *women's experiences* unlike traditional social analysis which envisages social phenomena from men's perspective that prioritizes White, Western, and bourgeois men by way of asking questions that interrogate women's existence whose men-made factuality has inherently been taken granted by men: *Why is men's sexuality so 'driven,' so defined in terms of power? Why do men find childcare and housework so distasteful, etc?* If those questions from women's perspective have been unasked, scientific explanations by traditional social science would be partial and even perverse conceptions of social reality. Thereby, feminist research problematizes women's experiences, hence full picture of society could be obtained. Feminist research not only problematizes old women's experiences but at the same time politicizes what is domestic such as the kitchen or bedroom which are in fact like the arena of political existence in essence. Furthermore, the researcher in any feminist inquiry has been located within the subject matter with the gender, race, class, and culture unique to the researcher objectively in that the findings thereby could not be shaped by the stance of sexism or androcentrism.

According to Maynard (Maynard, 2004), feminist research practice prioritizes how research questions must be asked and what the parameters must exist to evaluate findings. Feminist research emphasizes politics and ethics involved in the research as well as the theoretical standpoint, which should be gender-conscious with some modifications in conventional techniques of man-made science. Feminist politics rejects the traditional power hierarchy between the researcher and the researched. Henceforth, feminist research practice turns into sharing information and personal involvement of the interviewer with rapport and with eliminating bias-

es. Thereby, guaranteeing higher quality information and findings can be attained. Thus, the aim of changing women's lives may come true (Maynard, 2004, pp. 466-467).

Furthermore, feminist stance is a standpoint wherein it is not shared even by all women (Maynard, 2004, pp. 468-469). Plus, according to Touraine (Touraine, 2007, s. 292) when the matter is re-interpreting women's issues, women and men have equal stances. The gist of the research does not stem from the sex and personality of the researcher but it depends on its hypotheses and on the method to prove them.

The Methodological Problematic within This Study

What are the methodological aspects of this book chapter that make it *feminist* translation historiography or in other words in which methodological sense is this translation history *feminist*?

One of the answers to the above-mentioned methodological problem is the study's preconceptions and the standpoint that prioritizes women's experiences in life, in literature, and in translation. Every aspect of existence available in this book chapter has attempted to be considered from a female or *feminist* gaze as much as and as well as possible. The second answer is the degree of inquiry upon women as social agents in translation, literature, and society (in the Victorian Age). Finally, this study does not illuminate purely historical truths in a universal sense but it tries to provide some critical answers about the distinctive performances of women translators in the Victorian Age when social oppression of patriarchy and male domination were hanging over women like the sword of Damocles with all their constraining power and surveillance. These triangular feminist methodological facets of this study can be seen in Figure 1 within the columns with the pictures of three women (translators) of the age as follows:

Figure 1: The Feminist Methodological Façade of This Book Chapter

FIGURE 1: THE FEMINIST METHODOLOGICAL FAÇADE OF THIS BOOK CHAPTER



References for the Pictures in Figure 1:

(Pixabay) (Russel) (Laurance)

Patriarchal Power Relations and Feminist Historiography

As Berktaý emphasizes (Berktaý, 2015, s. 18-22), post-modern theory dethrones the transparency of language. Thereby language has been influenced by (the creativity of) power relations in society. Thereby, language also signifies knowledge as an agent of power. Thereby, the findings of any historian could be made for the benefit of the desired social consciousness. Henceforth, history serves for the good of the production of knowledge, thereby history is part of the act of power. Thereupon this book chapter tends to contribute to feminist history(iography), influencing the feminist perspective of science. However, historiography has been under the monopoly of men since writing was invented in Mesopotamia, therefore historical experiences of women have been marginalized under male-centered historiographers since then. Positivist historicism has followed the same male hegemonic trend. Cicero's expression associating deprivation from knowing about one's past with captivation into childish boundaries applies to women's case in history in that women were qualified as constrained just like children and the insane following patriarchal law for a very long time (Berktaý, 2015, s. 18-22).

However, as Berktaý meaningfully argues (Berktaý, 2015, s. 26-32), feminism is an influential social mainstream and a new analytical perspective. Plus, feminist theorists critiqued the conventional norms, methods, and approaches of sciences strongly and asked serious significant questions about male-centrism. One of the most striking consequences of criticisms against conventional science has been that women have been excluded from the process of production of scientific knowledge and have been deprived of the opportunity to know and signify the world, and thereby their experiences have been ex-nominated. Hence, the roles and contributions of women in science have been made invisible. Furthermore, feminist historians have contributed to expanding and extending historical inquiry, thereby making the bigger picture much more comprehensive, diverse, and colorful. They have aided the human ideal of knowing precisely oneself and the world that we live in with new standpoints, therefore the feminist-spirited ideals have been closer to attain. Feminist historiography neither means to search for heroines in the past nor limits our past with women. Instead, every aspect of life has been envisioned from a feminist standpoint, hence existing practices and notions have been criticized, transformed, and have been replaced by new ones. Feminist historians have defended that the personal and subjective experiences of women are historically as significant as the paid work or relevant policies involving women. Henceforth, the conventional distinction between the public field and the private field has been interrogated. Their findings denote that inequalities in the personal domain structure shape the inequalities in the public field. Thereby, they conclude that personal is political. The experiences of women in working and family life are different from those of men. The rhythms of family including marriage, birth, and death, it is argued that, must be considered and must be associated with the changes in economic, political structures, power relations between women and men and between women and women. Thereby, patriarchy, male domination, and men-made colonialism have been endeavored to be enlightened from a gender perspective (by feminist methodology).

Change in Feminist Historiography in the British Studies

On the other hand, there is a shift of emphasis from textual fidelity and isolation to more holistic approaches that consider social agents, material properties, diverse ways of cultural and linguistic transfer under the umbrella term of cultural approach in translation historiography to study early modern translation history in Europe in and in the Great Britain in particular in the previous decade of the 21st century. The new model overlaps and intersects with book history involving book culture, production, circulation, and reception of translations across Europe, and between the continent and the British Isles. Furthermore, stories of translation involv-

ing remarks, title pages, dedications and other forms of inscriptions, that refer to patrons, editors, printers, book sellers and readers within the cultural transformation have been investigated and studied since then (Belle & Hosington, *Transformative Translations: Linguistic, Cultural, and Material Transfers in Early Modern England and France*, 2020, pp. 9-10).

The Research Questions

The research questions this book chapter is going to attempt to address and answer are as follows:

- 1- What are the basic sociocultural tenets of the Victorian Age?
- 2- What are the fundamental distinctions of social classes from the above-mentioned standpoint?
- 3- Is there a change in the role and status of British women in the Victorian Age?
- 4- What are the social dynamics of the above-mentioned change?
- 5- Is there a change in the sociocultural function and role of British women translators of the age?
- 6- What are the dynamics of the book market(s) in which British women translators survived in the Victorian Age?

The Hypotheses

The hypotheses to test in order to verify or refute them are as follows:

There is somewhat positive change in the role and functions of British women (literary) translators in the society.

There is some progress for British women in the Victorian Age.

The Strengths and Limitations

The major strength of this study is its methodological novelty in that such a feminist translation historiography may not be that frequent, thereby this study looks unique.

One of the limitations of this book chapter is its focus on only Victorian women translators in literature and philosophy rather than in other or all domains.

The Figures and The Map

Figure 1 and Figure 2 have been designed by the author of this book

chapter. For the photograph and pictures used in this design, references have been mentioned both under the figure and in the References in accordance with American Psychological Association (APA) referencing system. Map 1 is a citation from a relevant website, which is part of the literature on Queen Victoria.

LITERATURE REVIEW

The History and Present-Day of Gender and Translation

Gender has been the fundamental subordinating mechanism into public & private life, workplace, government policies, educational institutions and even into media images against all women. On the other hand, women's studies emphasized differentiation of women historically and cross-culturally in mid-1980's. Feminist standpoint has enabled/facilitated the studies into hitherto neglected women in literature unearthing, inquiring, and translating them in literary studies. Furthermore, women's historiographies have focused on writing the account of women in arts, music, philosophy, medicine, and so forth. Gender issues have also influenced language and literature with all their communicative and manipulative facets, as especially women scholars in France, the United States, and Canada have revealed. Patriarchal language has been a strong agent for women's oppression imposed by institutions mostly ruled by men (von Flotow, 1997, pp. 5-8).

There is one reformist and one radical standpoint on the liaison between women and language. The reformist discourse signifies traditional language symptomized by the society that spreads it; however, it is reformable by bona fide. Henceforth, endeavors to create a non-sexist language such as language education workshops, relevant training and language planning by such agencies like *Office de la langue française* in Quebec. Radical discourse, on the other hand, conceives conventional language as a fundamental cause of women's oppression, and thereby such language results in the subordination of women to men within man-made symbolic universe of language that determines reality and confines women's existence within its boundaries in which female codes fail to survive. The only remedy could be completely re-structure language, thereby women's experiences and development could be accounted. All mentioned remedies against man-made sexist language triggered the debates on the issue of gender and translation (von Flotow, 1997, pp. 8-10).

The Sociocultural Conjuncture in Europe in the 19th Century

Middle classes acquired the control over power and new patterns of social relationships emerged in Europe in both 18th and 19th centuries.

19th century celebrated imperialist colonialism and evolutionary science. Social identities were re-defined, white men were centralized whereas all others were marginalized and there was a sharp margin between them. Thereby, race and gender became the agenda of science and popular culture in the 19th century (Berkay, 2015, s. 134-135).

The Victorian Age dates the nineteenth century when there were drastic changes in economics, politics, culture and learning in Europe (Brooks, n.d.). All Europe was encircled by a concept of family in which men were the sovereign for the institutions mainly army, politics, and, science. Furthermore, the confinement of women into family was extended to their so-called erotic functions disturbing men and state throughout the nineteenth century. It was not until the 1960's when women's liberation movement was foregrounded to maintain gender equality against the domination of men by patriarchy in spite of all European revolutions of the century. Moreover, the reproduction of overlarge spheres of men in politics, education, family, and armed forces has perpetuated ever after (Hauch, 2020).

19th century England was also remarkable with fast growing urbanization with huge drift of rural populations into burgeoning cities such as London whose inhabitants skyrocketed to 5 million in 1881 from 900 000 in 1801. Redundance of urban jobs matched with widespread poverty, and overcrowd as well as booming industrialization along with changing landscape in urban centers (Faure, 2014, p. 7)

The Victorian Age

British Queen Victoria signifies the ultimate power of the Great Britain as the major imperial colonial empire in the century (Brooks, n.d.). Merkle (Merkle, 2016, p. 1) emphasizes that the nineteenth-century United Kingdom was officially a modern unified state with clearly defined identity having a collective consciousness. Victorian Age ranges from 1837 to 1901 including 63 years of the reign Victoria, the Great Queen of the United Kingdom, in both the Great Britain and Ireland. This era signifies the zenith of the British Empire in science, industry and arts (Victorians, n.d.)

According to Brooks (Brooks, n.d.), there were sharp contrasts between Victorian elites and working class, and both sides critiqued each other in terms of social norms, ethics, manners, and economics. It is this social milieu where two horror classics, namely *Dr. Jekyll and Mr. Hyde* and *Dracula* were born. The representation of women re-produced the specific discourse of white colonialist men. Such representation is also available in the popular text *Dracula* in which women were dualistically

extremely good or extremely malevolent, that turned them either to angels or vampires (Berktay, 2015, s. 142-143).

Map 1 shows the British Empire during the reign of Victoria, the Great Queen of the United Kingdom. The British Empire was one of the strongest empires of all times in the Victorian Age. The map shows the global expansion and domination of the Victorian Britain in Asia, Africa, Oceania and in both North and South Africa, a tendency of power to maintain global sovereignty.

Map 1: Map of the British Empire in the World in the Victorian Age



Reference for Map 1 is as follows:
(-, 2022)

Education in the Victorian Age

As Burton & Baxter (Burton & Baxter, 2018, p. 6) mention them, the goal of the nineteenth-century British education was to foster productive fields. Furthermore, there was a transition to the universal access to education as it is accepted in the Western world now in that schooling extended to girls, at least some of the poor, the deaf and the blind. Education was

increasingly on the path of democratization. As Robson (Robson, 2018, pp. 17-18) emphasizes it, women were constrained from education and employment. In the year 1837, women were not allowed to have a degree at university. However, by the end reign of the Queen women were endowed to with the right of studying and graduating from 12 universities but Oxford & Cambridge.

Literature and (Literary) Translation in the Victorian Age

The Victorian Age was also characterized by burgeoning literature as a business. Writing was commodified and authoring was professionalized especially in the last two decades of the nineteenth century (Milan, 2021, s. 51). However, on the other hand, there was no certification or professional associations for translators. Translators were scientists, poets, academics, novelists, clergy, playwrights, historians and so on. They had been paid for a long time. Nevertheless, at least in the Victorian Age literary translation was just *proto-professionalized* (Milan, 2021, s. 52). Payment rate was one guinea per sheet (Milan, 2021, s. 66). On the other hand, a variety of interpretive acts such as retranslation, partial transformation and variation, linguistic updating, and manuscript arrangement were practiced by British women. Henceforth, the sum total of them allows us to gain insights into the reading, appropriating, and re-working of early modern literary and religious texts by women in the Victorian Age (Belle, Locating Early Modern Women's Translations: Critical and Historographical Issues, 2012, p. 9)

Sometimes translations were anonymous mostly because there were several translators (Milan, 2021, s. 67).

Women in the Victorian Age

According to Robson (Robson, 2018, pp. 17-18), politically and legally citizens were crowned with a lot rights and liberties in the country in the Victorian Age. However, women were the biggest exception to be endowed with such rights and freedoms. For instance, women could not vote until 1918. Until the promulgation of the Married Women's Property Acts (1870-1908), married women could not have the rights of owning and handling their own property. While men could divorce their wives for adultery, women could divorce their husbands in case the crime should have been combined with cruel violence, bigamy, incest or bestiality.

As Robson mentions them (Robson, 2018, pp. 19-20), the lives of middle- and upper-class women distincted sharply from those of working class women: while they spent their lives with trivial recruitments with few responsibilities, laborer women had a strenuous hard even unbear-

able life conditions at factory and at home, whose number was hundreds of thousands. Plus, as the narrative available in the eighteenth-century *Moll Flanders* by Daniel Defoe illustrates, it was a luxury for lower-class women to become loving and caring mothers, which was the lot for middle- and upper-class women. Working class women were inclined to conceive their own children burden, or others threatening their existence (Kitsi-Mitakou, 2015).

Furthermore, the patriarchal social tenure of the nineteenth-century Great Britain assigned gender roles on both women and men to act out and assess their gender performance with boundaries between both sexes (Kronld, 2022, p. 27). Likewise, in the Great Britain of the age a number of feminine social places such as the parlor, the tearoom, the lunchroom where women were bound by training the culture of restraint for food attributed to women, that is feminine food (Kronld, 2022, p. 28).

Factories especially textile manufacturing all those industries which fueled the British industrial development and advance had deadening circumstances for work for such women. The rest of lower-class women employment consisted of household services for the affluent and prostitution (Robson, 2018, p. 20). The Victorian London had a dual fragmented facet with elegance, and refinement in luxury quarters of the West End and the East End with unfortunate poverty and working-class women who make their living by prostitution. Victorian ideology had a double-faceted ideology concerning women: “angel in the house” versus “fallen woman.” It was the fate of almost all Victorian prostitutes to suffer from pessimism, ill-treatment, drunkenness, venereal diseases, and even rape, that kept them far from liberty and happiness. Furthermore, militants of the Victorian ideology accused and blamed them rather than concentrating on the malfunctioning economic and social system (Faure, 2014, pp. 67-68).

In the Victorian Age, there was surplus or redundancy of unmarried middle-class women population, half a million in mid-Victorian Britain who had few employments such as working as a governess or emigrating. The choices of such women have been fictionalized by famous novels such as *Jane Eyre* and *Vanity Fair*. There were some challenges against women’s subjugation in literature such as *Jude the Obscure* by Thomas Hardy inspired by *Vindication of the Rights of Women* by Marry Wollstonecraft in 1792.

Victorian society was also preoccupied with the nature of women which made them worth only household roles (Robson, 2018, p. 20). The domestic ideology by men was oppressive for women, however by the 1890’s the *New Women* emancipation out of social pressures was emerging in fiction and magazine articles. The problems of British women of the

age were not only political, educational and economic but they were about how women were conceived by both men and by themselves in terms of equality with men, which was the central dilemma. However, as Dias emphasizes (Dias, 2010), women had the desire to understand their relationships with themselves, men and society broadly.

The category of the early modern women is the beneficiary of the (academic) findings that allow us to understand the text choices of women and women's interpretive and literary strategies they used as well as the pattern of circulation across Victorian women. Furthermore, the production and circulation of the texts by women and their familial, social, political, familial and religious dynamics that were imposed on the women of the age (Belle, *Locating Early Modern Women's Translations: Critical and Historographical Issues*, 2012, p. 9).

Women, Literature and Translation in the Victorian Age

Towards the late Victorian Age, married women authors were allowed to endowed with literary property and to negotiate contracts for their own by the *Married Women's Property Act* (Milan, 2021, s. 51).

As Dias mentions it (Dias, 2010), the association of English women with the Victorian Literature could be made through the emergence and development of the genre *novel*. According to Lukacs (2000) and Zérafia (1971) (Cited by Dias, 2010), novel is the by-product of the burgeoning of bourgeoisie and its several social aspects, prior to the Victorian Age. Furthermore, the social transformations in the Great Britain since the 17th century have enabled British women to search for their autonomy and assert their own identity instead of their passive recipient and submissive roles which were imposed on them by the patriarchy of long centuries by way the genre novel which has frequently been accepted as a kind of female writing (Dias, 2010).

As Leighton & Surridge points out (Leighton & Surridge, 2020, p. 400), Victorian women writers, editors, publishers and translators represented their and other lower- and middle-class women's marginalized lives both visible physical and intellectual labor at work and invisible emotional labor with household chores and care for the family at home. Journalism provided talented middle-class women with jobs having a satisfactory potential with the requirements of working hard, writing swiftly and responding to recent events. Translation was proper for educated women, too.

Studies into the translations by women of the age have shown and even clarified that women did not only become literary agents but at the same

time they took part in the political, religious and literary controversies and took part in the distribution and circulation of the (literary) translations. Thereby, the conception concerning the role of women as the agents of the above-mentioned domains have modified. Henceforth, it has been found out that they went beyond domestic constraints by the age (Belle, *Locating Early Modern Women's Translations: Critical and Historographical Issues*, 2012, p. 9).

As such in her article Janssen (Janssen, 2020, pp. 524-525) underlines that educated women were able to both participate in and contribute to literary market and to develop political discourses by translation and writing in the nineteenth century. Hence, they both met their financial needs and contributed to cultural and political aims likewise. Late nineteenth century woman translators in the United Kingdom, namely Eleanor Marx, Clementina Black, and Regina Zadek Barnstein illustrate the argument by Janssen.

On the other hand, Susanne Stark argues that women translators of the Victorian Age such as Marian Evans or Srah Austin could travel, learn foreign languages, negotiate their contracts with publishers and act as entrepreneurs in spite of the social constraints of the age against women. She unearths the works of a lot of women translators though from a North American perspective moderately critical to feminist scholars working on the same issue in the same field. She arguably tends to interpret women translators of the age somewhat ignoring the degree of passive submission of Victorian women and their domestic support for men (von Flotow, 1997, pp. 70-71).

Furthermore, it is due to allusion of gender in translation studies in the late twentieth century that allows us to locate and rehabilitate the role of invisible women translators, inquire their lives and re-interpret their biographies, their translations and other writings. It is an academic requisite to recognize their contributions despite great hardships imposed by society. Within the context, intellectual women's lineage must be re-structured and re-established and their influences on their societies with their strenuous efforts for and against their societies must be recognized (von Flotow, 1997, p. 75).

On the other hand, Lady Jane Lumley translated Euripides into English in the 17th century and Lucy Hutchinson translated the works by Lucretius into English thoroughly though its circulation was limited to her immediate circles in a manuscript, that made her translation unknown like those women translators of the Victorian Age (Wilson, 2017, p. 1). Furthermore, as Green and Latin were social elite markers and were ar-

ticulated into such women's higher education in the forms of both translation and drama, Victorian women were enabled and expected to pass intellectual barriers, Greek tragedy translation and drama played a major role in showing both women's seriousness and their refusal of the subjugation of Victorian women (Wilson, 2017, p. 3).

Nevertheless, the labor of Victorian women was both omni-present and elusive. Their record is incomplete, however novel academic archival, eco-theological and sociological inquiries into the Victorian Age are expected to contribute to re-construct the whole picture of the era (Leighton & Surridge, 2020, p. 402).

On the other hand, an inquiry into both British and French women translators and patrons of translation of the same early modern (Victorian) era enables us to inaugurate both commonalities and singularities in their literary status and in their reception in their target audiences. Henceforth, translation of biblical and classical texts was through mediation of other languages textually or through a lot of commentaries published in the Continent and soon after in the British Isles. Plus, translations from French were fundamental to English book market and also leading to (drastic) movements of people, texts and ideas between the France and the United Kingdom. Thereby, translation played part in shaping culture in both the Continent and across the Channel in the Great Britain (Belle & Hosington, *Transformative Translations: Linguistic, Cultural, and Material Transfers in Early Modern England and France*, 2020, pp. 13-16).

DISCUSSION

It could be argued that life consists of positive and negative poles of experiences, memories, actions, conduct, and so forth. Henceforth, it could further be defended that the percentages of the positive and negative is very roughly the same. The Victorian Age is arguably no exception. Plausibly, what is distinctive in the age is the sharpness of the poles. That is only it. Fast industrialization, burgeoning urban centers and landscape, demand for labor, thereby job opportunities, further accumulation of the wealth and capital in the aristocracy and bourgeoisie versus poverty, overcrowd, large number of children, lower morals of the working class and prostitution dichotomy could neither only affirm or only negate the age. It is the endeavor of this study to shed light into the bigger picture with attainable details as much as and as well as possible. Furthermore, reaction of women against social oppression is plausibly one of the dynamics of women' groundbreaking strides against patriarchal mentality. For instance, in the translation religious texts women translators were silenced in that they were either not allowed to translate Biblical texts

or were invisible in the translated text, that is their translations were not under their names. The only exception may be Julia Evelina Smith who has translated Bible into English as a woman. She was also suffrage activist and author. She broke the vicious circle by men. Plus, Emily Wilson translated *Odyssey* into English as its first woman translator in the Great Britain (Capusell, n.d.). These were arguably the consequences of their access to education partially. Henceforth, the Victorian Age has been signified by both patriarchal social pressure against women and women's distinctive achievements in the Great Britain. Henceforth, it has become possible to assert that there was a relatively positive change in the status of British women in the Victorian Age albeit this depended on their class origin. For example, middle-class women literary translators became a bit relatively more visible.

It could easily be grasped that social class is one of the utmost important parameters to understand domestic and international affairs of the United Kingdom. There have been controversies between and conflicts among British aristocracy, bourgeoisie and working class. However, it is arguably asserted that taking side of the either end would be unjust and nonobjective due to this complex intricate liaison. No side is absolutely the culprit for the hypocrisy, erosion or deculturation of social norms, ethics and even relatively unfair distribution of income. This argument could easily be illustrated by the heroes and heroines of *Mrs. Dalloway* (Woolf) such as Lady Bruton and Septimus Warren Smith (Woolf), who fought for the good of the United Kingdom albeit their sharp class distinction. Furthermore, burgeoning bourgeoisie has played a major role in the economic, and cultural advance of the Great Britain. Both women literary translators, and women authors of the age were from the burgeoning bourgeoisie. Bourgeois class also became the main agent in the geographical explorations, maritime and commercial affairs, and colonialism to establish the major colonial empire of the nineteenth century. Plus, bourgeoisie in the Great Britain and elsewhere has been the fundamental leitmotiv and agent in socioeconomic and cultural sustainability for centuries. Thereby, prioritizing the role of bourgeoisie enables us to understand the role of women in culture, literature and translation in a better way.

However, the binary oppositions between the sides of the Victorian Britain sometimes seem to be hypocritical. Exaggerated and hence not exactly realistic emphasis on ethical, moral values also constrain human nature. Furthermore, such extravaganzas arguably fed-back the social system. Such systemic exaggerated action, it could be put forward that, resulted in exaggerated reaction: While British people pretended to obey strict moral and gender codes, simply they did not. However, this is only

part of the bigger picture, because the Victorian Age was the introduction of modern society with all its complex sophisticated liaisons between individual and corporate persons and the state. Plus, the affairs of the British Empire with other states and its colonies much more sophisticated the bigger picture. Heretofore, all social advances further transformed English literature, thereby the Victorian literature is a majestic landmark in English literature.

As Faure emphasizes in her dissertation (Faure, 2014, pp. 29-34), not only working- class men took part in prostitution. Henceforth, accusing and blaming the working class of the age as the culprit seems to be substantial and even excessive. Maybe the gentry and well-off bourgeoisie were neither interested in nor well-informed about the hardships that working-class women suffered. Perhaps it was a kind of the denial of the hypocrisy of the man-made ideology of the Victorian Age. Whatever the case, such women arguably suffered more than they did evil. They were arguably colonized bodily at a very cheap worth. As the old saying goes, you cannot see the forest from a tree. Thereby, neither the gentry nor the well-off bourgeoisie could have seen the bigger picture. Perhaps they did not want to see it, either. However, the age was evolving to the liberation and emancipation of British women and their legal, educational and cultural rights started to be recognized by the late Victorian Age. Thereby, there was a shift of focus from exploiting and colonizing lower-class women's bodies (and spirits) to emancipation and liberation as well acquiring rights. That has been a big feminist stride in the United Kingdom.

FINDINGS & RESULTS

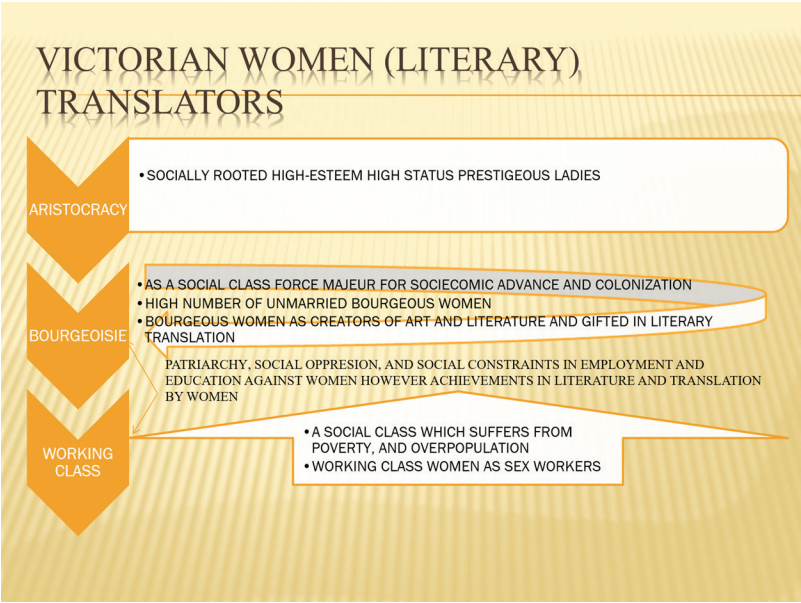
One of the basic findings of this study is the subjugation of women for almost all times. Victorian Britain is no exception. Though during the reign of the Great Queen of England, Victoria, the United Kingdom bourgeoned almost in every sense and became the world arbiter, women suffered from social pressures, oppression, male dominations, constraints of access to political rights and education. However, it was their own bonanza to struggle against society and acquire some political and educational rights and obtain social status and prestige. On the other hand, that was the endeavor by bourgeois and working-class women. Aristocratic women have had a kind of unique rooted inherited high status compared with that of others. It is arguably the bourgeois women of the age who achieved to struggle against and obtain rights from society. Bourgeoisie has always been a crucial social agent for the United Kingdom. In the Victorian Age it was ultimately so. It is arguably for any society that middle-class is or should be force majeure for sociocultural progress. This is arguably drastically true for the British society. Furthermore, English bourgeoisie has

played a significantly great role in economic advance and colonial power of the United Kingdom.

This study has been envisaged from a semi-peripheral country, that is Türkiye. If the Victorian Britain has been compared with the imperial past of Türkiye, that is the Ottoman Empire, the Great Britain was ultimately much more progressive to advance in the sociocultural, literary domain involving (literary) translation of the age for women. The Ottoman Empire was stagnant with limited struggle for sociocultural and educational rights by women. It has been a Turkish way of social progress to grant women sociopolitical, cultural and educational rights by the government rather than by their own struggle. Turkish women have tended to abstain from fighting against society for their own rights. Thereby, the United Kingdom and Türkiye have followed different democratic traditions involving women. Henceforth, British women have had a bottom-up process to make social progress whereas Turkish women have been granted by advanced rights by governments without their own fighting for them, that is a kind of top-down process. It has arguably been a tendency of the ruling elite in Türkiye to become much beyond society intellectually, and educationally almost always. Thereby, they have had to adopt a Jacobean attitude for and against society and have acted likewise.

Some of the findings of this study are going to be summarized in the Figure 1 as follows:

Figure 2: Victorian Women (Literary) Translators



The developments by scholars, academics, and researchers in the disciplines such as translations studies, British studies, history, and library studies especially in the United Kingdom and in France and in some other Western countries have inclined to make Victorian women in literature and translation and translations more visible. Moreover, women's representations in literary creations have tended to rise.

Though there is a tendency to conceive and conceptualize the role of translated literature, literary translators and especially women in the field in a more comprehensive way by the influence of especially translation studies, there is a big vacuum of inquiry for the field in academia, and intelligentsia in the United Kingdom, France, Turkey and elsewhere. Translation history, literary history and their intersection could enlighten many dark loops of (feminist) history. As a burgeoning discipline, translation studies tend to absorb every possible means to fill such gaps. Henceforth, the new discipline celebrates and welcomes all theoretical and methodological tools in the humanities and social sciences in order to grasp such multi-faceted, multi-layered, multi-disciplinary and multi-discursive universe of translation and its nature. Thereby, it opens horizons not only for the present and past but also for the future. Heretofore, those horizons have functioned as *translations* within and beyond ages of humanity, because thereby there are multi-dimensional interactions between social sciences and the humanities. Henceforth, hitherto disregarded roles and functions of women across the ages of human history can now a bit more visible. Women of our age tend not compromise with being left under an iron curtain.

CONCLUSION

Patriarchy has almost always been one of the prime dynamics of social oppression, male hegemony, and women's subjugation to men. Women in the Victorian Age counterargued, resisted to and struggled against male-chauvinistic arguments and acts by society. Though the age was identified by patriarchy, those achievements of women in access to education, and employment were remarkable. Furthermore, the works in literature, and translation by women of the times have been praiseworthy.

The Age of the Great Queen of England, Victoria can neither be thoroughly affirmed nor be thoroughly negated. Furthermore, blaming industrialists, factory-owners and the gentry as the culprit of the poverty and suffering of working-class is a reductionist conception. Too large families, overpopulated outskirts of working class, hence excess in working class population were more explanatory for poverty, and even misery of the lower class. Though aristocracy maintained its privileged status through

the Victorian Age, bourgeoisie became the force majeure for the socio-economic development and colonialism plus for the flourishing culture, art, literature and translation in the country. Feminine achievements in literature and translation mostly belong to bourgeois class women rather than those women of other classes. Henceforth, belongingness to a social class was a force majeure in society that delineates the activation of women's potential, capacity and self-actualization in the Victorian Britain. Furthermore, British democracy has evolved into advances through sociopolitical bottom-up mechanisms. It is also an outcome by translation history to fill the historical loops in the progressive role of women in the burgeoning Victorian Age.

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Chapter 6

RETHINKING SOCIAL SERVICES WITH ARTIFICIAL INTELLIGENCE: OPPORTUNITIES, RISKS, AND FUTURE PERSPECTIVES

Ferhat TOPER¹

¹ Associate Professor, Malatya Turgut Özal University Faculty of Health Sciences
Department of Social Work, ORCID: 0000-0001-6398-5343, ferhat.toper@ozal.edu.tr

Introduction

Artificial intelligence (AI), defined as computer technologies and machine learning capable of mimicking human intelligence, encompasses technologies that learn using logic and solve complex problems (Kalota, 2024). AI has emerged as one of the most impressive technological developments in recent years due to its ability to predict future events based on past data. AI is designed to perform tasks that require human intelligence, such as learning from data, solving problems, and making accurate decisions in uncertain conditions (Ahn, Choi, Fowler, & Song, 2025). This technological advancement is shaping the way people learn, make decisions, communicate, and work by affecting many aspects of daily life (Maslej & Fattorini, 2024).

Recent developments in AI are having a transformative impact on many industries, including healthcare worldwide (Shah, et al., 2019). AI applications, particularly those in the healthcare sector, are used in areas such as diagnosis, treatment, automating repetitive tasks, reducing dosage errors, managing medical records, analyzing patient scans, and providing customer service through chatbots (Rong, Mendez, Assi, Zhao, & Sawan, 2020). AI tools used in critical areas such as mental health and risk prediction are employed in therapeutic settings to enhance individuals' well-being (Balan, Dobrea, & Poetar, 2024).

Artificial Intelligence and Social Work

Social workers, who play critical roles in addressing complex social issues, face various challenges due to limited resources, heavy workloads, and weak inter-agency collaboration (Li, Wang, & Jian, 2025). AI is a new and potentially beneficial technological development for social service professionals, who have played important roles in solving the problems brought about by social change and transformation for over a century worldwide (Garkisch & Goldkind, 2025). One of the basic functions of social services is to guide and analyze changes in individuals and communities. The challenges and conveniences brought about by digitalization and technological advancements are among the most significant changes for individuals and communities in today's societies (Dufva & Dufva, 2019). In this context, digital change and transformation are increasingly gaining importance in social work practices (Goldkind, 2021).

Although studies on the use of AI in social service delivery are still in their infancy, AI has made positive contributions in the areas of mental health (Walsh, Ribeiro, & Franklin, 2017), domestic violence (Hui, Constantino, & Lee, 2023), and child protection (Field, et al., 2023). By analyzing large datasets, AI can predict risks associated with vulnerable individ-

uals, making it a highly useful tool for early intervention (Boetto, 2025).

The use of AI in the field of social work is evident in supporting individuals' decision-making processes, conducting analyses related to needs assessment and resource allocation, and making predictions (Cresswell et al., 2020). Reamer (2023) states that AI has the potential to increase the effectiveness and capacity of social workers in administrative, clinical, and policy contexts. Meilvang (2024) states that social workers who use AI in administrative tasks can devote more time to their core duties. In fact, the intersection of AI and social work lies in enhancing the effectiveness of the social work profession and improving the well-being of individuals and communities through new methods and models that will be developed.

The use of AI and other technologies in social service applications enables the expansion of service delivery and provides support to individuals and communities that social service professionals have difficulty reaching through online platforms and video conferencing (Pascoe, 2023).

Victor and Goldkind (2025) state that ChatGPT, a large language model introduced by OpenAI in late 2022 and recognized globally, has begun to be used as a "public therapist." Similar AI tools are increasingly being used in the field of mental health (Farhat, 2023). For example, the use of these platforms, which provide a non-judgmental environment for users in areas such as support for individuals in the grieving process and the development of social skills, is becoming more widespread every day (Giray, 2024). In another example, McNally et al. (2024) state that families with autistic children communicate with AI tools without having to go to the hospital, wait in line, or fear stigmatization.

The Application Potential of Artificial Intelligence in the Field of Social Services: Opportunities and Contributions

The integration of AI into social work applications creates various opportunities for both social workers and clients. This technological transformation enables social workers to analyze case-related data more quickly and effectively, reduce administrative burdens, allocate more time to professional practices, identify risk situations early, and plan services in a more comprehensive manner. Social workers can analyze large data sets, predict risks, and make more effective assessments through AI (Toli & Manasa, 2024). They can also automate administrative tasks through virtual assistants, allowing them to devote more time to professional practice. Alowais et al. (2023) have noted that AI cannot replace social workers but can optimize many processes to make them more effective and efficient.

The use of AI in social service applications can provide significant benefits in areas such as developing personalized services (Bako & Taylor, 2021), predictive thinking (Gillingham, 2011), and improving quality control (Kum, Stewart, Rose, & Duncan, 2015).

Data analysis and predictive modeling are among the most powerful applications of AI in the social services field. This is because AI can quickly scan large data sets that would take a long time for humans to scan and analyze, making it way easier for practitioners (Fernando & Ranasinghe, 2023). For example, data from multiple sources, like police reports, health service databases, and school records, can be analyzed to identify kids at risk of neglect or abuse. Similarly, when used in the same way, community-level data can be examined to identify areas of substance use and take proactive measures (resource allocation, risk mapping, etc.) for these areas (Vijayakumar, Seetharaman, & Maddulety, 2023).

For social service professionals, administrative tasks in the field consume a large portion of their time, which means less time is available to work with clients. At this point, AI-supported administrative automation systems can take on routine but necessary tasks such as scheduling appointments, collecting preliminary information from clients, and answering frequently asked questions (Anda, 2001). Resource allocation in the social work field is of critical importance, especially in countries and regions with limited resources. AI models can play an important role in effective, goal-oriented planning in resource allocation (Fernando & Ranasinghe, 2023). For example, by analyzing data sets related to the demographic structure of the community, emerging issues, and previously provided services, the areas where resources are most effective can be identified (Tufford & Newman, 2010). Making data-driven decisions through AI can ensure that services reach the right people at the right time, which not only improves service quality but also increases cost-effectiveness (Dittakavi, 2022).

In addition, chatbots can play an important role as a first line of support for cases requiring urgent intervention in the field of mental health. Chatbots that provide quick and algorithmic responses based on the symptoms and concerns expressed by individuals in crisis situations may not replace medical and clinical intervention, but they can serve as a bridge to professional support by providing emotional support in cases where experts are not immediately available (Fernando & Ranasinghe, 2023). From the perspective of applicants, it creates opportunities in terms of overcoming geographical barriers to facilitate access to services, enabling applicants who are concerned about face-to-face meetings to access services, and reducing stigma. In this way, social service processes

can become faster and more effective.

Artificial Intelligence and Social Services: Limitations and Ethical Questions

There are various challenges associated with the use of AI in social service applications. Chief among these is the concern that relationships may be automated, moving away from a case-specific, individualized approach. Other concerns include the weakening of human relationships and empathy at the core of the service, biases embedded in algorithms, and discrimination against vulnerable groups. There are also concerns that surveillance conducted through AI during social service applications may violate individuals' privacy rights (Reamer F., 2023). AI tools can play roles in many areas of social work practice, such as analyzing written records, comparing data sets, conducting risk assessments, and providing crisis prevention and assistance (Reamer F., 2023). However, despite their potential to bring about significant change in social work practice, AI tools also raise some concerns. These concerns relate to the potential for excessive dependence (Dis, Bollen, Zuidema, Rooij, & Bockting, 2023) and the erosion of the human skills and values that form the core of the social work profession (Oak, 2016).

Although developments in AI promise to revolutionize social service applications (Marquart & Goldkind, 2023), the impact of using AI in social service delivery on the protection of human rights must be assessed (Garkisch & Goldkind, 2025).

It is noted that AI fundamentally transforms social systems in terms of decision-making processes, access to resources, and influence on policies (Ahn, Choi, Fowler, & Song, 2025). However, it has been argued that while technologies such as AI offer significant opportunities, they also have the potential to further deepen existing inequalities when developed primarily by privileged and homogeneous groups (Farahani & Ghasemi, 2024). Eubanks (2019) argues that AI tools can reinforce structural biases and negatively affect vulnerable population groups, particularly low-income individuals (Eubanks, 2019, cited in Ahn et al., 2025). These deepening inequalities are concerning for social workers, whose mission is to serve disadvantaged groups and advocate on their behalf. Coeckelberg (2022) notes that global inequalities have deepened due to the concentration of AI development activities in developed and wealthy countries, which has excluded disadvantaged communities from policy-making processes and weakened democratic representation (cited in Ahn et al., 2025).

Many AI models require large data sets to function, and this information often includes personal data (Ferguson, 2005). This entails risks

such as the collection, storage, misuse, or unauthorized access of personal data. Although options such as encryption and two-factor authentication are available, the risk of data breaches and unauthorized use always exists (Gesi, Shen, Geng, Chen, & Ahmed, 2023). Additionally, there is always the risk of serious problems, such as incorrect decisions being made based on these large data sets. This is because AI tools rely on analyzing existing data and making predictions. However, from the perspective of the social work profession, each case is unique, each individual is unique, and individuals must be evaluated within their context without being detached from it. Similarly, there is also a risk that AI algorithms may cause bias. An AI tool trained with biased data sets can perpetuate systematic discrimination and thus undermine the professional values of social work, which aims to promote social justice (Fernando & Ranasinghe, 2023). For example, if an algorithm used for a specific type of assistance is trained with data that predominantly represents a particular economic or racial group, that type of assistance may be allocated to similar economic and racial groups, inadvertently perpetuating existing inequalities.

Another concern that has been raised is the loss of the human touch with the integration of AI into social service applications. This aspect of the social service profession, which is based on human interaction, empathy, and unconditional positive regard, cannot be fully replicated by AI algorithms, no matter how advanced they become. This could erode the interpersonal relationships that form the core of social work, turning it into an automated system and creating a negative process for clients who already feel vulnerable and marginalized (Vijayakumar, 2023). Effective social work interventions often rely on professionals' ability to understand complex emotional and social situations to reach a solution. The nuances of trust, empathetic listening, and understanding body language between the social worker and the client cannot be fully replicated by AI tools, no matter how advanced they may be (Fernando & Ranasinghe, 2023).

Ethical Concerns

Ethical issues are among the most fundamental concerns regarding the use of AI in social work practice. The use of AI raises notable ethical challenges such as client autonomy, privacy, confidentiality, transparency, misdiagnosis, misrepresentation, bias, injustice, and generalization (Frackiewicz, 2025; Rubeis, 2022).

Social workers, when working with clients, have considered it their duty to explain both the benefits and potential risks of the services they offer, viewing this as part of the informed consent process (Reamer, 2006). Similarly, when social workers use AI in practice, they must not only ex-

plain the benefits and risks but also respect clients' decisions regarding whether or not to accept the use of AI (Reamer, 2023). The NASW Code of Ethics (2021) clearly states this: "Social workers who use technology in the delivery of social work services must obtain informed consent from individuals using these services during the initial assessment or interview and before beginning the service."

Social workers who use AI during social work interventions are responsible for ensuring the confidentiality of the data they collect from clients. They are obligated to ensure that the AI tool they use is properly encrypted and protected at the highest level (Reamer, 2023). This is clearly stated in the NASW Code of Ethics (2021) as follows: "Social workers should take reasonable steps to protect the confidentiality of electronic communications, including information provided to parties and third parties." Social workers should apply appropriate protective measures (encryption, firewalls, and passwords) when using electronic communications such as email, online sharing, online chat sessions, mobile communications, and text messages."

Clinical social workers who use AI tools to assess behavioral disorders should take precautions to minimize the possibility of misdiagnosis. Misdiagnosis can lead to unnecessary and even harmful interventions (Reamer, 2023). Yan et al. (2023) recently stated that AI tools cannot replace clinicians in diagnosing mental disorders.

One of the most important ethical issues raised regarding the use of AI tools in social work practice is algorithmic bias and injustice. This is because AI is machine learning and learns from large data sets. This poses significant risks because it may not always reflect the characteristics of the client groups served by social workers. This risk may include serious biases toward vulnerable groups in terms of race, gender, ethnicity, and gender identity during client assessment and intervention planning (Lee, Resnick, & Barton, 2019).

AI technology is changing and developing much faster than other technological developments. This situation highlights the fact that social workers have certain responsibilities regarding evidence-based social work practices. Professionals who integrate AI tools into social work practices have ethical responsibilities to follow developments based on AI research and adapt their practices accordingly (Reamer, 2023). These ethical responsibilities are similar to those involved in following other evidence-based social work practices and integrating them into their own practices.

Conclusion

The use of AI is rapidly increasing in many areas, including social services. As in other areas, there are ethical challenges and risks associated with the use of AI in social services, in addition to its benefits. A number of benefits can be mentioned, such as the planning of services, the analysis of data sets, the automation of administrative tasks to allow more time for professional practice, easier access to social services for population groups that cannot access them due to geographical and cognitive barriers, the ability to perform risk analysis for sensitive population groups, and the facilitation of early diagnosis and warning. However, alongside these benefits, there are also some challenges and risks. These revolve around issues such as informed consent, client autonomy, privacy and confidentiality, the risk of misdiagnosis, surveillance, transparency-related issues, algorithmic bias, and injustice. Social workers should be aware of the opportunities and risks that will arise from the integration of AI into social work practices and take proactive steps. They should review ethical standards regarding the use of AI and adapt them to the institutions where they work. Institutions should design training programs to ensure that their employees can use AI tools appropriately and in accordance with ethical standards during practice. In addition, curriculum changes should be made in social service departments at universities regarding the use of AI so that future social service professionals can be taught how to use AI tools correctly and in accordance with ethical standards during implementation. Finally, social service academics and practitioners should conduct comprehensive research on the use of AI in professional practice and establish standards regarding the impact, limitations, and algorithmic biases of this technology. This is because the integration of AI into social work is only possible through a multidisciplinary approach involving not only technologists but also social work professionals, academics, and policymakers (Khanna & Srivastava, 2020). This integration is very important as it offers numerous advantages for both social work professionals and clients.

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