UNDERSTANDING BARRIERS EXPERIENCED BY WOMEN IN TÜRKİYE'S IT SECTOR

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Approval of the thesis:

UNDERSTANDING BARRIERS EXPERIENCED BY WOMEN IN TÜRKİYE'S IT SECTOR

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ABSTRACT

UNDERSTANDING BARRIERS EXPERIENCED BY WOMEN IN TÜRKİYE'S IT SECTOR

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Ongoing gender inequalities the in the Information Technology (IT) industry emphasize the need for aimed interventions to promote gender equality in the world. Despite advancements in technology and societal attitudes, systemic barriers hinder women's participation and advancement in IT careers. This thesis investigates the challenges and barriers women face in Türkiye's IT sector and explores how demographic factors influence these challenges. Through a comprehensive analysis of IT workers' perspectives, this study aims to uncover key challenges and provide recommendations for organizations to enhance employee wellbeing and overcome barriers faced by female IT workers. The research questions explore the specific challenges encountered by women, variations in perspectives of participants based on demographic factors, and recommendations for organizational policies and practices via a survey study. The survey was first applied to 25 people in a pilot study. After the necessary revisions were made, the main study was conducted by collecting data from 238 IT professionals working in different companies in the industry. The findings show that male colleagues do not exhibit direct discrimination to females in work-life. Still, there is doubt about women's advancement into managerial roles and personal obstacles stop women from entering the IT sector. Additionally, the study highlights the struggle to maintain work-life balance and the importance of accessibility to technology in supporting gender diversity. Recommendations to address these challenges include implementing applications such as menstrual leave, special leave for parents, and flexible work arrangements for women. Furthermore, proactive measures such as revisiting hiring and salary policies and organizing campaigns to increase female participation in IT are proposed. Türkiye's IT industry can foster a more inclusive and equitable work environment for women by addressing these challenges and implementing targeted interventions.

Keywords: Gender Inequality, Women's Challenges in IT, Information Technology (IT), Workplace Barriers, Self-Efficacy, Women in Technology

ÖZ

TÜRKİYE'DEKİ BT SEKTÖRÜNDE KADINLAR TARAFINDAN YAŞANAN ENGELLERİ ANLAMAK

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Doç. Dr. Nurcan Alkış Bayhan

Nisan 2024, 133 sayfa

Bilgi Teknolojileri (BT) sektöründe süregelen toplumsal cinsiyet eşitsizlikleri dünyadaki toplumsal cinsiyet eşitliğini geliştirmeye yönelik müdahalelerin gerekliliğini vurgulamaktadır. Teknolojideki ve toplumsal tutumlardaki ilerlemelere rağmen sistematik engeller kadınların BT alanındaki kariyerler olanaklarını değerlendirmelerini ve bu alandaki kariyer yolunda ilerlemelerini engellemektedir. Bu tez çalışması, Türkiye'nin bilişim sektöründe kadınların karşılaştığı zorlukları ortaya çıkartmayı hedeflemekte ve demografik faktörlerin bu zorlukları nasıl etkilediğini araştırmak amacı ile yazılmıştır. Bu çalışma kapsamında BT çalışanlarının bakış açılarının kapsamlı bir analizi yapılarak, karşılaşılan temel zorlukları ortaya çıkartmak, şirketlere çalışanların refahını artırmaya ve kadın BT çalışanlarının karşılaştığı engelleri aşmaya yönelik öneriler sunmak amaçlanmıştır. Araştırma soruları, kadınların karşılaştığı belirli zorlukları, demografik faktörlere dayalı olarak katılımcıların bakış açılarındaki farklılıkları ve bir anket çalışması aracılığıyla kurumsal politika ve uygulamalara yönelik önerileri araştırıyor. Hazırlanan anket, pilot çalışma kapsamında farklı firmalarda çalışan 25 BT profesyoneli ile yürütülmüş ve gerekli revizyonlar yapıldıktan sonra 238 BT profesyoneli ana çalışmaya dâhil edilmiştir. Bulgular, erkek meslektaşların doğrudan ayrımcılık yapmadığını, ancak kadınların yönetici rollerinde yükselmesi konusunda şüpheleri olduğunu ve kadınların BT sektöründe katılmak istemesine engel olan kişisel engellerin bulunduğunu gösteriyor. Ayrıca çalışma, iş-yaşam dengesini koruma mücadelesine ve cinsiyet çeşitliliğinin desteklenmesinde teknolojiye erişilebilirliğin önemine dikkat çekiyor. Bu zorluklara çözüm bulmak için adet izni, ebeveynlere özel izin, esnek çalışma düzenlemeleri gibi uygulamaların hayata geçirilmesi öneriler arasında yer alıyor. Ayrıca işe alım süreçleri ve maaş politikalarının yeniden gözden geçirilmesi ve kadınların BT'ye

katılımını artırmaya yönelik kampanyalar düzenlenmesi gibi proaktif önlemler önerilmektedir. Türkiye'nin BT sektörü, bu zorlukları ele alarak ve hedeflenen müdahaleleri uygulayarak kadınlar için daha kapsayıcı ve eşitlikçi bir çalışma ortamı haline gelebilir.

Anahtar Sözcükler: Cinsiyet eşitsizlikleri, Bilgi Teknolojileri (BT), Engeller, Öz-yeterlik, Teknolojide Kadınlar

To My Grandmother, Urguç Nermin Andaç

Sevgili Anneannem, Urguç Nermin Andaç'a

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AND, my cat Yulaf who came into my life surprisingly on the first day of the new year, you have brought me good luck since you entered my life. Thank you for the good luck you brought.

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LIST OF ABBREVATIONS

ACM: Association for Computing Machinery

ANOVA: Analysis of Variance

ICSE: International Conference on Software Engineering

ICT: Information and Communication Technologies

IEEE: Institute of Electrical and Electronics Engineers

IS: Information Systems

IT: Information Technologies

NCWIT: National Center for Women & Information Technology

OECD: Organization for Economic Co-Operation and Development

PC: Personal Computer

R&D: Research and Development

SE: Software Engineering

STEM: Science, Technology, Engineering, Mathematics

TÜBİDER: Turkish Information Technology Industry Association

TURKSTAT: Turkish Statistical Institute

UI: User Interface

UN: United Nations

UX: User Experience

QA: Quality Assurance

WEF: World Economic Forum

CHAPTER 1

INTRODUCTION

The active involvement of women in the workforce, both on a global scale and within our country, Türkiye, has experienced a notable upswing, particularly since the 20th century. Yet, the increase in the involvement is still less than men's when compared and in professional life, women are less involved and employed then men [1]. The labor force participation rate of women for United Nations (UN) and Organization for Economic Co-Operation and Development (OECD) countries is given in Table 1 for the year 2023. The labor force participation rate is the ratio of the labor force, which is the sum of the employed and the unemployed looking for a job, to the active population. A high labor force participation rate indicates the efficiency of the labor market.

Table 1 Labor force participation rate for 2023, adopted from Turkish Statistical Institute TURKSTAT [1]

Year 2023	Women	Men	In Total
OECD	53.5	68.8	60.9
UN	52.4	64.1	58.0

According to the data, in 2023, the labor force participation rate in UN countries is 58.0% while in OECD countries, the rate is 60.9%. In both groups of countries, men's participation rate is higher than women.

The employment rate is important in terms of indicating the extent to which the labor force can participate in economic activities. The ratio of employed individuals to the working-age population represents the employment rate.

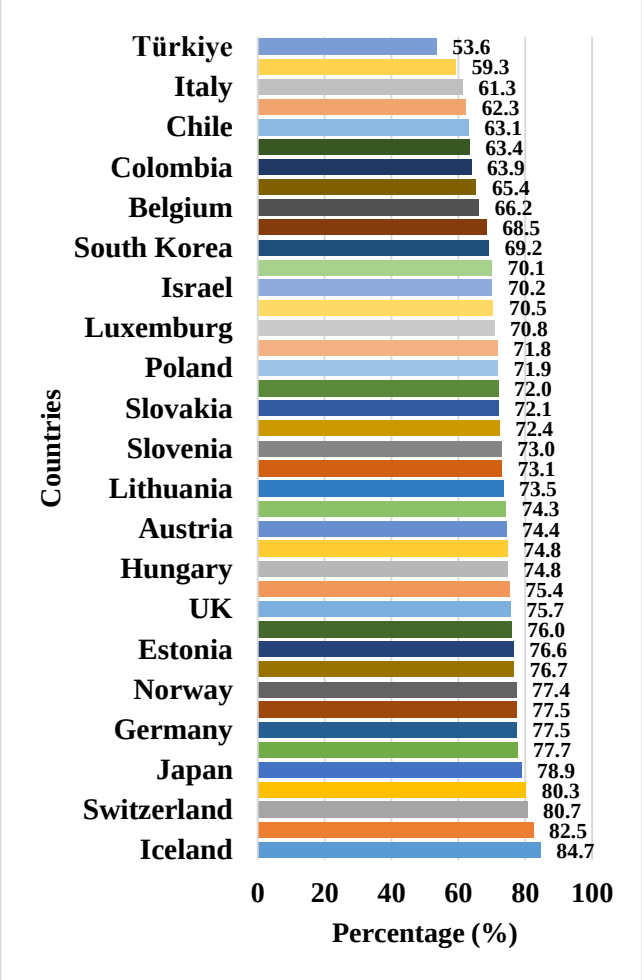

Figure 1 Employment rate for OECD countries in 2023 Q2, adopted from [2]

According to the OECD data given in Figure 1 [2], for the period of 2023 – 2nd Quarter Türkiye's employment rate is 53.6% for the population aged between 15 and 64. It can be seen that Türkiye is ranking last among all members.

According to the report of TURKSTAT [3], which was published in December 11, 2023, for the period of 2023 –4th Quarter in Türkiye, labor force participation rate is announced as 53.1%. The labor force participation rate for men is 70.8% and for women is 35.7%, which can be seen in Table 2 below. In terms of other statistics, women have higher rates of unemployment rate and has lower rates of employment rate. Therefore, it can be referred that although participation of women to the work life increases through years, the rates are still less than men both globally and in Türkiye.

Table 2 Labor Force in Türkiye, Q4, adopted from [3]

	4th Quarter, 2023		
	Total	**Male**	**Female**
(in thousand)			
Population aging 15 and more	65589	32463	33126
Labor force	34796	22979	11816
Employment	31835	21359	10476
Unemployed	2961	1620	1341
Not in the labor force	30793	9483	21310
(%)			
Labor Force Participation Rate	53.1%	70.8%	35.7%
Employment Rate	48.5%	65.8%	31.6%
Unemployment Rate	8.5%	7.0%	11.3%
Youth Unemployment Rate (ages 15-24)	16.3%	13.8%	21.0%

The sectoral distribution of employment involves gender-based segregation and although it varies from country to country, women generally tend to work more intensively in the agriculture and service sectors within the labor market [4]. Even within the service sector, there is noticeable gender-based segregation based on specific industries. Accordingly, men tend to work in sectors such as construction, transportation, storage, and communication, while women are often employed in accommodation and food services, tourism, real estate, commercial and administrative services, health and social services, education, and other service sectors [4]. However, as the participation rates of women in higher education increase over time, and with the significant improvements occurring in digital technologies worldwide (i.e. Industry 4.0) new applications and information technologies directly impact societal structures and labor markets [5].

Computer technologies are extensively used in all production processes and employment fields. Especially through the flexible employment models it facilitates, it has had a significant impact on the employment of both women and men, creating new sectors and professions (such as computer programmers, system analysts, etc.) Wright and Jacobs [6] obtained results supporting the increasing number of women working in the IT sector in their studies.

In sectors such as IT, the ratio of female to male employees is relatively close to each other when compared to others. According to the study of Baş and Tekeli [7], when the gender ratios in various sectors is analyzed, it can be seen that IT sector stands out as the sector with the least difference between male and female. According to the "TÜBİDER Information Technology Sector Employee Salaries Survey" conducted by the Turkish Information Technology Industry Association (TÜBİDER) in 2013 [8], the percentage of women employed in the IT sector is 32.7%, while the percentage of men is 64.4%. There exist not up to date report published by TÜBİDER but still it can be said that the IT sector

is a gender-mixed group in Türkiye. Even if IT sector can be categorized as gender-mixed with respect to the other sectors, this situation does not imply the absence of gender-based division of labor as mentioned previously.

There exist many studies about the underrepresentation of women in IT both in Türkiye and globally and studies focus on the challenges that women encounter with from different perspectives even in an industry where women participation rate is respectively high [7, 10, 11, 12, 16].

In addition to those challenges impacting the women IT workers, they face more obstacles due to their several demographic factors such as marital and parental statuses. These challenges often emerge from added responsibilities in their social lives. Particularly women in IT roles, encounter with different kinds of issues that may significantly affect them, largely due to the roles that society imposes on them. Although IT sector may appear less discriminated towards women compared to other sectors [9], research shows that women still face distinct challenges in this field. These studies suggest that barriers vary based on geographical location [10, 11, 12] and directly influence the challenges that women encounter in the IT industry.

Furthermore, the COVID-19 pandemic's impact on remote and hybrid work models introduces new challenges, particularly for women in IT. These current issues highlight the need for this study, which aims to holistically examine multiple challenges for the women employees in Türkiye.

1.1. Motivation of the Thesis

The motivation behind this thesis emerges from the recognition of persistent gender inequality within the IT industry, within the case of Türkiye. Despite significant advancements in technology and societal attitudes, women continue to face systemic barriers and challenges that hinder their participation and advancement in IT careers. This underrepresentation of women not only deprives the industry of diverse perspectives and talents but also sustains inequalities in economic opportunities. Understanding the specific challenges faced by women in Türkiye's IT sector is essential for developing targeted interventions and policies to promote gender equality and foster a more inclusive work environment.

The existing studies in this field focus on only one challenge or barrier mainly and they do not examine how responses vary depending on certain factors [10, 11, and 13]. Moreover, most of the existing studies do not utilize surveys or interviews or do not share the survey conducted even if they have [11, 14, and 15].

Most importantly, most of the existing studies in the literature do not include the effects COVID-19 pandemic, which did not exist in our lives four years ago. Additionally, there is no study examining different categories of challenges in the case of Türkiye based on

our knowledge. This thesis seeks to address this gap in knowledge by investigating the perspectives of IT workers in Türkiye on the challenges faced by women in the industry. By engaging with the experiences and opinions of IT professionals, including both women and men, we aim to shed light on the underlying factors contributing to gender discrimination and identify opportunities for change. Additionally, by examining how demographic factors, such as gender, marital status, parental status, and work setup influence participants' perceptions of challenges, we aim to provide a detailed understanding of the dynamics of gender inequality within the IT sector by conducting a survey.

The goal of this thesis is to contribute to the body of knowledge on gender equality in the IT industry and provide actionable insights for IT companies and policymakers in Türkiye. By highlighting the challenges faced by women in the industry and offering recommendations for enhancing employee wellbeing for removing barriers to advancement, we seek to facilitate positive change towards a more equitable and inclusive IT workforce in Türkiye.

1.2. Significance of the Study

This study holds significant implications for advancing gender equality and fostering inclusivity within Türkiye's IT industry. By shedding light on the challenges faced by women in the sector and exploring the factors influencing these challenges, this research offers valuable insights for IT companies, policymakers, and stakeholders. The significance of this study are discussed in the following topics:

Informing Policy and Practice: We believe that the findings of this study can shed light on the development of practices and policies aimed at eliminating and reducing gender inequalities within Türkiye's IT industry. By understanding the specific barriers women face, the opinions of different demographic groups on these barriers and the factors that shape their experiences, organizations can implement more effective strategies to promote gender equality and foster a more inclusive work environment.

Increasing Organizational Diversity and Inclusion: By recognizing and addressing gender biases and systemic barriers in the IT industry, organizations can develop a culture of diversity and inclusion that benefits employees of all genders. Creating opportunities for women to choose technical roles and leadership positions not only strengthens individual organizations but also contributes to the innovation of the IT sector in Türkiye.

Supporting Women's Career Development: By raising awareness of the challenges women face and providing recommendations to overcome these challenges, this research can support women's career development and create pathways to success in the industry by empowering them.

Contributing to Academic Studies: The findings of this study can contribute to the growing body of literature on gender equality in the workplaces, particularly within the

context of the IT industry in Türkiye. By sharing the experiences of IT workers, this research enriches academic studies and informs future researchers on this topic.

Overall, the significance of this study lies in its potential to drive positive change within Türkiye's IT industry and contribute to broader efforts to promote gender equality and inclusivity in the workplace.

1.3. Research Strategy

The principal aim of this study is to investigate the IT workers' perspectives on the challenges faced by women in the IT industry in Türkiye. Furthermore, it is also aimed to uncover the challenges that women IT workers encounter and how the participants' opinions varied based on the factors such as gender, marital status, parental status, and work-setup, such as working in a remote, hybrid or on-site style. Based on the findings, recommendations for IT companies and employees to increase the wellbeing levels of their employees and hinder the barriers that women encounter in the IT sector are provided. Regarding those purposes, the research questions (RQ) are proposed as follows:

RQ 1: What are the challenges that women encounter in their career in the IT sector in Türkiye?

RQ 2: How the participants' opinions about challenges vary based on the demographics factors such as gender, marital status, parental status and working setup?

RQ 3: What are the recommendations for organizations to increase the wellbeing of their employees to hinder the challenges/barriers that females encounter with?

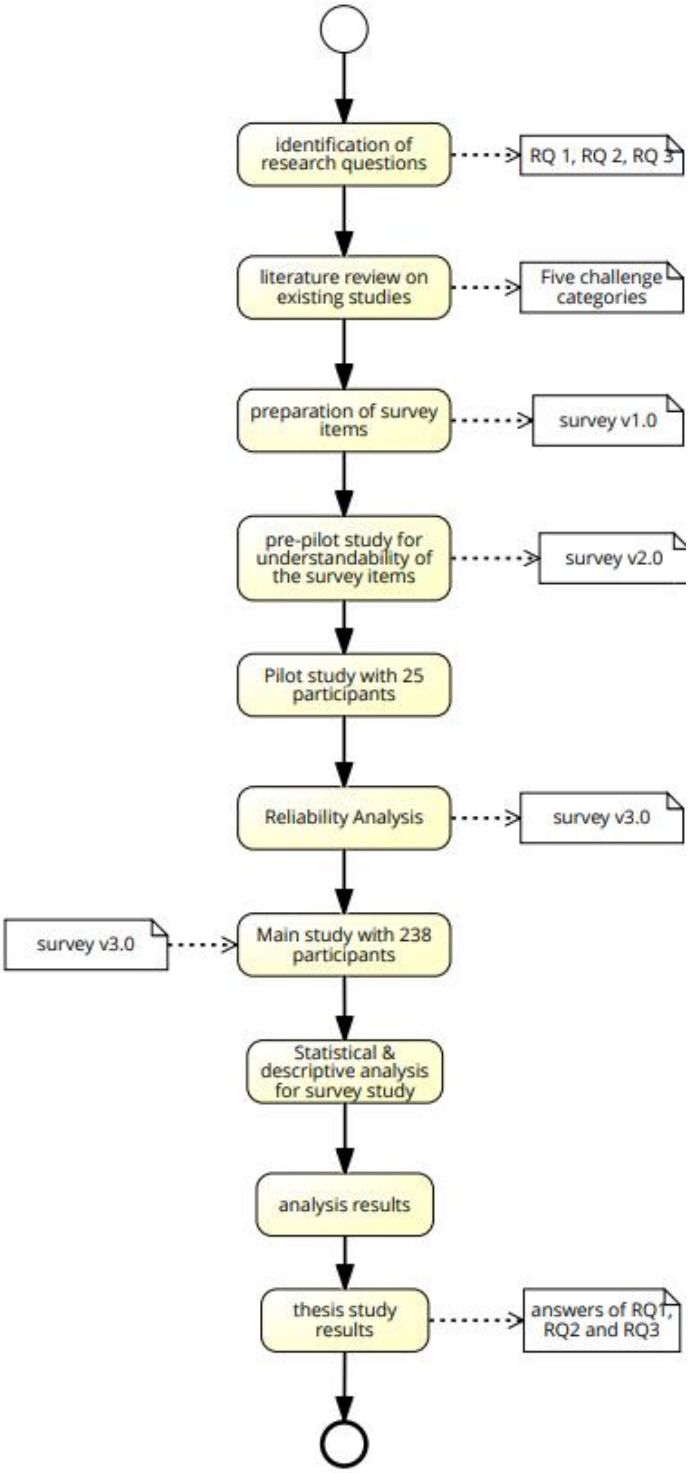

Figure 2 Process Diagram of the Research Strategy

Presented in Figure 2, each step of research strategy together with outputs and inputs are showed to answer the research questions provided before.

To answer to the research questions provided above, the first step was to conduct a comprehensive literature study to investigate the existing studies in the same field and topic. The aim was to understand the possible challenges encountered most through different countries having different cultures. With the results of the literature study and findings, five challenge categories were specified. Afterwards, a survey was developed to be able to foster five categories of challenges: discrimination from male dominated industry, difficulties in advancing managerial roles, self-imposed barriers among women, ensuring work-life balance and accessibility to technology.

The survey firstly was controlled by a group four people from both genders working in IT sector in Türkiye to check the clarity and the understandability of the survey items. According to the feedback taken from the respondents; the survey items were revised for better clarity and understandability.

At the second stage, we conducted a pilot study with 25 participants satisfying the conditions to be able to participate in the survey. Reliability analysis was performed with pilot study data and according to its results, some of the survey items were removed for the final version of the survey.

As the final stage of the data collection process, the main survey study was conducted among 251 participants to understand the perspectives of the IT workers from different positions of the different companies. Some of the data points had to be removed from before analysis since they were not suitable for the conditions needed, e.g. not working in an IT related position, therefore, and total number of participants was finalized to 238.

After collecting the data, it was analyzed with the help of SPSS package and the opinions of participants regarding to challenge categories were shared.

1.4. Structure of the Thesis

The rest of this thesis is organized as follows; Chapter 2 provides the literature review on the situation, challenges, and insights that women encounter within the IT industry from varying countries.

Chapter 3 presents the research methodology including research questions, data collection and pilot study stages together with the validity threads of the study.

Chapter 4 includes the data analysis approach and results for the survey study; demographics of the survey participants and results associated with the challenges together with the recommendations for the organizations to overcome the challenges The results were analyzed in terms of some demographics' factors such as gender, age, marital

status, parental status, education level, years of experience in the same role and working style.

Chapter 5 presents the discussions of the findings of the thesis study from the survey results.

Chapter 6 includes the summary of the findings as a conclusion, implications, and the possible outcomes of the study for both individuals and companies together with the limitations of the study and future research areas.

CHAPTER 2

LITERATURE REVIEW

This chapter presents an overview of the literature from the perspective of what other studies have found about the problems that women encounter in IT from different regions of the world. To be able to explain the followed way of conducting the literature study, the process was explained in Section 2.1 together with inclusion and exclusion criteria. It was encountered that the challenges and barriers are mainly stem from "inequality" in workplaces, therefore, the term "gender inequality" was elaborated on in Section 2.2 in order to understand the concept. After categorizing the studies found, the most encountered challenges were specified and another detailed search for the challenge categories were conducted, which are presented in Section 2.3 to 2.7 with a detailed analysis.

2.1. Literature Review Process

This section describes the literature review process that we performed in order to specify existing challenges that female IT workers encounter within the IT industry. By the help of literature review, two of our research questions are aimed to be answered, which are what the challenges are that women encounter in their career in the IT sector in Türkiye and how the participants' opinions about challenges vary based on the demographics' factors such as gender, marital status, parental status and working setup.

The following research engines were used: ACM Digital Library, IEEE Explore, Scopus, Google Scholar and ProQuest. Additionally, a special conference series' publication - ICSE, Software Engineering in Society track and Gender Equity workshop- were also investigated.

In order to reach as many relevant studies as possible, the following search keywords were determined by exploring alternative keyword options:

< (IT OR "Software Engineer*" OR "Information System") AND ("Gender Bias" OR Obstacle* OR Challenge* OR Inequality OR Disparity OR Representation OR Stereotype OR STEM) AND (gender OR women OR female)>

At the first stage with the help of keywords defined, the related search was conducted in the provided search engines, and 167 papers were found. After that, the following inclusion and exclusion criteria were applied.

2.1.1. The Inclusion and Exclusion Criteria

Several inclusion and exclusion criteria to reach the most relevant research in the literature were identified. These criteria are presented below:

Inclusion Criteria

- Studies published in journals and academic conferences.
- Research conducted in various countries and cultures, in order not to miss any possible challenge regarding to regions.
- Research studies both qualitative and quantitative.

Exclusion Criteria

- Studies conducted in non-IT fields.
- Research published in languages other than English and Turkish.

After identifying inclusion and exclusion criteria, and removing the duplicates, the number of related papers were decreased to 45. Later, the reviewed papers were listed in an Excel worksheet together with the following information including reference number, citation, its time period, related specific sector, country, and notes regarding if they include surveys in the study or not. The related table is presented in Table 3.

Table 3 List of papers after applying the inclusion and exclusion criteria

Ref No.	Reference	Period	Sector	Country	Research Type & Relevance
[32]	Masiero, S., & Aaltonen, A. (2020). Gender bias in Information Systems Research: A literature review. *SSRN Electronic Journal*. doi:10.2139/ssrn.3751440.	2020	IT	-	Literature Review
[46]	Gonzalez-Gonzalez, C. S., Garcia-Holgado, A., de los Angeles Martinez-Estevez, M., Gil, M., Martin-Fernandez, A., Marcos, A., … Gershon, T. S. (2018). Gender and engineering: Developing actions to encourage women in Tech. *2018 IEEE Global Engineering Education Conference (EDUCON)*. doi:10.1109/educon.2018.8363496.	2018	STEM	-	Qualitative

Table 3 (cont.)

[45]	Tahsin, N., Ahmed, N. S., Asad, M., & Sakib, K. (2022). Can female underrepresentation in information technology be solved through an awareness-based approach? *Proceedings of the Third Workshop on Gender Equality, Diversity, and Inclusion in Software Engineering*. doi:10.1145/3524501.3527606.	2022	IT	Bangladesh	Qualitative using survey
[31]	Blincoe, K., Springer, O., & Wrobel, M. R. (2019). Perceptions of gender diversity's impact on mood in software development teams. *IEEE Software*, *36*(5), 51–56. doi:10.1109/ms.2019.2917428.	2019	IT	Poland	Qualitative using interviews & survey
[65]	Strachan, R., Peixoto, A., Emembolu, I., & Restivo, M. T. (2018). Women in engineering: Addressing the gender gap, exploring trust and our unconscious bias. *2018 IEEE Global Engineering Education Conference (EDUCON)*. doi:10.1109/educon.2018.8363497.	2018	STEM	-	Qualitative using interviews
[66]	Trinkenreich, B., Britto, R., Gerosa, M. A., & Steinmacher, I. (2022). An empirical investigation on the challenges faced by women in the software industry. *Proceedings of the 2022 ACM/IEEE 44th International Conference on Software Engineering: Software Engineering in Society*. doi:10.1145/3510458.3513018.	2022	ICT	-	Qualitative using interviews & survey
[47]	Bennaceur, A., Cano, A., Georgieva, L., Kiran, M., Salama, M., & Yadav, P. (2018). Issues in gender diversity and equality in the UK. *Proceedings of the 1st International Workshop on Gender Equality in Software Engineering*. doi:10.1145/3195570.3195571.	2018	STEM	UK	Quantitative using survey

Table 3 (cont.)

[48]	Hyrynsalmi, S., & Sutinen, E. (2019). The role of women software communities in attracting more women to the software industry. *2019 IEEE International Conference on Engineering, Technology and Innovation (ICE/ITMC)*. doi:10.1109/ice.2019.8792673.	2019	STEM	Finland	Quantitative using survey
[39]	Hussain, A. J., Connell, L., Francis, H., Al-Jumeily, D., Fergus, P., & Radi, N. (2015). An investigation into gender disparities in the field of computing. *2015 International Conference on Developments of E-Systems Engineering (DeSE)*. doi:10.1109/dese.2015.17.	2015	IT	UK	Qualitative
[49]	Khalil, W., Nayab, S., Naeed, T., Khan, S., & Khalil, S. (2015). Female representation in Computer Science and Information Technology. *2015 International Conference on Information and Communication Technologies (ICICT)*. doi:10.1109/icict.2015.7469574.	2015	IT	Pakistan	Quantitative using survey
[63]	Kim, R. Y. (2024). Gender and workplace promotion: A case study of a multinational it corporation. *IEEE Transactions on Engineering Management*, *71*, 5174–5181. doi:10.1109/tem.2022.3216307.	2004	IT	-	Qualitative
[40]	Gupta, S., & Pathak, G. S. (2016). HR practices for women employees: A Study of Information Technology (IT) sector in India. *2016 3rd International Conference on Recent Advances in Information Technology (RAIT)*. doi:10.1109/rait.2016.7507980.	2016	IT	India	Qualitative & Review

Table 3 (cont.)

[41]	Shen, C. Y., & Ge, J. (2005). Women and ICT. *Proceedings of the International Symposium on Women and ICT Creating Global Transformation - CWIT '05*. doi:10.1145/1117417.1117431	2005	ICT	China	Qualitative
[14]	Arrawatia, M. A., & Meel, P. (2012). Information and Communication Technologies & Woman Empowerment in India. International Journal of Advanced Research in Computer Engineering & Technology (IJARCET), 1(8), 99–104.	2012	ICT	India	Qualitative
[16]	Menezes, Á., & Prikladnicki, R. (2018). Diversity in software engineering. Proceedings of the 11th International Workshop on Cooperative and Human Aspects of Software Engineering. https://doi.org/10.1145/3195836.3195857.	2018	SE	-	Qualitative using interviews
[11]	A. Bhattacharyya, "Women in Indian Information Technology (IT) sector: A sociological analysis," *IOSR Journal of Humanities and Social Science*, vol. 3, no. 6, pp. 45–52, 2012.	2012	IT	India	Qualitative
[76]	J. C. Carver and A. Serebrenik, "Gender in software engineering," IEEE Software, vol. 36, no. 6, pp. 76–78, 2019.	2019	SE	-	Qualitative
[10]	Elnaggar, A. (2007). The status of Omani women in the ICT sector. The International Journal of Education and Development Using Information and Communication Technology, 3(3), 4–15.	2007	ICT	Oman	Quantitative using survey

Table 3 (cont.)

[20]	de Ribaupierre, H., Jones, K., Loizides, F., & Cherdantseva, Y. (2018). Towards gender equality in software engineering: The NSA approach. Proceedings of the 1st International Workshop on Gender Equality in Software Engineering. https://doi.org/10.1145/3195570.3195579.	2018	STEM	UK	Qualitative
[15]	Hyrynsalmi, S. M. (2019). The underrepresentation of women in the software industry: Thoughts from career-changing women. 2019 IEEE/ACM 2nd International Workshop on Gender Equality in Software Engineering (GE). https://doi.org/10.1109/ge.2019.00008.	2019	STEM	Finland	Quantitative using survey
[67]	Judy, K. H. (2012). Agile values, innovation and the shortage of women software developers. 2012 45th Hawaii International Conference on System Sciences. https://doi.org/10.1109/hicss.2012.92	2012	IT	USA	Qualitative
[68]	Murphy, A., Kelly, B., Bergmann, K., Khaletskyy, K., O'Connor, R. V., & Clarke, P. M. (2019). Examining unequal gender distribution in software engineering. Communications in Computer and Information Science, 659–671. https://doi.org/10.1007/978-3-030-28005-5_51	2019	SE	-	Qualitative
[75]	Radziemski, C., & Mitchell, K. (n.d.). Different is good: Barriers to retention for women in software engineering. 30th Annual Frontiers in Education Conference. Building on A Century of Progress in Engineering Education. Conference Proceedings (IEEE Cat. No.00CH37135). https://doi.org/10.1109/fie.2000.896558	2000	STEM	Arizona	Quantitative using survey

Table 3 (cont.)

[12]	Wolff, A., Knutas, A., & Savolainen, P. (2020). What prevents Finnish women from applying to software engineering roles? Proceedings of the ACM/IEEE 42nd International Conference on Software Engineering: Software Engineering Education and Training, 93–102. https://doi.org/10.1145/3377814.3381708.	2020	SE	Finland	Quantitative using survey
[7]	Paşaoğlu Baş, D., & Tekeli, S. (2020). Bilişim Sektöründe Kadinin yeri: Literatür Taraması. Ekev Akademi Dergisi, (81), 555–569. https://doi.org/10.17753/ekev1321	2020	IS	Türkiye	Literature Review
[13]	Bozkurt, B., & Akpınar, A. (2017). Bilişim Sektöründe Toplumsal Cinsiyete Dayalı İş Bölümü. Marmara Universitesi Kadin Ve Toplumsal Cinsiyet Arastirmalari Dergisi, 1(2), 17–28. https://doi.org/10.26695/mukatcad.2018.8	2017	IS	Türkiye	Qualitative using interview
[5]	Ecevit Satı, Z., & Oktay Yılmaz, B. (2020). Endüstri 4.0 ortamında değişen iş ve mesleklerin türkiye'de kadın istihdamına etkileri. Strategic Public Management Journal, 6(11), 54–76. https://doi.org/10.25069/spmj.701685	2020	Industry 4.0	Türkiye	Qualitative & Review
[69]	Cetinkaya, A. (2020). Üretim ve Emek Ekseninde Dijital Oyun Sektöründe kadın. Uluslararası İnsan Çalışmaları Dergisi. https://doi.org/10.35235/uicd.726960	2020	Gaming	Türkiye	Qualitative using interview
[51]	Akçil, Çağla. İş Yaşam Dengesi Ve İş Tatmini: Bilişim Sektöründe Kadin Çalişanlar Üzerine Bir Araştirma Marmara Universitesi (Turkey) ProQuest Dissertations Publishing, 2019. 28244906.	2019	IT	Türkiye	Quantitative using survey

Table 3 (cont.)

[70]	Yıldız, İ., Yıldız, H. N. & Arslan, F. (2019). A Case Study on Glass Ceiling Syndrome Of Female Employees In The Information Technology Sector. Atatürk İletişim Dergisi , (16) , 99-112 . DOI: 10.32952/atauniiletisim.489417	2018	IT	Türkiye	Qualitative & Quantitative.
[74]	Toprakcı Alp, G. & Aksoy, B. (2021). Bilim, Teknoloji ve Kadın: Çalışmanın Geleceğine Dair Bir Değerlendirme . Pamukkale Üniversitesi İşletme Araştırmaları Dergisi , 8 (1) , 248-264 . DOI: 10.47097/piar.932215	2021	STEM	Türkiye	Qualitative
[73]	Alp, Gözde. (2019). Endüstri 4.0 Perspektifinden Kadın İstihdamı	2019	Industry 4.0	Türkiye	Qualitative
[71]	F. P. Acar, "Gender differences in promotions to top level management positions: An examination of glass cliff in the IT sector," Procedia - Social and Behavioral Sciences, vol. 210, pp. 223–230, 2015.	2015	IT	Türkiye	Quantitative using survey
[72]	Y. Ecevit, A. Gündüz‐Hosgör, and C. Tokluoglu, "Professional women in computer programming occupations: The case of Turkey," Career Development International, vol. 8, no. 2, pp. 78–87, 2003.	2003	IT	Türkiye	Qualitative using survey
[22]	E. D. Canedo *et. al.*, "Breaking one barrier at a time: How women developers cope in a men-dominated industry," *Brazilian Symposium on Software Engineering*, Sep. 2021. doi:10.1145/3474624.3474638	2021	IT	-	Qualitative using interviews
[26]	L. Howe-Walsh and S. Turnbull, "Barriers to women leaders in academia: Tales from science and technology," *Studies in Higher Education*, vol. 41, no. 3, pp. 415–428, Jun. 2014. doi:10.1080/03075079.2014.929102	2014	IT	-	Qualitative using interviews

Table 3 (cont.)

[28]	M. Heilman, "Sex bias in work settings: The lack of fit model," *Research in organizational behavior*, vol. 5, 1983.	1983	IT	-	Qualitative
[33]	S. Michie and D. L. Nelson, "Barriers women face in information technology careers," *Women in Management Review*, vol. 21, no. 1, pp. 10–27, Jan. 2006. doi:10.1108/09649420610643385	2006	IT	-	Quantitative using survey
[35]	P. Moorman and E. Johnson, "Still a stranger here: Attitudes among Secondary School Students towards Computer Science," *ACM SIGCSE Bulletin*, vol. 35, no. 3, pp. 193–197, Jun. 2003. doi:10.1145/961290.961564	2003	IT	-	Quantitative using survey
[38]	D. J. Armstrong, C. K. Riemenschneider, M. W. Allen, and M. F. Reid, "Advancement, voluntary turnover and women in it: A cognitive study of work–family conflict," *Information & Management*, vol. 44, no. 2, pp. 142–153, Mar. 2007. doi:10.1016/j.im.2006.11.005	2007	IT	-	Qualitative using interviews
[43]	A. Elnaggar, "Towards gender equal access to ICT," *Information Technology for Development*, vol. 14, no. 4, pp. 280–293, Oct. 2008. doi:10.1002/itdj.20100	2008	ICT	-	Qualitative
[44]	A. Acilar and Ø. Sæbø, "Towards understanding the gender digital divide: A systematic literature review," *Global Knowledge, Memory and Communication*, vol. 72, no. 3, pp. 233–249, Dec. 2021. doi:10.1108/gkmc-09-2021-0147	2021	IT	-	Systematic Literature Review
[50]	A. Antonio and D. Tuffley, "The gender digital divide in developing countries," *Future Internet*, vol. 6, no. 4, pp. 673–687, Oct. 2014. doi:10.3390/fi6040673	2014	IT	-	Qualitative & Review

Table 3 (cont.)

[29]	M. E. Heilman, "Gender stereotypes and workplace bias," Research in Organizational Behavior, vol. 32, pp. 113–135, Jan. 2012. doi:10.1016/j.riob.2012.11.003	2012	-	-	Qualitative
[30]	J. Colwill and J. Townsend, "Women, leadership and information technology," Journal of Management Development, vol. 18, no. 3, pp. 207–216, Apr. 1999. doi:10.1108/02621719910261049	1999	IT	-	Qualitative

As seen in Table 3, nearly 22% of the papers were conducted in Türkiye, while 7% in Finland, India, and UK and one study for remaining different countries. Nearly 42% of them do not specify the countries in the papers. Nearly 65% of the papers presented qualitative analysis while 27% of them were conducted quantitative analysis and the remaining ones are either literature review or mixed methods.

In our study, it was decided to conduct quantitative analysis through a survey verified with IT professionals. The studies listed in Table 3 were categorized whether they have survey or interview questions in order to make use of them. They are investigated in terms of having similar research questions to our study to foster the challenges. In terms of conducting surveys and interviews in the studies, and research questions, a detailed table is presented in Table 4.

Table 4 List of the research papers applying survey/interview methods

Ref No.	**Country**	**Research Questions**	**Challenges**	**# of Survey/Interview Questions**	**# of respondents**
[45]	Bangladesh	What are the factors influencing female underrepresentation in IT in Bangladesh?	Inequality	12	200

Table 4 (cont.)

[31]	Poland	Is gender inequality still exists in IT sector?	Inequality	Not shared	252
[65]	-	How to address the gender gap by exploring notions of trust and unconscious bias?	Gender Bias	Not shared	4
[66]	-	RQ1: What challenges do women face in software teams? RQ2: What are possible actions to mitigate the identified challenges, from the women's perspectives?	Male Domination	Not shared	94
[47]	UK	What are the issues effecting gender gap in computing fields in UK?	Accessibility & lack of role models	20	87
[48]	Finland	What is the role of women software communities in attracting more women to the software industry?	Accessibility	Not shared	134

Table 4 (cont.)

[49]	Pakistan	What are the factors affecting the percentage of females in the field of computer science and IT in Pakistan?	Accessibility & Self-efficacy	Not shared	205
[16]	NA	RQ1: Which studies have been published about diversity in SE and what are its characteristics? RQ2: How does diversity impact the software development process?	Inequality	3	-
[12]	Finland	What experiences may directly or indirectly affect the willingness of Finnish women to apply for SE roles?	Self-efficacy	48	252
[13]	Türkiye	-	Advancing managerial roles	Not Shared	12
[70]	Türkiye	-	Discrimination from Male Domination	Not Shared	8
[51]	Türkiye	What is the relationship between job satisfaction and work-life balance of women working in the IT sector?	Work-Life Balance	56	101
[71]	Türkiye	-	Discrimination from Male Dominated Industry	Survey not shared; 6 interview questions	Survey: 36 Interview: 20

As it can be referred from the Table 4, most of the authors did not provide the survey questions they utilized in order to reveal the barriers that females encounter, and the number of respondents are relatively little. Moreover, they focused on only one type of barrier.

It was encountered in the literature that most of the papers focuses on inequality at first. The inequality was mentioned in all types; gender, ethnicity, age, disability, etc. According to the papers, the challenges and barriers mainly stem from inequality in the workplaces, and inequality in living conditions. Therefore, the term "gender inequality" will firstly be mentioned in order to understand the status of the IT industry. Then, for each challenge category, the in-depth analysis of the existing papers in the literature will be elaborated and presented.

2.2. Gender Inequality in the IT sector

A growing body of literature suggest that companies in IT industry often favor males and females unfairly in hiring processes and assigning positions. In Menezes and Prikladnicki's [16] systematic literature review emphasizes the predominant focus on gender diversity within the sector of IT, reflecting a global interest in understanding and addressing gender disparities in the field. Across different countries, research emphasizes the need for inclusive practices and equitable opportunities for all individuals, aligning with broader discussions on diversity in STEM fields.

The study by Wang and Redmiles [17] provides empirical evidence of implicit gender biases in hiring decisions within the software development industry. Through a detailed experimentation involving 142 software engineers, the researchers reveal a tendency to associate technical roles with men while assigning women to family-related positions. Their findings underscore the systemic nature of gender biases in the industry, calling for comprehensive strategies to promote greater equity and inclusivity. In parallel, studies conducted in Germany [18] and the United Kingdom [19] shed light on the persistence of gender biases in role assignments within the software development sector. German researchers [18] suggests that women are often directed towards roles based on perceived social interaction levels, such as project management positions. Similarly, studies in the United Kingdom [19] indicate a continued trend of positioning women in less technical roles, primarily based on soft skills criteria. These findings highlight the need for interventions to address rooted biases and encourage a more inclusive environment.

Expanding beyond industry practices, Ribaupierre *et. al.*'s [20] study explores the efforts to tackle the gender gap in higher education institutions. Recognizing the underrepresentation of women in STEM fields, their approach offers solutions aimed at reducing this gap among both students and staff. The solutions include designing a curricula and courses that will increase the confidence of female students, creating conversion courses that will enable students to apply and be accepted to master's degree programs in computer science or software engineering. By addressing broader societal

and institutional dynamics, these initiatives contribute to creating a more inclusive and diverse landscape within software engineering education and practice.

2.3. Specification of Challenge Categories

With the comprehensive literature review (given in Table 3), five challenge categories were identified by grouping the studies the studies having common grounds. The most encountered challenges were male dominated industry, difficulties in advancing managerial roles, self-efficacy of women, imbalances in professional and personal life and difficulties in reaching technology. The grouping can be seen in Table 5.

Table 5 Challenge Categories

Challenge Category	Paper References
Discrimination in a Male Dominated Industry	[15],[67],[7],[5],[69],[70],[22]
Difficulties in Advancing Managerial Roles	[11],[7],[13],[71],[28],[29],[30],[26]
Self-Imposed Barriers Among Women	[15], [68],[12],[33],[35]
Ensuring Work-Life Balance	[7],[70],[72],[38]
Accessibility to Technology	[14],[10],[43],[44],[50]

Therefore, to address the RQs, we decided that the challenge categories investigated in this study will be the most common and extensively studied challenges in the literature. This decision is based on the preliminary literature review conducted to establish their foundations. A detailed analysis of each category are presented below in subsections 2.3.1, 2.3.2, 2.3.3, 2.3.4 and 2.3.5.

2.3.1. Challenge 1: Discrimination in a Male Dominated Industry

Discrimination can be exposed in various ways, the difference of relationships according to the gender, sexist expressions to the colleagues, etc. There are different researches focusing on this issue.

Both Hyrynsalmi [15] and Wolff *et. al.* [12] shed light on common challenges and findings regarding gender discriminations in the software industry with the studies they conducted in Finland. The authors conducted interviews and surveys about underrepresentation of women in software industry. Both studies reveal a widespread perception among female participants of clear gender bias within the IT and software engineering sectors. This bias is reflected in various aspects such as *unequal salaries*, a *male-dominated workforce*, and permanent stereotypes regarding women's competence in technical domains. The common highlight from both studies are the instances where female participants reported experiencing *discrimination from their male colleagues*. These discriminatory experiences range from subtle biases in daily interactions to more obvious forms of exclusion and marginalization in the workplace, which means the obstacles encountered in society and situations of being pushed out of society. The findings suggest that negative

experiences of discrimination and gender bias can adversely affect women's self-efficacy and motivation in pursuing careers related to software engineering. Women may feel discouraged or less confident in their abilities due to these challenges, potentially impacting their career aspirations and professional development in the field.

Despite Finland's relatively high female employment participation rate, as indicated in the Global Gender Gap Report [21], both Hyrynsalmi [15] and Wolff *et. al.* [12]'s studies underscore the persistence of gender-related obstacles faced by women in the Finnish software industry. This suggests that while progress may have been made in certain areas, significant challenges, which are specifically the discrimination from male domination and self-efficacy problems remain in achieving gender equity and inclusivity within the sector.

By identifying these common points of findings, both Hyrynsalmi [15] and Wolff *et. al.* [12]'s studies contribute to a deeper understanding of the systemic issues surrounding gender diversity and inclusion in the software industry, highlighting the need for continued efforts to address these challenges effectively.

Similar to the studies conducted in Finland, the study in Brazil conducted by Canedo *et. al*. [22] also highlights the existence of gender bias in the workplace. Female participants reported observing *sexist attitudes and behaviors* among their teams, indicating a pervasive issue of gender bias in professional environments through the structured interviews conducted within the scope of the study. According to the findings of Canedo *et. al.* [22], in the workplaces, more complex tasks are often given to men. This is echoing the findings from the Finnish studies [12, 15] where women reported facing challenges such as unequal salaries and limited access to certain roles or opportunities.

The findings indicated that among the subcategories of barriers; lack of experience, leadership issues, cultural differences and gender bias, the most recurring barrier is gender bias. Moreover, most of the challenges that participants faced with is related to lack of gender diversity in their workplaces and behavior of the males to the females.

These common points of findings across different geographical contexts underscore the global nature of gender disparities in the workplace, emphasizing the need for comprehensive strategies to address gender bias and promote inclusivity and diversity in professional environments.

2.3.2. Challenge 2: Difficulties in Advancing Managerial Roles

Another challenge category that is encountered in the literature can be specified as "difficulties in advancing managerial roles". Within the scope of this study, this statement covers situations such as women not being preferred for managerial positions in the companies they work in and *receiving less bonuses/raises* than their male colleagues at the same level.

The demand for IT workers is growing due to increased global competitiveness. However, despite this rising demand, there continues to be a shortage of women in the field [23].

According to the National Center for Women & Information Technology (NCWIT)'s report in 2016 [24], women held 25% of computing positions in United States. In 2022, the same statistics only increased up to 27% for US [25]. Therefore, having less women in the industry, highly decreases the possibility of women in leadership roles. According to a study of Howe-Walsh and Turnball [26], the lack of women in management or senior positions makes it even more difficult for other women to be in senior level positions. In Statista's "Percentage of Women in Management Positions in the IT Industry Worldwide" Report for 2019, only 3% of CEOs in the IT sector were women [27]. According to NCWIT's Women in Tech: The Facts Report [24], even though female IT professionals aspire to hold a c-level or senior management position; only 25% of the technical females in the study reported that their companies support *women's leadership aspirations*.

In terms of challenges in advancing in managerial roles, Heilman [28, 29] and Colwill & Townsend [30] both suggest that despite women possessing relevant skills and capabilities, they face challenges in advancing to higher-level positions within organizations. Heilman [28] notes that women are often perceived to lack qualities necessary for success in top management roles, such as aggressiveness and emotional resilience. Colwill and Townsend [30] echo this sentiment by highlighting how organizational power and culture, largely influenced by male decision-makers, sustain barriers to women's advancement despite possessing managerial skills.

Both studies [28, 30] highlight the impact of gender stereotypes on women's perceived suitability for certain organizational positions. Heilman discusses how descriptive stereotypes create barriers for women, particularly in top management and executive roles, due to perceived mismatches between female attributes and those believed to be necessary for success [28]. Similarly, Colwill and Townsend acknowledge the existence of differences in behaviors and attitudes between men and women, which influence perceptions of managerial capabilities [30]. Despite women possessing skills aligned with effective management, organizational power structures often favor traditional male decision-makers. Similar in both research, they imply and overlap between skills associated with effective management and traditional female characteristics. Heilman mentions the perceived mismatch between stereotypical perceptions of women and the qualities deemed necessary for success in higher-level roles [28]. Colwill and Townsend similarly note that many characteristics identified as good management skills align with traditional female characteristics. Despite this alignment, organizational structures continue to prioritize conservative decisions made by males in managerial selections, further hindering women's advancement [30, 31].

Overall, it is highlighted how gender stereotypes and organizational structures maintain barriers to women's advancement in managerial positions, despite possessing relevant skills and capabilities [32, 31].

2.3.3. Challenge 3: Self-Imposed Barriers Among Women

In existing literature, several studies [15, 33, and 35] address the issue of self-imposed barriers among women in the IT sector. This section will explore research conducted by authors and researchers focusing on whether women themselves create barriers related to *self-esteem* within the industry.

Self-efficacy of women is an encountered topic in the literature both in IT and other sectors. Both Hyrynsalmi's [15] and Michie and Nelson's [33] studies identify self-doubt and uncertainty among women as they navigate careers in the IT industry. Hyrynsalmi [15] notes that some respondents' express doubts about their abilities, even if they are already working in the sector, leading them to pursue higher education to feel equal with their colleagues [15]. According to a survey study [31] conducted in Poland, 49.6% of females reported that they had to work harder in order to prove their worth due to the break bias. Similarly, Michie and Nelson find that female respondents report lower levels of self-efficacy compared to males, indicating doubts about their capabilities in the IT field [33]. In both papers, concerns are expressed about gender differences in self-efficacy and their potential impact on *women's participation in the IT* industry. Michie and Nelson highlight the disparity between male and female respondents' confidence levels regarding computing abilities. They express concern that male perceptions of female technical abilities, which are often lower, could pose challenges in a male-dominated industry [33]

In fact, the seeds of the barriers that women established themselves against the IT sector may date back to their student years, but understanding the factors contributing to these barriers is crucial. A 2012 report titled "Girls in IT: The Facts" by NCWIT [34] sheds light on key structural and social factors influencing girls' interest in computing and potentially discourage them from pursuing careers in IT. The report identifies families and communities, media and popular culture, peers, and formal education as significant influencers shaping girls' perceptions, interests, and confidence levels regarding IT. These factors contribute to the broader challenge of "accessibility to technology" which will be further explored in subsequent sections. The report highlights a remarkable pattern: despite comparable achievement levels, girls consistently show lower confidence and self-assess their abilities at a lower level than boys. Moorman and Johnson's findings [35] from the report emphasize this trend, revealing a notable gender disparity in confidence levels and computer proficiency. For example, when asked to evaluate their computer skills relative to their peers, 65% of male students asserted superiority over their female classmates, with 52% claiming to be more advanced than their male peers. In contrast, only 19% of female students believed they were more advanced than their male classmates, and 37% considered themselves more advanced than others. These findings underscore the pervasive influence of gender dynamics on perceptions of proficiency and confidence levels in the IT field.

2.3.4. Challenge 4: Ensuring Work-Life Balance

In almost every society, there are differences between the roles expected from women and the roles expected from men. These expectations associate women with roles such as housework, cooking and taking care of children, while they associate men with challenging work and providing for the household. When we consider the issue from the perspective of women, there are difficulties and contradictions experienced by women who are expected to have such responsibilities and, at the same time, have an active business life. The imbalances and contradictions between work and private life balance also occur in the IT sector, which can be more flexible than other sectors. Interpreting that situation as a barrier for women also reflected in the literature [36, 37, 38, 39, 40, and 41].

Acknowledging the role of *work-family conflict* as a significant source of stress for women in IT was mentioned in Ahuja's [36], Way's [37] and Armstrong *et. al*.'s [38] studies. Ahuja [36] emphasizes the influence of social and structural factors, while Way [37] and Armstrong *et. al.* [38] elaborate on the pressure to balance work and personal life, especially as women progress in their careers or become parents. Ahuja [36] presented a model of barriers faced by women in IT, she discussed the effects of social and structural factors which influence as barriers were investigated. According to the study, she believed that work and family conflict may be a source of occupational stress that women feel in themselves. Despite work-family conflict do not directly link with staying in IT, it may negatively affect the choice of IT as a career since it requires long working hours and constant updating of skills. She also admitted that ensuring work-life balance in IT creates conflicts both for men and women but since women are more *associated with family and children* more than men, they experience the conflict more. Therefore, she strongly advice researchers to focus on this social factor that influence women in IT as a barrier. In parallel with Ahuja's advice [36], Way's findings [37] reported females *are feeling pressure to balance their work and private life* because of the sector's expectations to be on call anytime and long working hours. Especially when participants become parents, they reported that they felt their job requirements do not fit their personal life requirements, so they made decisions about the amount of time dedicated to work or changing their career. The findings of Way's are also in line with the study conducted by Ragins and Sundstrom's [42], the IT sector's demands from their employees; working at an extreme level of hours in front of a computer at any time of the day; which can be called as "IT culture", force employees to maintain work-family balance. Therefore, those experiences lead females to make career turnover.

While all these three papers [36, 37, 42] acknowledge the impact of work stress and the importance of work schedule flexibility, Armstrong *et.al.* [38] delve deeper into the interconnectedness of these factors and their implications for managing family responsibilities and work-family conflict. They realized patterns of linkages between the concepts and identified them as loops. According to the findings of Armstrong *et. al.*, in an identified loop, it was observed that there are a strong direct and indirect linkages between the concepts "Managing Family Responsibilities", "Work Stress" and "Work Schedule Flexibility". "Managing Family Responsibilities" focuses on matters related to

domestic life of women; including children care and housework. Conversely, "Work Stress" predominantly revolves around issues related to work, such as working extended hours and meeting deadlines, etc. "Work Schedule Flexibility" serves as a bridge between professional and familial roles, meaning arranging work related task's schedules and taking time off for personal matters. In the results, it can be said that flexible work schedules associated with lower work stress and lower work-family conflict. Moreover, there is another interesting loop of concepts found in the study, which consists of "Job Qualities", "Work Stress" and "Managing Family Responsibilities". "Job Qualities" meaning the set of actions to improve skills since IT sector has changes with rapid technology advancements and employee's abilities may become obsolete. Thus, they may need to learn new technologies and increase their technical skill sets in order to survive in the industry. Since women face the fear of their skills becoming obsolete, it triggers the work-related stress and therefore interacts with the challenges of managing family responsibilities. It can easily be said that work stress majorly affects work-family conflicts for women in IT. The emphasis on the dynamic relationship between work stress, flexibility, and family responsibilities sets Armstrong *et. al.*'s [38] study apart from the other papers mentioned.

2.3.5. Challenge 5: Accessibility to Technology

Another significant challenge addressed is the accessibility to technology. This encompasses situations, particularly prevalent in countries with *limited internet or computer access*, where individuals, especially women, face barriers to engaging with technology. Additionally, this category encompasses *women's lack of participation in the IT* sector due to a lack of exposure or role models, or a general unawareness of suitable opportunities in IT. The literature presents studies highlighting how accessibility poses a challenge for females in entering the IT field.

Emphasizing how women face barriers in accessing ICT common grounds can be seen in Elnaggar's [43], Acilar *et. al.*'s [44] and Tahsin *et. al.*'s [45] studies. They both addressing the gender digital divide, which means the gap between people having access to technology and the ones who do not and highlight various barriers that hinder women's access to ICT, including socio-cultural norms, economic constraints, and insufficient resources. To interpret with data, Elnaggar's findings [43] show that 44% of women participants to the study stated that they do not know how to use a personal computer (PC) and less than 32% have access to a computer. It is not the only barrier that national availability of telecommunications infrastructure or availability of PCs. Elnaggar states that simply providing women with PCs and Internet connections does not fully address the challenges they face. Barriers to individual access are also shaped by economic and educational factors. Therefore, the insufficient access to ICT for using it as a tool in their lives results from a combination of some factors; inability to afford a PC or Internet access, lack of proficiency in ICT, and insufficient awareness of the benefits of ICT [43].

Another important factor influencing the choice of Omani women to enter the ICT sector is the accessibility of career guidance and mentorship. Young females lack a

comprehensive understanding of what ICT really does, they do not have counselors or mentors that influence them [39, 43, 46, 47, 48, 49]. There is a lack of exposure to success stories or experiences of other female professionals. All those issues are actually being influenced by educational and financial factors; they play an important role in the adoption of technology, especially women are being prevented from having and using ICT [43]. According to the study of Antonio and Tuffley in the systematic literature [50], it is estimated that two-thirds of the world's illiterate population, which means people unable to read and write, are women in 2014 and access to education is still a greater barrier for women than men. Addressing these multifaceted barriers requires concerted efforts to provide comprehensive support systems and educational opportunities for women interested in pursuing careers in technology.

2.4. Discussion of Literature Review

The literature review was conducted in order to understand the situation related to gender issues in IT in different countries and Türkiye. After investigating many papers for this topic in the literature, it was seen that most of the papers focused detailed on only one type of barrier that females encounter with. Moreover, as it can be seen in Table 4, only some of them utilized surveys and interviews in order to foster the challenges and most of the authors did not provide the survey items and for the number of respondents are relatively less, which can affect the reliability. Additionally, considering the previous studies, the number of studies focusing on the situation in Türkiye is comparatively low when compared to other countries.

Considering the lack of issues in the literature presented above, this thesis aims to uncover the multiple challenge types that female workers encounter in Türkiye's IT sector, with a survey study having more than 200 respondents.

CHAPTER 3

RESEARCH METHODOLOGY

In this chapter, the research methodology of the thesis is provided. The aim of this chapter is to declare the aim of the study and the strategy used to answer the provided research questions. In Subsection 3.1, the aim of the study is given. Subsection 3.2 presents the sample of the study with the survey conducted. Subsection 3.3. presents the research strategy with the research questions. In Subsection 3.4. The survey instrument and the steps of pilot study together with the details is explained. Finally, in Sections 3.5 and 3.6., data collection process for the study survey and ethical clearance are presented.

3.1. Aim of the Study

In this study, a quantitative research methodology is applied, which includes the collection, examination and consolidation of data collected via a questionnaire to investigate the IT workers' perspectives on the challenges faced by women in the IT industry in Türkiye. It is aimed to uncover the challenges that women IT workers encounter and how the participants' opinions varied based on the factors such as gender, marital status, parental status, and work-setup, such as working in a remote, hybrid or on-site style. Moreover, based on the findings, recommendations for IT companies in order to increase the wellbeing levels of the employees and hinder the barriers that women encounter in the IT sector shall be made.

Therefore, the survey is conducted with participants working in the IT industry or working in other industries but being responsible for the roles related to IT in their companies.

3.2. Sample of the Study

A total of 238 people working in the IT sector or working in different sectors but in IT related roles participated in the research. Out of the 238 participants, 61% are females, while 39% are males. In terms of age ranges, 63.6% of the participants are aged 30 years old or younger. Moreover, 64.01% of the participants hold Bachelor's Degrees, while 35.98% of them are holding Master's or PhD. Degree.

3.3. Survey Instrument Development

The survey items were created to address our RQs, aiming to explore the challenges faced by female IT workers. Moreover, to be able to make recommendations for the companies,

current practices of companies to improve employee well-being is aimed to be found out through the survey items.

The questionnaire consists of four sections and 58 items in total. First section has 11 questions and aims to get demographics including gender, age, marital status, parental status, the company they work for, the industry they work for, educational background, position, experience level, and work model (i.e., hybrid, on-site or remote).

The second section has 37 5-point Likert scale items, "1" represents "Strongly Disagree" and "5" represents "Strongly Agree.". The items were developed based on literature associated with the challenges faces by female IT workers. The literature review identified five distinct categories of challenges encountered by these professionals:

- Challenge 1: Discrimination in-a Male Dominated Industry
- Challenge 2: Difficulties in Advancing Managerial Roles
- Challenge 3: Self-Imposed Barriers Among Women
- Challenge 4: Ensuring Work-Life Balance
- Challenge 5: Accessibility to Technology

The third section has one multiple choice question and one open-ended question to gather data about the practices implemented in companies to increase the work-life balance of the female employees. The last section has seven questions about remote/hybrid working applications and regulations in the companies.

While creating the survey items in order to disclose the challenges, the studies existing in the literature having surveys in the scope of their research were investigated. Some of the survey items were developed by influencing existing studies' surveys. The items used in this study and the items from surveys that is influenced by are presented in below Table 6.

Table 6 Origin of Survey Statements

Challenges	**Survey Statements**	**Referenced Statement**
Challenge 1: Discrimination in a Male Dominated Industry	Statement 1: I prefer working with women over working with men.	Self-developed
	Statement 2: In the company I work for, the number of male managers is greater than the number of female managers.	There are more men than women in software programming roles in Finland. [12]
	Statement 3: I believe that in the company I work for, male employees receive more promotions/improvements.	Self-developed
	Statement 4: I have witnessed women being interrupted during team collaborations.	Self-developed
	Statement 5: I have witnessed that women's opinions are not valued in team collaborations.	Self-developed

Table 6 (cont.)

	Statement 6: I believe that the number of female employees joining the company has decreased over time.	It is easier for men to get software programming roles than women in Finland. [12]
	Statement 7: I think that in hiring processes, there are not enough opportunities given to women in technical positions such as software development (e.g., coding)	Self-developed
	Statement 8: I believe that the challenges I have faced in the industry are due to female employees.	Self-developed
	Statement 9: believe that the challenges I have faced in the industry are due to male employees.	Self-developed
	Statement 10: I believe that women feel safe in the company I work for.	Self-developed
	Statement 11: I have witnessed mobbing (bullying) towards female employees in the company I work for.	Self-developed
	Statement 12: I have witnessed men raising their voices in meetings at the company I work for.	Self-developed
	Statement 13: I have witnessed women raising their voices in meetings at the company I work for.	Self-developed
Challenge 2: Difficulties in Advancing Managerial Roles	Statement 1: In the company I work for, I believe that male employees have a higher probability of becoming managers.	Self-developed
	Statement 2: In the company I work for, I believe that female employees have a higher probability of becoming managers.	Self-developed
	Statement 3: I believe that male employees at the company I work for receive higher performance ratings/bonuses.	Self-developed
	Statement 4: I believe that female employees at the company I work for receive higher performance ratings/bonuses.	Self-developed
Challenge 3: Self-Imposed Barriers Among Women	Statement 1: I believe that women do not prefer undergraduate education programs such as computer engineering/software engineering.	Self-developed
	Statement 2: I believe that women are hesitant to enter the IT industry.	I am concerned about the lack of opportunities for women in software programming roles. [12]
	Statement 3: I believe that I am knowledgeable about the work I do.	I feel anxious about using computers and other technologies [12].
	Statement 4: I believe that my female colleagues are competent for the positions they work in.	Self-developed

Table 6 (cont.)

	Statement 5: I believe that my female colleagues are confident in expressing themselves on work-related matters.	Self-developed
	Statement 6: I believe that female employees take longer to bond with each other.	Self-developed
	Statement 7: I believe that there is less cooperation among female employees.	Self-developed
	Statement 8: I encourage women/girl students around me to work in the IT industry.	I would recommend female friends to apply for software programming roles [12].
	Statement 9: I think women are concerned about using computers and other technologies.	Self-developed
Challenge 4: Self-Imposed Barriers Among Women	Statement 1: I believe that I maintain a balance between my work life and personal life.	There is a good balance between the time I spend on my job and the time I spend on non-work activities. [51].
	Statement 2: I believe that women maintain a balance between their personal and work lives.	Self-developed
	Statement 3: There are times when I cannot spend time with my family/friends due to my job.	I have to postpone/miss out on family/personal activities due to the time I need to devote to my work responsibilities [51].
	Statement 4: I believe that women struggle to maintain a work-home balance due to the roles attributed to them.	Self-developed
	Statement 5: I believe that women find it difficult to disclose their plans for motherhood to employers.	Self-developed
	Statement 6: I believe that women find it difficult to inform employers that they are prospective mothers.	Self-developed
	Statement 7: I believe that women struggle to use more than six months of unpaid maternity leave.	Self-developed
	Statement 8: I believe that women experience a loss of rights when they return to the workplace after maternity leave.	Self-developed
Challenge 5: Accessibility to Technology	Statement 1: I believe that if women are guided towards Information Systems during their student years, their interest in this sector will increase.	Self-developed
	Statement 2: I believe that if women saw female role models working in the Information Technology sector around them, they would show more interest in this field.	Self-developed

Table 6 (cont.)

	Statement 3: I believe that if female students were guided more towards information systems, their interest in this sector would increase even more.	Self-developed

3.3.1. Validity Threats

This section discusses the possible threats to validity of the thesis study. They can be stated as follows:

- Validity

  Validity refers whether a tool used for measurement really represents the point we are aimed to measure [52]. In our thesis study, the survey was firstly verified with five IT professionals to get feedback regarding the understandability of the survey items; some of the items were edited or removed accordingly.

- Internal Reliability

  Internal reliability refers measurement instrument's ability to provide consistent and reproducible results [53]. To increase internal reliability, pilot study was performed. For internal consistency of the survey items, Cronbach's Alpha values were checked, and some items were removed accordingly.

- Generalizability

  Generalizability refers to applying research findings and conclusions from a study conducted on a sample group to the broader population [54]. According to the paper of Taherdoost [55], sample size is important in research including surveys in order to make accurate inferences about the population and avoid sampling biases. In his paper, he provided a formula and sample tables to calculate and decide sample sizes considering the confidence level, margin of error and variance of the population. With the formula provided, with confidence level of 95%, variance of the population 50% and margin error of 6.35%, sample size of 238 was reached out in our study. To provide generalizability, survey was distributed to people working in different companies in IT sector and individuals working in IT related role.

3.3.2. Pilot Study

After development of the questionnaire, a pilot study was conducted to measure the reliability of the questionnaire items. The pilot study was carried out with 25 participants from different backgrounds and experiences in IT domain. Reliability analysis was performed in the scope of pilot study in order to be ensure the reliability of the questionnaire items in themselves. For the Likert items to be analyzed, Cronbach Alpha

analysis was conducted to see the reliability of the questions in terms of quantitative analysis. The initial values of Cronbach Alpha (α) for overall Likert items and alpha for the items under each challenge category together with the number of items can be seen in Table 7 below:

Table 7 Initial Values of Cronbach's Alpha

Category	**Initial Cronbach Alpha (α)**	**# of items**
All Likert Items	0.831	40
C1: Discrimination in-a Male Dominated Industry	0.833	13
C2: Difficulties in Advancing Managerial Roles	0.666	5
C3: Self-Imposed Barriers Among Women	0.468	9
C4: Ensuring Work-Life Balance	0.628	9
C5: Accessibility to Technology	0.194	4

According to the results, alpha values for challenge categories are not acceptable since Cronbach Alpha should be higher than 0.7 [56].

All the challenges were examined one by one to increase the reliability for the outlier challenge categories.

Challenge 1: Discrimination in-a Male Dominated Industry

This section includes 13 Likert type items and achieved Cronbach Alpha value of 0.833, which is bigger than 0.7 and can be recorded as acceptable. Therefore, there exist no need to change any items in this section.

Challenge 2: Difficulties in Advancing Managerial Roles

This section includes 5 Likert type items and Cronbach Alpha value is 0.666 which is less than it should be. Therefore, a detailed analysis was conducted in order to satisfy the alpha level requirement. Item-Total Statistics were investigated, and it was seen that if the item "I believe I can get a managerial position in the company I work for" shall be deleted, the alpha value will increase to 0.872. As an action, that item was deleted, and total number of questions is decreased to 4 and alpha value is increased to 0.872.

Challenge 3: Self-Imposed Barriers among Women

This challenge category includes 9 Likert type items and Cronbach Alpha value is 0.468 which is less than it should be. Moreover, according to the Item-Total Statistics, there exist no item that will increase the alpha value to the desired level. There were some reverse items under this challenge category, therefore their scores were coded reversely in the analysis and reliability analysis was conducted again. The alpha value of 0.784 was achieved.

Challenge 4: Ensuring Work-Life Balance

The challenge category includes 9 items and initial alpha value was 0.628. Moreover, it was noticed that there exist an item occurs twice as a typo, so it was removed. Similar to the prior challenge, 2 items scores were reversed, and alpha value increased to 0.780.

Challenge 5: Accessibility to Technology

In this challenge, there exist only 4 items and the initial alpha was 0.194 but it was analyzed that if the item "During my student life, I did not have any difficulties accessing computers and the Internet" shall be deleted, it will increase to 0.782. Therefore, the item was removed from the questionnaire and the alpha reach the desired level.

After all analysis are made separately for the items under the challenge categories, an overall reliability analysis was made in order to achieve the alpha level. According to the revisions, revised alpha values and the total number of items can be seen in the below Table 8, both for all items in the questionnaire and for each category items. As a result of the pilot study, the desired level of alpha levels was achieved in order to continue to the study. Moreover, with the items deleted, the questionnaire has reached its final form to share with more potential participants.

Table 8 Final Values of Cronbach's Alpha after Pilot Study

Category	**Final Cronbach Alpha (α) for Pilot Analysis**	**# of questions**
All Likert Items	0.809	37
C1: Discrimination in-a Male Dominated Industry	0.833	13
C2: Difficulties in Advancing Managerial Roles	0.872	4
C3: Self-Imposed Barriers Among Women	0.784	9
C4: Ensuring Work-Life Balance	0.780	8
C5: Accessibility to Technology	0.782	3

The final version of the survey can be found in Appendix A in Turkish and Appendix B in English. The survey was applied Turkish but English version of the survey was also given for the global readers. Data collection process for the main study is presented in the upcoming section of this chapter.

3.4. Data Collection Process

After obtaining ethical approval from the Middle East Technical University's Human Research Ethics Board and reaching the final version of the questionnaire after pilot study, the survey was distributed through various channels. The snowball sampling and convenience sampling approaches [57] were employed for involvement of the participants. Both of the approaches belong to non-probabilistic sampling methods. Convenience sampling includes selection of participants that are suitable for the research. The survey was disseminated among techno parks in Türkiye, housing numerous companies, predominantly in the IT sector. E-mails were also sent to graduate programs in various universities within the scope of convenience sampling. For snowball sampling, specific individuals were reached out via the online professional networking platform, LinkedIn. The survey link was shared with connections, and some were asked to distribute the survey further.

The survey was accessible by the participants via Google Forms from May 2023 to August 2023. Prior to taking the survey, the participants were provided with information about the estimated completion time, and their freedom to exit the survey at any point. The total number of respondents after the data collection process was 251 individuals but after filtering out those not directly linked to IT departments or positions, the valid participant count reduced to 238. The survey items' reliability was evaluated like the pilot study, using Cronbach's Alpha scores and revisions needed was done and the data analysis process was started. The findings are detailed in Section 4.

3.5. Ethical Clerance

In the scope of this study, in order to conduct the questionnaire with the participants working in IT sector or other sector but working in IT related roles, ethical clearance from the board should have been taken. Therefore, approval of all ethical and experimental procedures and protocols was granted by the Human Subjects Ethics Committee of Middle East Technical University with Protocol No: 0092-ODTUİAEK-2023. The ethical clearance approval is presented in Appendix C.

CHAPTER 4

FINDINGS

This chapter describes the overall findings of the survey study conducted. It includes preparation of data for the analysis by conducting reliability analysis, demographic information of survey respondents. Further, this chapter includes the methods used for data analysis in terms of statistical analysis; explains the process followed with the explanation of statistical tests applied, the effects of some demographics factors to the challenges defined and descriptive analysis for practices applied in companies. Moreover, it includes recommendations for increasing the wellbeing of both male and female employees.

4.1.Preparation of Data for Analysis

In total, 251 individuals responded to the survey. However, some responses from participants were excluded who are not directly affiliated to the IT departments. As a result, the final number of valid survey participants was reduced to 238.

Reliability of the questionnaire items were analyzed by checking the Cronbach's Alpha score. All the reliability results together with the number of items for each category of challenge are presented in Table 9. The reliability values of Challenges 1, 4 and 5 were higher than the required value, which is 0.7 [56].

The alpha value of Challenge 2 is found as 0.638, which is slightly lower than the threshold value [56]. One item was deleted from Challenge 3 to reach an acceptable alpha score, which is 0.600, slightly lower than the threshold.

Table 9 C. Alpha values for Main Study

Category	Final Cronbach Alpha (α) for Main Study	# of items
All Likert Items	0.786	36
C1: Discrimination in-a Male Dominated Industry	0.752	13
C2: Difficulties in Advancing Managerial Roles	0.638	4
C3: Self-Imposed Barriers Among Women	0.600	8
C4: Ensuring Work-Life Balance	0.808	8
C5: Accessibility to Technology	0.901	3

To address RQ 1: "*What are the challenges that women encounter in their career in the IT sector in Türkiye?"* and RQ 2: "*How the participants' opinions about challenges vary based on the demographics factors such as gender, marital status, parental status and working setup?"* this section analyzes the survey responses for each identified challenge category. The discussion will focus on demographic factors including gender, age, marital status, parental status, education level, years of experience in the same role and working style.

In order to conduct parametric tests (t-test and ANOVA) to decide if there are any significant difference between demographics, the following four assumptions were analyzed:

1- The dependent variable should be continuous.

2- The dependent variable should exhibit normal distribution.

3- The variances should be homogeneous (Homogeneity of Variances)

4- The independent variable should be categorical.

   a. For t-test; independent variable should be in two categories (such as gender, female and male)

   b. For ANOVA; independent variable should be more than two categories.

In order to check normality assumption; skewness and kurtosis values were checked. As a result, out of 36 statements prepared for measuring challenges, four statements were found out to be not satisfying normality. Therefore, non-parametric tests were applied for those statements. The details shall be explained in related sections.

For the majority of the statements, both t-test and ANOVA were employed while deciding if there is any significant difference between groups to the answers for the items.

As mentioned earlier, gathered information related to demographics were gender, age, marital status, parental status, education level, years of experience in same role and working style in the survey.

The independent samples t-test is used to statistically evaluate whether there is a significant difference between the means of two independent groups by examining the mean to the answers given to the items in the surveys. In the survey, some question's answer option is two, like gender. Answers can be "male" or "female". Or for marital status; answers can be "single" or "married". Therefore, for those questions having two independent answer groups, the t-test can be used in examining the mean of the items. On the other hand, the frequency of the choices of answers plays an important role while conducting t-test. For example, for the "age" category, the frequencies of the answers

given can be seen in Figure 4. In order to apply t-test for the "age", distribution of ages was categorized into two groups: 30 and less (n=154) and more than 30 (n=84).

Additionally, if there are multiple groups in the independent variable, ANOVA can be employed to analyze how independent variables interact with each other and to examine the effects of these interactions on the dependent variable. For the demographics category "experience in the same role", the frequencies of the answers given can be seen in Figure 7. In order to apply ANOVA for the "experience in the same role", distribution of experience levels was categorized into three groups: experience less than two years (n=82), experience between 2-7 years (n=124) and experience more than seven years (n=32).

As a summation, the details of the categorization for the demographics group, the test method used, and the distributions are detailed in Table 10. For demographics "working style information", "marital status", "parental status" and "gender" there already exist a regular distribution between groups; so, grouping stayed the same.

Table 10 Grouping of the Categories with test methods

Demographics Category	**Answer Options with distributions**	**Revised Grouping for the test**	**Test method used**
Gender	1. Male (n=92) 2. Female (n=146)	No change	T-test
Age	1. 30 and less (n=154) 2. 31-36 (n=50) 3. 37-42 (n=24) 4. 43-49 (n=8) 5. 50 and more (n=2)	2 groups: 1. 30 and less (n=154) 2. more than 30 (n=84).	T-test
Marital Status	1. Single (n=146) 2. Married (n=92)	No change	T-test
Parental Status	1. Parent (n=49) 2. Not Parent (n=189)	No change	T-test
Education Level	1. High School Degree (n=0) 2. Bachelor's degree (n=153) 3. Master's degree (n=77) 4. PhD. (n=8)	2 groups: 1. Bachelor's Degree (n=153) 2. Master's or PhD. Degree (n=85)	T-test
Years of experience in same role	1. Less than 2 years (n=82) 2. 2-7 years (n=124) 3. 7-12 years (n=19) 4. More than 12 years (n=13)	3 groups: 1. less than 2 years (n=82) 2. 2-7 years (n=124) 3. more than 7 years (n=32).	ANOVA
Working style	1. Fully Remote (n=76) 2. On-site (n=75) 3. Hybrid (n=87)	No change	ANOVA

4.2.Demographics of the Participants

Out of the 238 participants, 61% are women, while 39% are men. In terms of age ranges, 63.6% of the participants are aged 30 years old or younger. The distributions can be seen in Figure 3 and Figure 4 respectively.

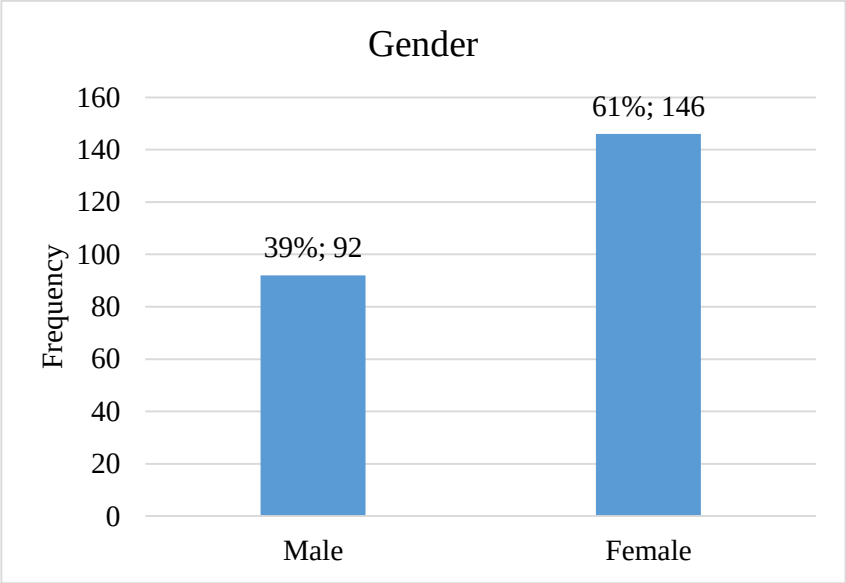

Figure 3 Gender Distribution of the Participants

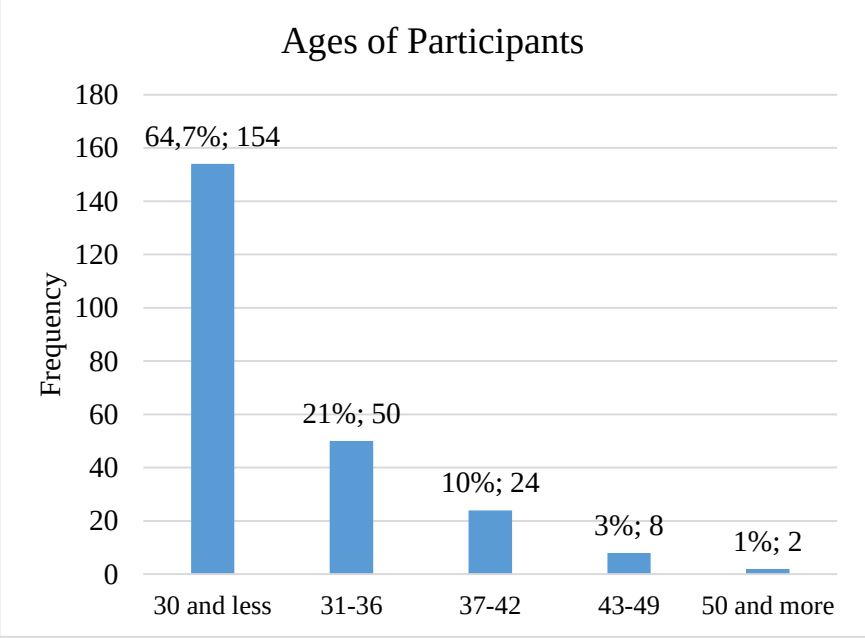

Figure 4 Age Distribution of the Participants

Moreover, the data indicates that 64.01% of the participants hold bachelor's degrees, while 35.98% of them have pursued postgraduate education, details of the distribution can be seen in Figure 5.

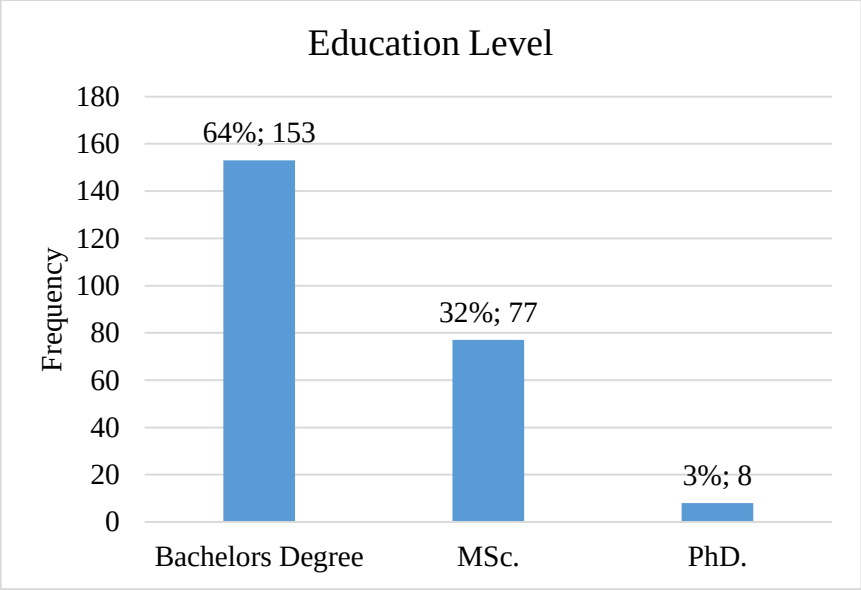

Figure 5 Education Level Distribution of the Participants

While participants hold various positions, the majority, at 37%, are software developers/engineers (see Figure 6 under the "Other" category, roles with a frequency of fewer than five participants include: a research engineer, an instructor technologist, a configuration manager, a network system administrator, two DevOps engineers, two IT support staff, two QA engineers, two Scrum masters, two database specialists, three business intelligence experts, three UI/UX designers, and four cybersecurity specialists.

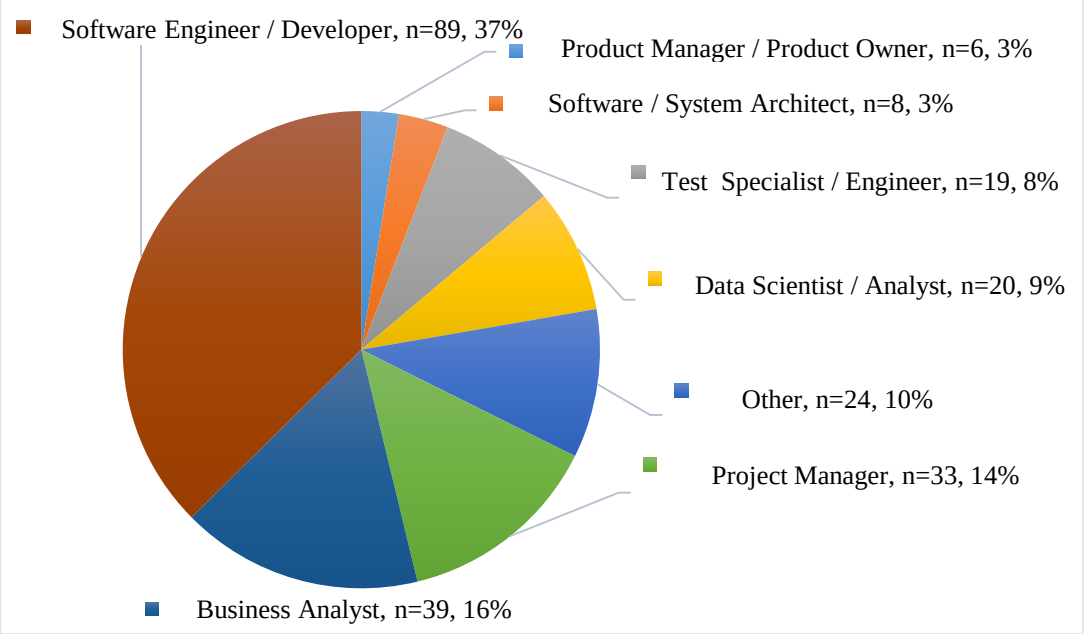

Figure 6 Positional Distribution of The Participants

The years of work experience of the participants in their current role can be seen in Figure 7, 52% of the participants are working between 2-7 years in their positions.

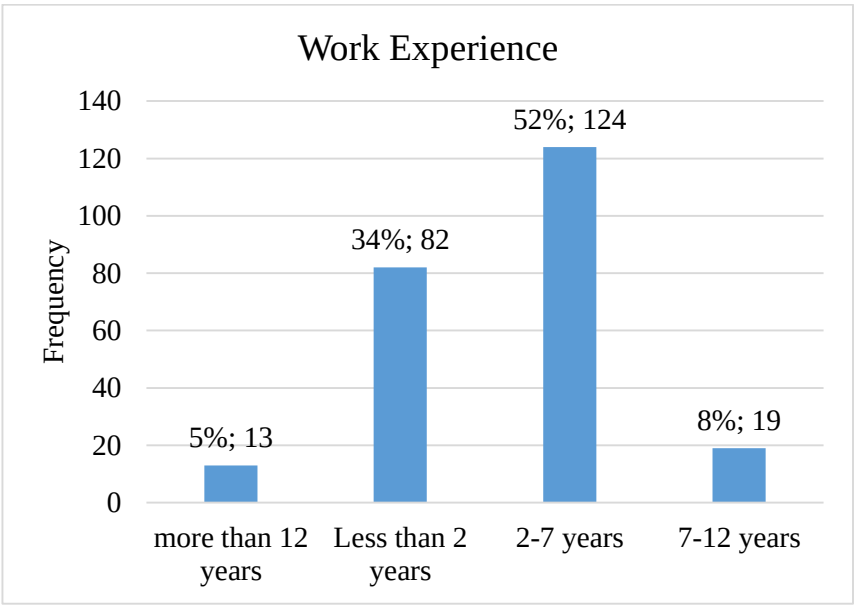

Figure 7 Experience Level of the Participants

Marital and parental statuses are other key demographic factors that could influence the study's results. Notably, 61% of the participants are single and 21% of the participants have at least a child they take care of (see Figure 8 and Figure 9).

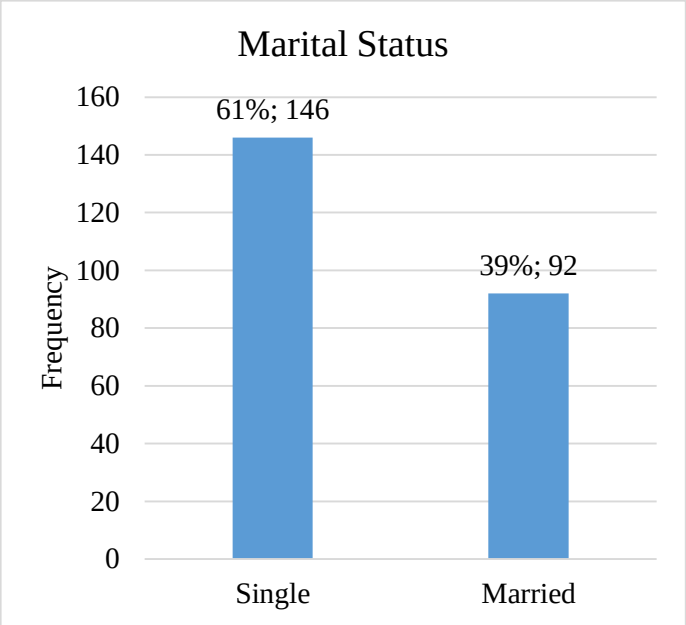

Figure 8 Marital Status of the Participants

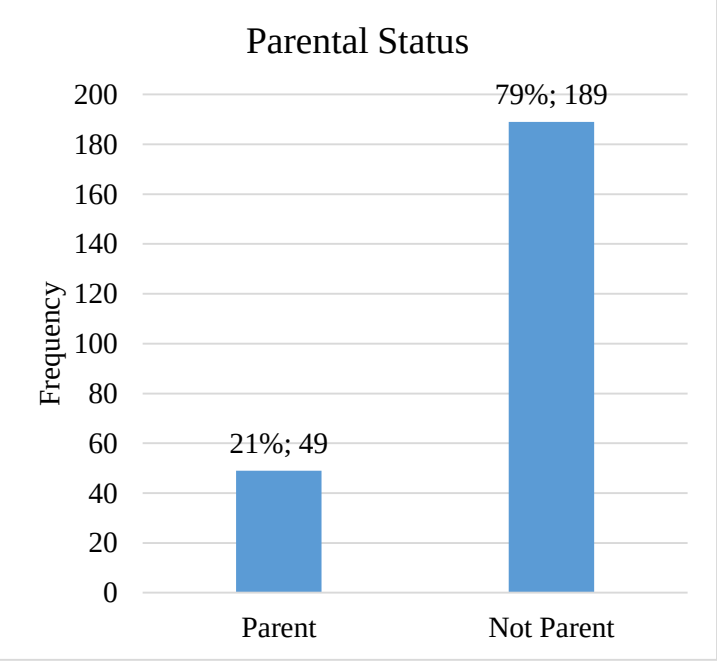

Figure 9 Parental Status of the Participants

The data also shows that 36.55% of the participants work in a hybrid working style where 31.51% work fully on-site and 31.93% work fully remote (see Figure 10).

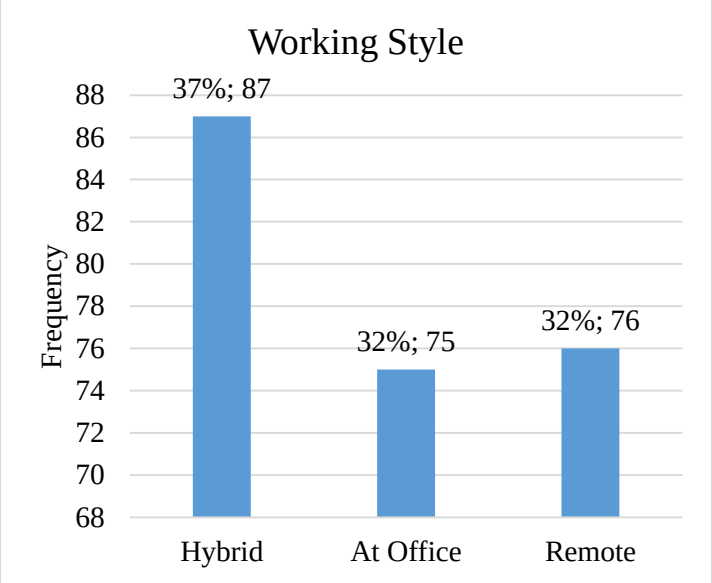

Figure 10 Working Style Status of the Participants

The data was collected from 16 different cities in Türkiye. Specifically, 142 participants filled out the survey from Ankara, 55 from İstanbul, and 5 from İzmir. Furthermore, 19 participants did not specify their city of residence, while the rest are from various cities across Türkiye.

Within the scope of this study, data was collected from 28 different sectors. Among participants, 30 of them do not specify the sector they work for.

In terms of 28 different sectors, the highest selected sector was "Defense Industry" with the rate of 21%. There are participants from 8 different companies operating in this sector. The second highest selected sector was "Telecom & Communication" with the rate of 18% and there are participants from 6 different companies operating in this sector.

4.3. Results Associated with Challenges

In the upcoming subsections, challenges were analyzed in terms of demographic information with the defined test method mentioned above.

4.3.1. Challenge 1: Discrimination in a Male-Dominated Industry

4.3.1.1. Gender

A major challenge for female IT workers in the sector is discrimination emerging from the industry's male-dominated nature according to the literature survey conducted. Figure 11 presents a comparison of scores attributed to statements highlighting challenges due to this male-centric dominance, categorized by gender. In the figures given from Section 4.3.1 to 4.3.5, "C" stands for "Challenge" and "S" stands for "Statement". For example,

"C1S1" represents the Statement 1 of Challenge 1. A t-test was applied to assess any significant variances in responses between male and female participants for the items related to this challenge. The results of the t-test, which can be seen in Table 11, indicated the items with statistically significant differences in perceptions between the genders.

The findings indicate that during team collaborations/meetings, female employees think that they are more frequently interrupted, and their opinions are less valued compared to the perceptions of their male associates. Contrary to expectations, female employees did not attribute the challenges they face in the industry solely to male colleagues. While female participants acknowledged the higher number of male managers, they did not necessarily correlate their industry challenges directly to this male predominance.

A notable divergence in perceptions was observed regarding workplace conduct: female participants reported witnessing male colleagues raising their voices more often than male participants did.

In terms of promotions in the companies, females are neutral about male employees receiving more promotions while male employees disagree with that.

Both genders are disagreed about there is a decrease in the number of female employees joining the company over time, but females believe it more than male do and this pattern is also same for the statement about the hiring process; not enough opportunities given to women in technical positions.

For the statement about witnessing mobbing towards female employees; both genders are negative about this; meaning that they have not witnessed such kind of a mobbing towards female. Though, the difference is significant, the average score of females are more than males.

Figure 11 Average Scores of Challenge 1 according to Gender

Table 11 t-test Results for Challenge 1 according to Gender

Item	Gender	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C1S1) I prefer working with women over working with men.	Female	146	2.82	1.00	.663
	Male	92	2.88	1.01	
C1S2) In the company I work for, the number of male managers is greater than the number of female managers.	Female	146	4.01	1.21	.422
	Male	92	3.88	1.30	
C1S3) I believe that in the company I work for, male employees receive more promotions/improvements.	Female	146	2.92	1.46	.000
	Male	92	2.20	1.22	
C1S4) I have witnessed women being interrupted during team collaborations.	Female	146	2.24	1.38	.000
	Male	92	1.46	0.94	
C1S5) I have witnessed that women's opinions are not valued in team collaborations.	Female	146	2.24	1.35	.000
	Male	92	1.58	1.15	
C1S6) I believe that the number of female employees joining the company has decreased over time.	Female	146	2.15	1.19	.054
	Male	92	1.85	1.15	
C1S7) I think that in hiring processes, there are not enough opportunities given to women in technical positions e.g. SE.	Female	146	2.56	1.36	.001
	Male	92	1.98	1.19	
C1S8) I believe that the challenges I have faced in the industry are due to female employees.	Female	146	1.68	0.90	.034
	Male	92	1.45	0.80	
C1S9) I believe that the challenges I have faced in the industry are due to male employees.	Female	146	2.56	1.24	.000
	Male	92	1.96	1.22	
C1S10) I believe that women feel safe in the company I work for.	Female	146	4.02	1.08	.060
	Male	92	4.28	0.98	
C1S11) I have witnessed mobbing (bullying) towards female employees in the company I work for.	Female	146	2.07	1.42	.001
	Male	92	1.54	1.04	
C1S12) I have witnessed men raising their voices in meetings at the company I work for.	Female	146	2.50	1.44	.000
	Male	92	1.70	1.25	
C1S13) I have witnessed women raising their voices in meetings at the company I work for.	Female	146	2.10	1.18	.109
	Male	92	1.84	1.26	

4.3.1.2. Age

As mentioned before, age ranges of participants were grouped into two, which are "30 and less" and "more than 30". Figure 12 presents a comparison of scores attributed to statements highlighting challenges due to this male-centric dominance, categorized by age. A t-test was applied to assess if there are any significant variances in responses between participants who are 30 and less and more than 30 for the items related to this challenge. The results of the t-test, which can be seen in Table 12, there exist no items having statistically significant differences in perceptions between two age groups (having p-value less than 0.05). Therefore, it can be said that participants' perceptions do not differ in terms of age.

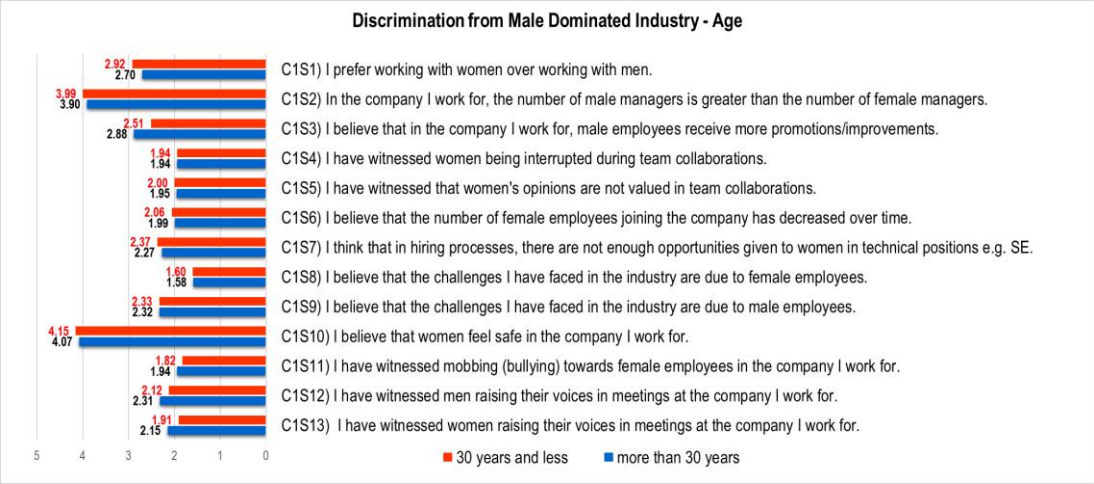

Figure 12 Average Scores of Challenge 1 according to Age

Table 12 t-test Results for Challenge 1 according to Age

Item	Age	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C1S1) I prefer working with women over working with men.	30 years and less	154	2.92	0.98	.107
	more than 30 years	84	2.70	1.04	
C1S2) In the company I work for, the number of male managers is greater than the number of female managers.	30 years and less	146	3.99	1.24	.600
	more than 30 years	92	3.90	1.26	
C1S3) I believe that in the company I work for, male employees receive more promotions/improvements.	30 years and less	146	2.51	1.42	.055
	more than 30 years	92	2.88	1.37	
C1S4) I have witnessed women being interrupted during team collaborations.	30 years and less	146	1.94	1.30	.975
	more than 30 years	92	1.94	1.26	
C1S5) I have witnessed that women's opinions are not valued in team collaborations.	30 years and less	146	2.00	1.33	.790
	more than 30 years	92	1.95	1.28	
C1S6) I believe that the number of female employees joining the company has decreased over time.	30 years and less	146	2.06	1.17	.662
	more than 30 years	92	1.99	1.22	
C1S7) I think that in hiring processes, there are not enough opportunities given to women in technical positions e.g. SE.	30 years and less	146	2.37	1.39	.594
	more than 30 years	92	2.27	1.21	
C1S8) I believe that the challenges I have faced in the industry are due to female employees.	30 years and less	146	1.60	0.86	.905
	more than 30 years	92	1.58	0.89	
C1S9) I believe that the challenges I have faced in the industry are due to male employees.	30 years and less	146	2.33	1.29	.955
	more than 30 years	92	2.32	1.21	
C1S10) I believe that women feel safe in the company I work for.	30 years and less	146	4.15	1.07	.584
	more than 30 years	92	4.07	1.02	
C1S11) I have witnessed mobbing (bullying) towards female employees in the company I work for.	30 years and less	146	1.82	1.26	.515
	more than 30 years	92	1.94	1.40	
C1S12) I have witnessed men raising their voices in meetings at the company I work for.	30 years and less	146	2.12	1.40	.336
	more than 30 years	92	2.31	1.46	
C1S13) I have witnessed women raising their voices in meetings at the company I work for.	30 years and less	146	1.91	1.21	.136
	more than 30 years	92	2.15	1.22	

4.3.1.3. Marital Status

The survey results were examined through the lens of marital status. A comparison of scores attributed to statements highlighting challenges due to this male-centric dominance, categorized by marital status can be seen in Figure 13.

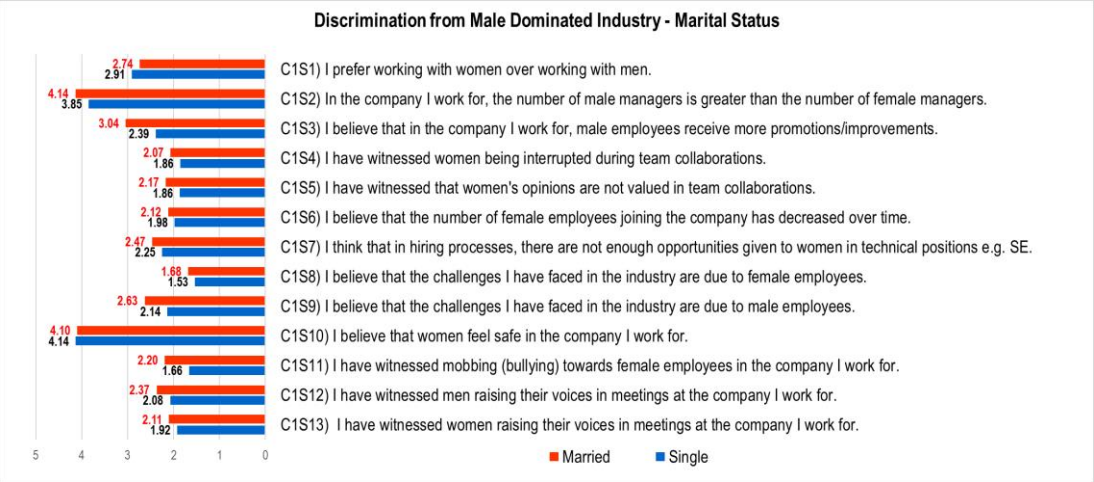

Figure 13 Average scores of Challenge 1 According to Marital Status

The t-test results (see Table 13) for this challenge statements reveal significant differences in the responses of married and single participants to certain items. For instance, married respondents remain neutral regarding the perception that male employees receive more promotions, while singles tend to disagree. This trend is also mirrored in the parental status demographic, with parents staying neutral and non-parents expressing disagreement. Similarly, when it comes to challenges faced in the industry due to male colleagues, married individuals maintain a neutral position, in contrast to their single counterparts who tend to disagree.

Both groups are negative about witnessing mobbing towards females, but married group's scores are higher than the single ones.

Table 13 t-test Results for Challenge 1 according to Marital Status

Item	Marital Status	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C1S1) I prefer working with women over working with men.	Single	146	2.91	0.97	.200
	Married	92	2.74	1.06	
C1S2) In the company I work for, the number of male managers is greater than the number of female managers.	Single	146	3.85	1.31	.068
	Married	92	4.14	1.12	
C1S3) I believe that in the company I work for, male employees receive more promotions/improvements.	Single	146	2.39	1.37	.000
	Married	92	3.04	1.41	
C1S4) I have witnessed women being interrupted during team collaborations.	Single	146	1.86	1.26	.222
	Married	92	2.07	1.32	
C1S5) I have witnessed that women's opinions are not valued in team collaborations.	Single	146	1.86	1.28	.075
	Married	92	2.17	1.34	
C1S6) I believe that the number of female employees joining the company has decreased over time.	Single	146	1.98	1.17	.375
	Married	92	2.12	1.21	
C1S7) I think that in hiring processes, there are not enough opportunities given to women in technical positions e.g. SE.	Single	146	2.25	1.33	.226
	Married	92	2.47	1.31	
C1S8) I believe that the challenges I have faced in the industry are due to female employees.	Single	146	1.53	0.82	.194
	Married	92	1.68	0.94	
C1S9) I believe that the challenges I have faced in the industry are due to male employees.	Single	146	2.14	1.23	.003
	Married	92	2.63	1.26	
C1S10) I believe that women feel safe in the company I work for.	Single	146	4.14	1.06	.779
	Married	92	4.10	1.03	
C1S11) I have witnessed mobbing (bullying) towards female employees in the company I work for.	Single	146	1.66	1.14	.004
	Married	92	2.20	1.49	
C1S12) I have witnessed men raising their voices in meetings at the company I work for.	Single	146	2.08	1.39	.121
	Married	92	2.37	1.46	
C1S13) I have witnessed women raising their voices in meetings at the company I work for.	Single	146	1.92	1.20	.255
	Married	92	2.11	1.24	

4.3.1.4. Parental Status

In terms of parental status, the survey results were examined and a comparison of scores attributed to statements highlighting challenges due to this male-centric dominance can be seen in Figure 14.

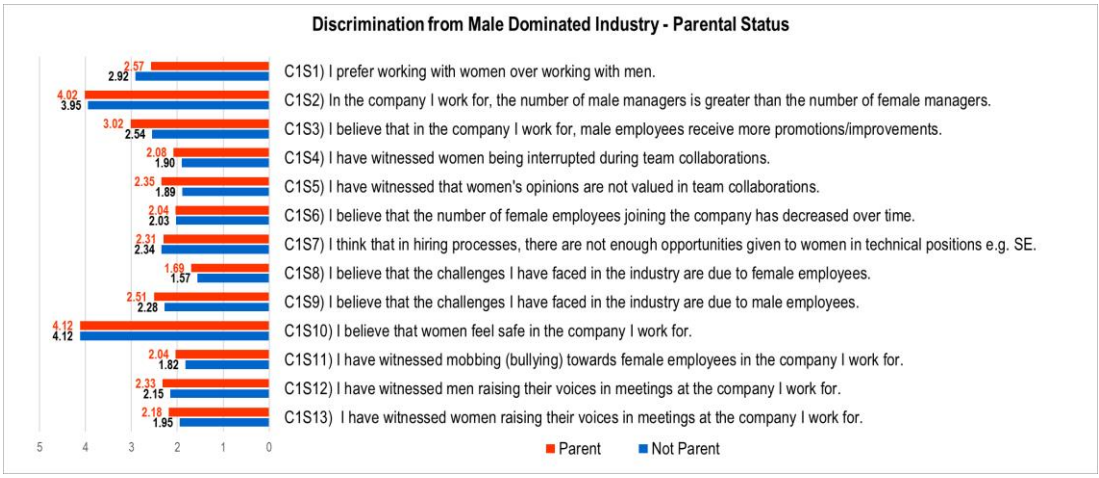

Figure 14 Average Scores of Challenge 1 according to Parental Status

According to the t-test results, can be seen in Table 14, there are only two statements that exists significant difference between parents and not parents. While parents are neutral about male employees receive more promotions, non-parents are disagreeing about this. Both groups are disagreed that women's opinions are not valued but scores of parents are higher than non-parents.

Table 14 t-test Results for Challenge 1 According to Parental Status

Item	Parental Status	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C1S1) I prefer working with women over working with men.	Parent	49	2.57	1.12	.053
	Not Parent	189	2.92	0.96	
C1S2) In the company I work for, the number of male managers is greater than the number of female managers.	Parent	49	4.02	1.16	.714
	Not Parent	189	3.95	1.27	
C1S3) I believe that in the company I work for, male employees receive more promotions/improvements.	Parent	49	3.02	1.38	.036
	Not Parent	189	2.54	1.41	
C1S4) I have witnessed women being interrupted during team collaborations.	Parent	49	2.08	1.29	.377
	Not Parent	189	1.90	1.28	
C1S5) I have witnessed that women's opinions are not valued in team collaborations.	Parent	49	2.35	1.35	.029
	Not Parent	189	1.89	1.29	
C1S6) I believe that the number of female employees joining the company has decreased over time.	Parent	49	2.04	1.08	.962
	Not Parent	189	2.03	1.21	
C1S7) I think that in hiring processes, there are not enough opportunities given to women in technical positions e.g. SE.	Parent	49	2.31	1.31	.859
	Not Parent	189	2.34	1.33	
C1S8) I believe that the challenges I have faced in the industry are due to female employees.	Parent	49	1.69	0.92	.361
	Not Parent	189	1.57	0.86	
C1S9) I believe that the challenges I have faced in the industry are due to male employees.	Parent	49	2.51	1.31	.258
	Not Parent	189	2.28	1.25	
C1S10) I believe that women feel safe in the company I work for.	Parent	49	4.12	1.03	.996
	Not Parent	189	4.12	1.05	
C1S11) I have witnessed mobbing (bullying) towards female employees in the company I work for.	Parent	49	2.04	1.40	.294
	Not Parent	189	1.82	1.28	
C1S12) I have witnessed men raising their voices in meetings at the company I work for.	Parent	49	2.33	1.41	.449
	Not Parent	189	2.15	1.43	
C1S13) I have witnessed women raising their voices in meetings at the company I work for.	Parent	49	2.18	1.18	.225
	Not Parent	189	1.95	1.22	

4.3.1.5. Education Level

In terms of educational level of the participants, who are grouped into "bachelor's degree" and "MS. or PhD. Degree", the scores given to the statements can be seen in below Figure 15. According to the t-test results (see Table 15), there exist no significant difference between two groups, meaning that opinions about male dominance do not differ according to the education level of the participants.

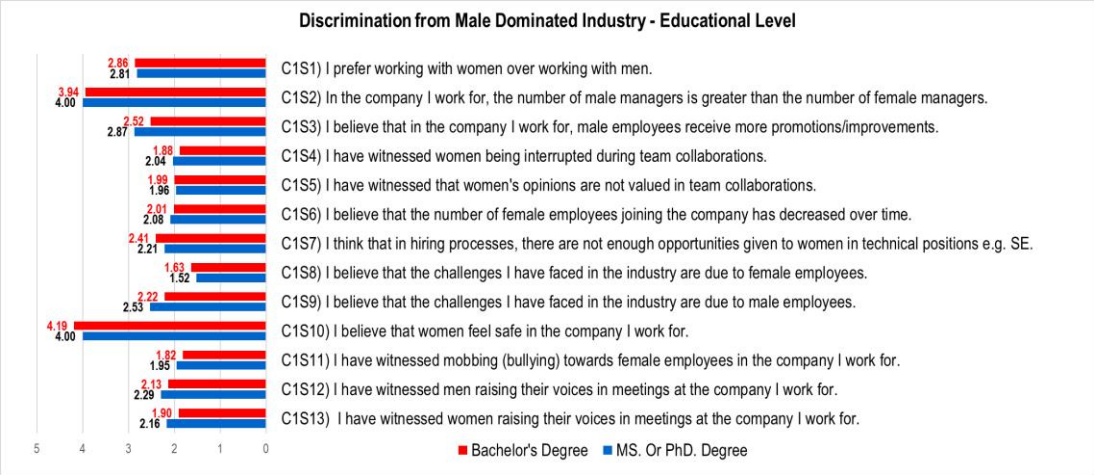

Figure 15 Average Scores of Challenge 1 According to Educational Level

Table 15 t-test Results for Challenge 1 According to Educational Level

Item	Educational Level	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C1S1) I prefer working with women over working with men.	Bachelor's Degree	153	2.86	1.08	.708
	MS. Or PhD. Degree	85	2.81	0.87	
C1S2) In the company I work for, the number of male managers is greater than the number of female managers.	Bachelor's Degree	153	3.94	1.22	.727
	MS. Or PhD. Degree	85	4.00	1.29	
C1S3) I believe that in the company I work for, male employees receive more promotions/improvements.	Bachelor's Degree	153	2.52	1.41	.064
	MS. Or PhD. Degree	85	2.87	1.40	
C1S4) I have witnessed women being interrupted during team collaborations.	Bachelor's Degree	153	1.88	1.27	.379
	MS. Or PhD. Degree	85	2.04	1.31	
C1S5) I have witnessed that women's opinions are not valued in team collaborations.	Bachelor's Degree	153	1.99	1.34	.872
	MS. Or PhD. Degree	85	1.96	1.28	
C1S6) I believe that the number of female employees joining the company has decreased over time.	Bachelor's Degree	153	2.01	1.21	.637
	MS. Or PhD. Degree	85	2.08	1.15	
C1S7) I think that in hiring processes, there are not enough opportunities given to women in technical positions e.g. SE.	Bachelor's Degree	153	2.41	1.37	.268
	MS. Or PhD. Degree	85	2.21	1.24	
C1S8) I believe that the challenges I have faced in the industry are due to female employees.	Bachelor's Degree	153	1.63	0.93	.295
	MS. Or PhD. Degree	85	1.52	0.75	
C1S9) I believe that the challenges I have faced in the industry are due to male employees.	Bachelor's Degree	153	2.22	1.26	.066
	MS. Or PhD. Degree	85	2.53	1.26	
C1S10) I believe that women feel safe in the company I work for.	Bachelor's Degree	153	4.19	1.05	.181
	MS. Or PhD. Degree	85	4.00	1.04	
C1S11) I have witnessed mobbing (bullying) towards female employees in the company I work for.	Bachelor's Degree	153	1.82	1.28	.444
	MS. Or PhD. Degree	85	1.95	1.36	
C1S12) I have witnessed men raising their voices in meetings at the company I work for.	Bachelor's Degree	153	2.13	1.38	.397
	MS. Or PhD. Degree	85	2.29	1.51	
C1S13) I have witnessed women raising their voices in meetings at the company I work for.	Bachelor's Degree	153	1.90	1.17	.110
	MS. Or PhD. Degree	85	2.16	1.28	

4.3.1.6. Years of Experience in the Same Role

Participants' experience in the same role can be an important factor in order to measure the effect of the hypothesized challenge. The scores given to the statements according to the experienced level can be seen in Figure 16.

Figure 16 Average Scores of Challenge 1 according to Experience of Participants

To be able to see if there exist any significant difference to the scores given to the statements between the groups, ANOVA was conducted. Homogeneity of variances were checked and for items having not equal variances, Welch test was applied. According to the results of ANOVA and Welch test, see Table 16, 5 statements have significant difference between groups.

Table 16 t-test Results for Challenge 1 according to Experience of Participants

Item	Experience	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C1S1) I prefer working with women over working with men.	Less than 2 years	82	3.01	0.91	Welch, .080
	2-7 years	124	2.80	1.07	
	More than 7 years	32	2.59	0.95	
C1S2) In the company I work for, the number of male managers is greater than the number of female managers.	Less than 2 years	82	3.72	1.39	Welch, .124
	2-7 years	124	4.10	1.14	
	More than 7 years	32	4.06	1.16	
C1S3) I believe that in the company I work for, male employees receive more promotions/improvements.	Less than 2 years	82	2.28	1.35	.003
	2-7 years	124	2.73	1.41	
	More than 7 years	32	3.22	1.39	
C1S4) I have witnessed women being interrupted during team collaborations.	Less than 2 years	82	1.82	1.17	.574
	2-7 years	124	2.01	1.38	
	More than 7 years	32	1.97	1.20	
C1S5) I have witnessed that women's opinions are not valued in team collaborations.	Less than 2 years	82	1.77	1.11	.178
	2-7 years	124	2.11	1.42	
	More than 7 years	32	2.03	1.33	
C1S6) I believe that the number of female employees joining the company has decreased over time.	Less than 2 years	82	1.94	1.15	Welch, .014
	2-7 years	124	2.19	1.27	
	More than 7 years	32	1.66	0.79	
C1S7) I think that in hiring processes, there are not enough opportunities given to women in technical positions e.g. SE.	Less than 2 years	82	2.33	1.26	.591
	2-7 years	124	2.40	1.38	
	More than 7 years	32	2.13	1.31	
C1S8) I believe that the challenges I have faced in the industry are due to female employees.	Less than 2 years	82	1.51	0.82	Welch, .248
	2-7 years	124	1.57	0.83	
	More than 7 years	32	1.88	1.10	
C1S9) I believe that the challenges I have faced in the industry are due to male employees.	Less than 2 years	82	2.05	1.12	Welch, .035
	2-7 years	124	2.46	1.33	
	More than 7 years	32	2.53	1.24	
C1S10) I believe that women feel safe in the company I work for.	Less than 2 years	82	4.28	0.92	.218
	2-7 years	124	4.06	1.11	
	More than 7 years	32	3.97	1.09	
C1S11) I have witnessed mobbing (bullying) towards female employees in the company I work for.	Less than 2 years	82	1.54	1.02	Welch, .005
	2-7 years	124	1.95	1.37	
	More than 7 years	32	2.38	1.52	
C1S12) I have witnessed men raising their voices in meetings at the company I work for.	Less than 2 years	82	1.87	1.33	.022
	2-7 years	124	2.30	1.42	
	More than 7 years	32	2.59	1.54	
C1S13) I have witnessed women raising their voices in meetings at the company I work for.	Less than 2 years	82	1.82	1.19	.258
	2-7 years	124	2.09	1.26	
	More than 7 years	32	2.09	1.09	

Since ANOVA and Welch tests were used in order to see if there exist any difference between groups more than two categories, it is needed to check which two groups create the difference. Therefore, post-hoc tests were conducted. Among different types of post-hoc tests, for unequal sample sizes, Gabriel's test was chosen for equal variances and Games-Howell test was preferred for unequal variances [55]. The same rationale is valid for other items analyzed by ANOVA and having significant difference between groups. The results of post-hoc tests are presented in Table 17 for demographics "gender" under challenge category 1.

Table 17 Post-hoc Test Results for Challenge 1 according to Experience of Participants

Item	Post-Hoc Test	Experience (I) x Experience (J)	Sig.
C1S3) I believe that in the company I work for, male employees receive more promotions/improvements.	Gabriel's	Less than 2 years & 2-7 years	,064
		Less than 2 years & More than 7 years	,003
		2-7 years & More than 7 years	,182
C1S6) I believe that the number of female employees joining the company has decreased over time.	Games-Howell	Less than 2 years & 2-7 years	,296
		Less than 2 years & More than 7 years	,295
		2-7 years & More than 7 years	,010
C1S9) I believe that the challenges I have faced in the industry are due to male employees.	Games-Howell	Less than 2 years & 2-7 years	,047
		Less than 2 years & More than 7 years	,146
		2-7 years & More than 7 years	,956
C1S11) I have witnessed mobbing (bullying) towards female employees in the company I work for.	Games-Howell	Less than 2 years & 2-7 years	,037
		Less than 2 years & More than 7 years	,017
		2-7 years & More than 7 years	,333
C1S12) I have witnessed men raising their voices in the meetings at the company I work for.	Gabriel's	Less than 2 years & 2-7 years	,090
		Less than 2 years & More than 7 years	,034
		2-7 years & More than 7 years	,604

According to the results, group having less than two years of experience disagree that male receive more promotion while group having experience more than seven years is neutral about that.

Although all groups are disagreeing about the challenges they face in the industry are due to male employees, there exist a significant difference between the least experienced group and the group having 2-7 years of experience. As participant's experience in the same role increases, he/she believes more that the challenges they faced in the industry are due to male employees.

Although the scores vary among themselves, all three groups of participants agree that there is no decrease in the number of female employees joining the company, they have not witnessed mobbing against female employees, and they have not witnessed men raising their voices in meetings.

4.3.1.7. Working Style

In terms of working style, which can be remote, on site or hybrid, the scores given to the statements can be seen in Figure 17. The answers to the statements that there exists significant difference between the groups can be seen by ANOVA, in Table 18. Homogeneity of variances were checked and for items having not equal variances, Welch test was applied.

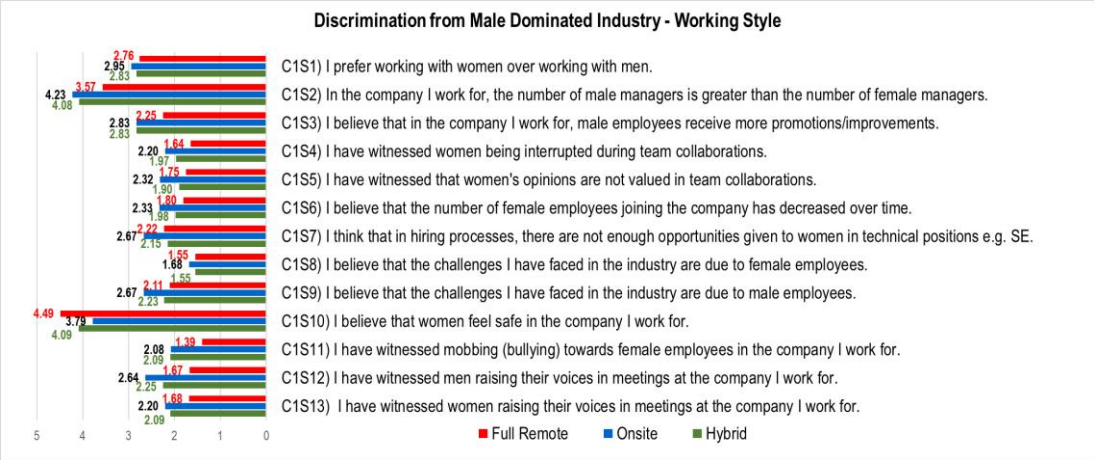

Figure 17 Average Scores of Challenge 1 according to Working Style of Participants

Table 18 t-test Results for Challenge 1 according to Working Style of Participants

Item	Working Style	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C1S1) I prefer working with women over working with men.	Hybrid	87	2.83	0.99	.524
	Onsite	75	2.95	1.13	
	Full Remote	76	2.76	0.89	
C1S2) In the company I work for, the number of male managers is greater than the number of female managers.	Hybrid	87	4.08	1.12	.002
	Onsite	75	4.23	1.26	
	Full Remote	76	3.57	1.28	
C1S3) I believe that in the company I work for, male employees receive more promotions/improvements.	Hybrid	87	2.83	1.32	Welch, .007
	Onsite	75	2.83	1.62	
	Full Remote	76	2.25	1.22	
C1S4) I have witnessed women being interrupted during team collaborations.	Hybrid	87	1.97	1.25	Welch, .026
	Onsite	75	2.20	1.41	
	Full Remote	76	1.64	1.13	
C1S5) I have witnessed that women's opinions are not valued in team collaborations.	Hybrid	87	1.90	1.22	.020
	Onsite	75	2.32	1.41	
	Full Remote	76	1.75	1.27	
C1S6) I believe that the number of female employees joining the company has decreased over time.	Hybrid	87	1.98	1.17	.019
	Onsite	75	2.33	1.22	
	Full Remote	76	1.80	1.11	
C1S7) I think that in hiring processes, there are not enough opportunities given to women in technical positions e.g. SE.	Hybrid	87	2.15	1.18	Welch, .050
	Onsite	75	2.67	1.51	
	Full Remote	76	2.22	1.25	
C1S8) I believe that the challenges I have faced in the industry are due to female employees.	Hybrid	87	1.55	0.82	.576
	Onsite	75	1.68	0.93	
	Full Remote	76	1.55	0.87	
C1S9) I believe that the challenges I have faced in the industry are due to male employees.	Hybrid	87	2.23	1.25	.015
	Onsite	75	2.67	1.33	
	Full Remote	76	2.11	1.16	
C1S10) I believe that women feel safe in the company I work for.	Hybrid	87	4.09	1.01	Welch, .000
	Onsite	75	3.79	1.23	
	Full Remote	76	4.49	0.74	
C1S11) I have witnessed mobbing (bullying) towards female employees in the company I work for.	Hybrid	87	2.09	1.35	Welch, .000
	Onsite	75	2.08	1.46	
	Full Remote	76	1.39	0.94	
C1S12) I have witnessed men raising their voices in meetings at the company I work for.	Hybrid	87	2.25	1.39	Welch, .000
	Onsite	75	2.64	1.53	
	Full Remote	76	1.67	1.18	
C1S13) I have witnessed women raising their voices in meetings at the company I work for.	Hybrid	87	2.09	1.19	0.021
	Onsite	75	2.20	1.32	
	Full Remote	76	1.68	1.09	

For items having significant difference between groups, post-hoc tests were applied and the results are presented in Table 19.

Table 19 Post-hoc test Results of Challenge 1 for Working Style of Participants

Item	Post-Hoc Test	Working Style (I) x Working Style (J)	Sig.
C1S2) I believe that in the company I work for, male employees receive more promotions/improvements.	Gabriel's	Hybrid & On-site	,830
		Hybrid & Remote	,022
		On-site & Remote	,003
C1S3) I believe that the number of female employees joining the company has decreased over time.	Games-Howell	Hybrid & On-site	1
		Hybrid & Remote	,012
		On-site & Remote	,040
C1S4) I believe that the challenges I have faced in the industry are due to male employees.	Games-Howell	Hybrid & On-site	,510
		Hybrid & Remote	,201
		On-site & Remote	,023
C1S5) I have witnessed mobbing (bullying) towards female employees in the company I work for.	Gabriel's	Hybrid & On-site	,112
		Hybrid & Remote	,852
		On-site & Remote	,022
C1S6) I have witnessed men raising their voices in the meetings at the company I work for.	Gabriel's	Hybrid & On-site	,153
		Hybrid & Remote	,715
		On-site & Remote	,017
C1S9) I have witnessed men raising their voices in the meetings at the company I work for.	Gabriel's	Hybrid & On-site	,079
		Hybrid & Remote	,892
		On-site & Remote	,018
C1S10) I have witnessed men raising their voices in the meetings at the company I work for.	Games-Howell	Hybrid & On-site	,206
		Hybrid & Remote	,013
		On-site & Remote	,000
C1S11) I have witnessed men raising their voices in the meetings at the company I work for.	Games-Howell	Hybrid & On-site	,998
		Hybrid & Remote	,000
		On-site & Remote	,002
C1S12) I have witnessed men raising their voices in the meetings at the company I work for.	Games-Howell	Hybrid & On-site	,218
		Hybrid & Remote	,012
		On-site & Remote	,000
C1S13) I have witnessed men raising their voices in the meetings at the company I work for.	Gabriel's	Hybrid & On-site	,919
		Hybrid & Remote	,091
		On-site & Remote	,026

It is interesting to say that nearly 80% of the items has difference between the participant groups. According to the results, scores of the group working on on-site are the highest among other two groups in almost all of the statements: both negative and positive ones. In almost all statements, difference occurs between on-site and remote group. It may be due to the fact that onsite workers can expose to both the challenges and also benefits more than remote and hybrid workers.

4.3.2. Challenge 2: Difficulties in Advancing Managerial Roles

4.3.2.1. Gender

Another category of challenge for female IT workers in the sector is difficulties encountered in advancing managerial roles in the organizations according to the literature survey conducted. Figure 18 presents a comparison of scores attributed to statements highlighting challenges about the difficulties of promoting to managerial roles, categorized by gender.

Figure 18 Average Scores of Challenge 2 According to Gender

A t-test was applied to assess any significant variances in responses between male and female participants for the items related to this challenge, can be seen in Table 20. The t-test results revealed a common perspective among both male and female participants: both groups think that female colleagues are seen as less likely to secure managerial roles. Compared to men, female respondents tend to believe more than their male counterparts that men in their companies have a better chance of becoming managers. Building on this, female participants agree more than male respondents that male employees often receive higher performance scores in their companies. These data highlight that women IT workers are being exposed to difficulties in advancing managerial roles and this is also agreed by male employees.

Table 20 t-test Results for Challenge 2 According to Gender

Item	Gender	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C2S1) In the company I work for, I believe that male employees have a higher probability of becoming managers.	Female	146	3.29	1.42	.000
	Male	92	2.55	1.39	
C2S2) In the company I work for, I believe that female employees have a higher probability of becoming managers.	Female	146	2.13	0.99	.809
	Male	92	2.16	1.07	
C2S3) I believe that male employees at the company I work for receive higher performance ratings/bonuses.	Female	146	2.72	1.34	.000
	Male	92	1.74	0.89	
C2S4) I believe that female employees at the company I work for receive higher performance ratings/bonuses.	Female	146	2.00	0.92	.815
	Male	92	2.03	1.11	

4.3.2.2. Age

In terms of age, which are grouped into two; "30 and less" and "more than 30", both age groups believe that male employees have a higher probability of becoming managers in their companies than female employees. The comparison of scores attributed to statements categorized by age can be seen in Figure 19. The scores given to the statements related to difficulties in advancing managerial roles do not differ significantly according to the t-test results, which can be seen in Table 21.

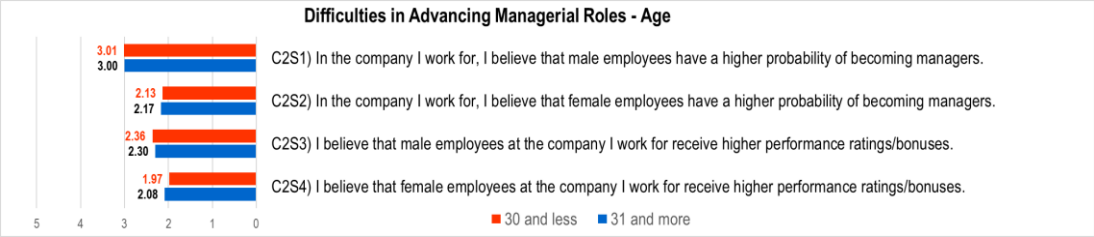

Figure 19 Average Scores of Challenge 2 According to Age

Table 21 t-test Results for Challenge 2 According to Age

Item	Age	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C2S1) In the company I work for, I believe that male employees have a higher probability of becoming managers.	30 years and less	154	3.01	1.45	
	more than 30 years	84	3.00	1.46	.974
C2S2) In the company I work for, I believe that female employees have a higher probability of becoming managers.	30 years and less	146	2.13	1.03	
	more than 30 years	92	2.17	1.02	.791
C2S3) I believe that male employees at the company I work for receive higher performance ratings/bonuses.	30 years and less	146	2.36	1.26	
	more than 30 years	92	2.30	1.31	.704
C2S4) I believe that female employees at the company I work for receive higher performance ratings/bonuses.	30 years and less	146	1.97	0.98	
	more than 30 years	92	2.08	1.03	.421

4.3.2.3. Marital Status

When this challenge is evaluated according to the marital status, it can be seen from the scores and the t-test results that (see Figure 20 and Table 22) the opinions of the participants do not show significant differences regardless of their marital statuses. It can be said that both singles and marrieds are disagreed that females receive higher performance bonuses. They also do not believe males receive higher bonuses, but scores are higher for male's probability, meaning that participants think that probability of males receiving higher bonuses is higher than females. Similarly, both groups do not think that females having higher probability of becoming managers. The highest scores present a neutrality about male's having higher probability of becoming managers.

Figure 20 Average Scores of Challenge 2 According to Marital Status

Table 22 t-test Results for Challenge 2 According to Marital Status

Item	Marital Status	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C2S1) In the company I work for, I believe that male employees have a higher probability of becoming managers.	Single	146	2.89	1.46	.129
	Married	92	3.18	1.43	
C2S2) In the company I work for, I believe that female employees have a higher probability of becoming managers.	Single	146	2.18	1.08	.424
	Married	92	2.08	0.92	
C2S3) I believe that male employees at the company I work for receive higher performance ratings/bonuses.	Single	146	2.27	1.27	.265
	Married	92	2.46	1.29	
C2S4) I believe that female employees at the company I work for receive higher performance ratings/bonuses.	Single	146	1.96	1.00	.298
	Married	92	2.10	1.01	

4.3.2.4. Parental Status

Like marital status, parental status has a similar pattern in terms of challenge category of difficulties in advancing managerial roles. The scores given to the statements categorized by the parental status can be seen in Figure 21.

According to the t-test results, presented in Table 23, there exist no significant differences regardless of the participants are parent or not. Similar to the marital status, while participants disagree that females receive higher performances and have higher probability of becoming a manager, they are neutral about male's probability of becoming a manager.

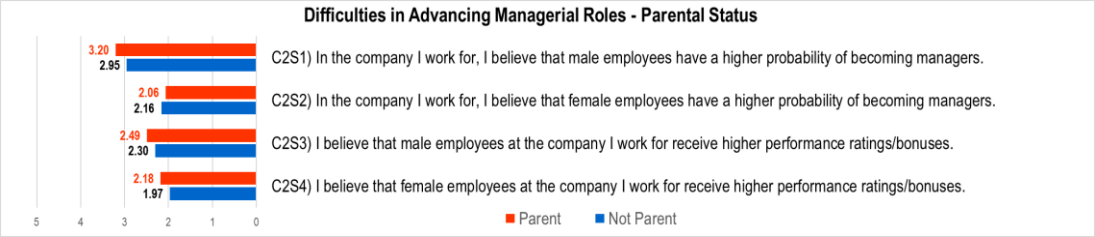

Figure 21 Average Scores of Challenge 2 According to Parental Status

Table 23 t-test Results for Challenge 2 According to Parental Status

Item	Parental Status	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C2S1) In the company I work for, I believe that male employees have a higher probability of becoming managers.	Parent	49	3.20	1.43	.281
	Not Parent	189	2.95	1.46	
C2S2) In the company I work for, I believe that female employees have a higher probability of becoming managers.	Parent	49	2.06	0.88	.531
	Not Parent	189	2.16	1.06	
C2S3) I believe that male employees at the company I work for receive higher performance ratings/bonuses.	Parent	49	2.49	1.36	.358
	Not Parent	189	2.30	1.25	
C2S4) I believe that female employees at the company I work for receive higher performance ratings/bonuses.	Parent	49	2.18	1.07	.180
	Not Parent	189	1.97	0.98	

4.3.2.5. Education Level

Education level of the participants is grouped into two; one group consists of people having Bachelor's Degree; graduated from a 4-year university. Other group includes participants having Master's Degree or Doctor of Philosophy (Ph.D.). The scores given to the statements categorized to the education level can be seen in Figure 22.

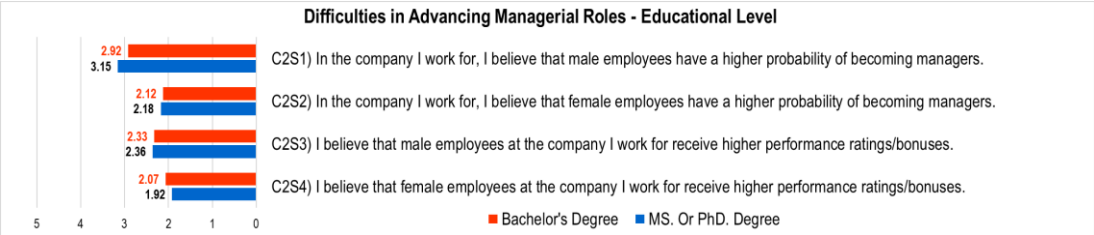

Figure 22 Average Scores of Challenge 2 According to Educational Level

According to the t-test results, there exist no significant differences regardless of their education level but the opinions of the participants follow a similar pattern with parental and marital status. T-test results together with the other statistical data can be seen in Table 24.

Table 24 t-test Results for Challenge 2 According to Educational Level

Item	Educational Level	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C2S1) In the company I work for, I believe that male employees have a higher probability of becoming managers.	Bachelor's Degree	153	2.92	1.41	.240
	MS. Or PhD. Degree	85	3.15	1.52	
C2S2) In the company I work for, I believe that female employees have a higher probability of becoming managers.	Bachelor's Degree	153	2.12	1.03	.706
	MS. Or PhD. Degree	85	2.18	1.01	
C2S3) I believe that male employees at the company I work for receive higher performance ratings/bonuses.	Bachelor's Degree	153	2.33	1.25	.827
	MS. Or PhD. Degree	85	2.36	1.33	
C2S4) I believe that female employees at the company I work for receive higher performance ratings/bonuses.	Bachelor's Degree	153	2.07	1.05	.256
	MS. Or PhD. Degree	85	1.92	0.90	

4.3.2.6. Years of Experience in the Same Role

In terms of experience level, number of years of experience in the same role was collected from the participants. The scores given to the statements categorized by experience levels can be seen in Figure 23. Homogeneity of variances were checked and for items having not equal variances, Welch test was applied instead of ANOVA. For others, ANOVA was conducted to see if there exist any significant difference between experience level categorized. According to the results, see Table 25, for one statement there is significant difference between groups. For statement 3, "I believe that male employees at the company I work for receive higher performance ratings/bonuses." the participants having experience more than 12 years are neutral about it while the others are disagreeing about that. As experience level increases, participants' thoughts move from disagreement to uncertainty about males receiving higher performance ratings. It may be due to the reason that people having more experience in the companies they work for have more chance to observe such kind of situations regarding to performance evaluations and results

Figure 23 Average Scores of Challenge 2 According to Experience of Participants

Table 25 t-test Results for Challenge 2 according to Experience of Participants

Item	Experience	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C2S1) In the company I work for, I believe that male employees have a higher probability of becoming managers.	Less than 2 years	82	2.73	1.42	.103
	2-7 years	124	3.17	1.44	
	More than 7 years	32	3.06	1.54	
C2S2) In the company I work for, I believe that female employees have a higher probability of becoming managers.	Less than 2 years	82	2.30	1.15	Welch, .151
	2-7 years	124	2.09	0.97	
	More than 7 years	32	1.94	0.80	
C2S3) I believe that male employees at the company I work for receive higher performance ratings/bonuses.	Less than 2 years	82	2.06	1.20	.043
	2-7 years	124	2.46	1.30	
	More than 7 years	32	2.59	1.29	
C2S4) I believe that female employees at the company I work for receive higher performance ratings/bonuses.	Less than 2 years	82	1.89	0.97	.392
	2-7 years	124	2.08	1.04	
	More than 7 years	32	2.06	0.91	

The related post-hoc test was conducted and the results are presented in Table 26.

Table 26 Post-hoc Test Results for Challenge 2 according to Experience of Participants

Item	Post-Hoc Test	Experience (I) x Experience (J)	Sig.
C2S3) I believe that male employees at the company I work for receive higher performance ratings/bonuses.	Gabriel's	Less than 2 years & 2-7 years	,078
		Less than 2 years & More than 7 years	,112
		2-7 years & More than 7 years	,984

Even if there exist significant difference according to the ANOVA results, post-hoc results did not show any significant difference between the experience level groups.

4.3.2.7. Working Style

In terms of working style, the scores given to the statements related to difficulties in advancing managerial roles can be seen in Figure 24.

It is interested that only the participants working on-site agree that male employees have a higher probability of becoming managers in the company they work for while hybrid and remote ones are neutral about it; the difference between scores have significant difference and they exist both between hybrid-remote and remote-on-site. Moreover,

while remote and hybrid ones are disagreeing that male employees receiving higher performance ratings/bonuses, participants working on-site are neutral about it. The differences between groups are similar to the prior statement, they exist both between hybrid-remote and remote-on-site. This situation may be due to the reduced opportunity for employees with remote and hybrid work arrangements to observe the dynamics and changes in the workplace compared to those working on-site in the office. They may not be expressing agreement with such challenges because they have not personally experienced those.

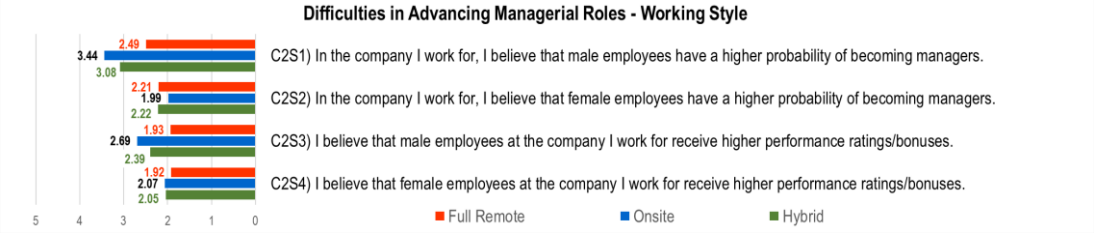

Figure 24 Average Scores of Challenge 2 According to Working Style of Participants

Homogeneity of variances were checked and for items having not equal variances, Welch test was applied, for others, ANOVA was applied. The answers to the statements that there exists significant difference between the groups can be seen in Table 27.

Table 27 t-test Results for Challenge 2 According to Working Style of Participants

Item	Working Style	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C2S1) In the company I work for, I believe that male employees have a higher probability of becoming managers.	Hybrid	87	3.08	1.38	.000
	Onsite	75	3.44	1.44	
	Full Remote	76	2.49	1.41	
C2S2) In the company I work for, I believe that female employees have a higher probability of becoming managers.	Hybrid	87	2.22	0.97	.279
	Onsite	75	1.99	0.99	
	Full Remote	76	2.21	1.10	
C2S3) I believe that male employees at the company I work for receive higher performance ratings/bonuses.	Hybrid	87	2.39	1.29	Welch, .001
	Onsite	75	2.69	1.34	
	Full Remote	76	1.93	1.09	
C2S4) I believe that female employees at the company I work for receive higher performance ratings/bonuses.	Hybrid	87	2.05	0.96	.623
	Onsite	75	2.07	0.98	
	Full Remote	76	1.92	1.07	

Only two of the statements have difference between the participant groups. To see which groups have difference, related post-hoc tests were applied and the results presented in Table 28.

Table 28 Post-hoc Test Results for Challenge 2 according to the Working Style of the Participants

Item	Post-Hoc Test	Working Style (I) x Working Style (J)	Sig.
C2S1) In the company I work for, I believe that male employees have a higher probability of becoming managers.	Gabriel's	Hybrid & On-site	,285
		Hybrid & Remote	,023
		On-site & Remote	,000
C2S3) I believe that male employees at the company I work for receive higher performance ratings/bonuses.	Games-Howell	Hybrid & On-site	,312
		Hybrid & Remote	,040
		On-site & Remote	,001

4.3.3. Challenge 3: Self-Imposed Barriers Among Women

4.3.3.1. Gender

This challenge broadly refers to the internal barriers' women may set for themselves. As mentioned in the literature part, it is indicated that some women grapple with issues related to self-confidence at work. The survey's items for this challenge aimed to reveal signs of low self-confidence and capture male workers' perceptions of their female colleagues' confidence levels. The scores given to the statements categorized by gender can be seen in Figure 25.

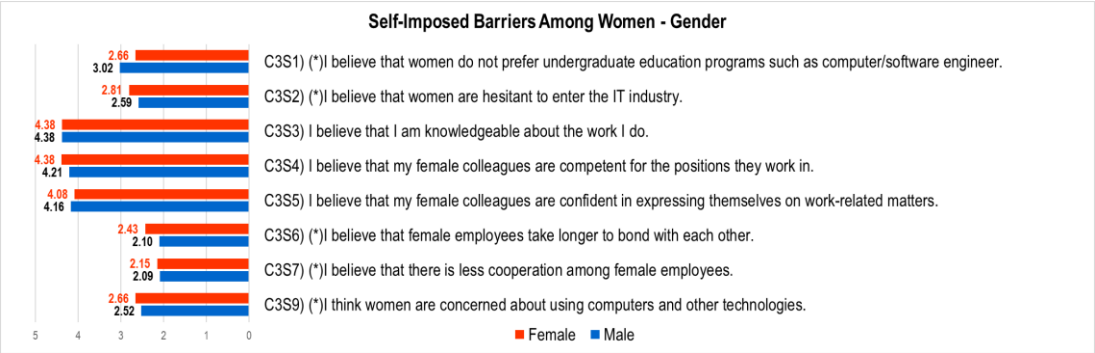

Figure 25 Average Scores of Challenge 3 According to Gender

The data suggests that female participants do not necessarily exhibit lower self-confidence compared to male participants. In fact, both genders gave high scores to statements regarding their own competency in their roles. Similarly, participants of both genders strongly think that their female colleagues are suitably qualified for the positions they have and that they express effectively on work-related topics.

As mentioned earlier, in order to apply t-test, normality of the data should be checked. The result of the normality tests resulted that 2 of the statements had shown not normal distribution; therefore, instead of t-test, Mann-Whitney U test was applied as a non-parametric version of the t-test; aiming the same target, which is to check are there any significant differences between male and female responses.

The t-test and Mann Whitney U tests results, which can be seen in Table 29, spotlight contrasting views between male and female participants about women choosing software engineering undergraduate programs. While both genders seem neutral about women's interest in SE education, male respondents more frequently believe that women are less likely to opt for SE-related programs than female respondents do. Interestingly, even though female participants acknowledge their own expertise and competency at work, they are neutral about women's enthusiasm to join the IT sector. In contrast, male participants do not perceive this uncertainty among women. These variances underscore the possibility of internal barriers women might face.

Table 29 t-test Results for Challenge 3 According to Gender

Item	Gender	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C3S1) (*)I believe that women do not prefer undergraduate education programs such as computer/software engineer.	Female	146	2.66	1.23	.028
	Male	92	3.02	1.25	
C3S2) (*)I believe that women are hesitant to enter the IT industry.	Female	146	2.81	1.21	.185
	Male	92	2.59	1.32	
C3S3) I believe that I am knowledgeable about the work I do.	Female	146	4.38	0.70	Whitney, .919
	Male	92	4.38	0.72	
C3S4) I believe that my female colleagues are competent for the positions they work in.	Female	146	4.38	0.75	Whitney, .358
	Male	92	4.21	0.99	
C3S5) I believe that my female colleagues are confident in expressing themselves on work-related matters.	Female	146	4.08	0.95	.524
	Male	92	4.16	0.95	
C3S6) (*)I believe that female employees take longer to bond with each other.	Female	146	2.43	1.29	.054
	Male	92	2.10	1.30	
C3S7) (*)I believe that there is less cooperation among female employees.	Female	146	2.15	1.19	.689
	Male	92	2.09	1.21	
C3S9) (*)I think women are concerned about using computers and other technologies.	Female	146	2.66	1.28	.422
	Male	92	2.52	1.25	

4.3.3.2. Age

In terms of age, like the gender, both age groups agree that they are knowledgeable enough for their roles, female colleagues are competent for their positions and confident in expressing themselves on work-related issues. The scores given for the statement with age category can be seen in Figure 26.

Both Mann-Whitney U test and t-test were applied, according to the results, shown in Table 30 there exist significant difference for the statement about women's hesitancy to enter the IT industry. The group aging more than 30 disagree that women are hesitant to enter the IT sector, while the other group seem neutral about that. Similarly, the group aging more than 30 thinks that women are not concerned about using computers and other technologies while the younger group seem uncertain about it. Therefore, it seems that in terms of age, it cannot easily be said that women have self-imposed barriers.

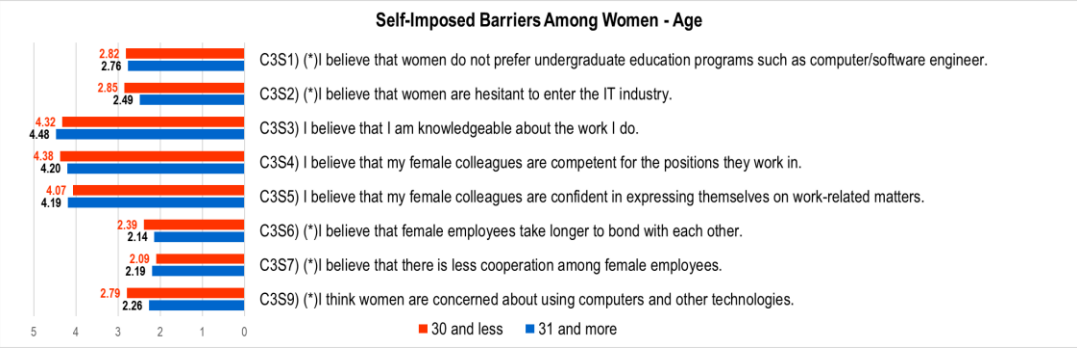

Figure 26 Average Scores of Challenge 3 According to Age

Table 30 t-test Results for Challenge 3 According to Age

Item	Age	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C3S1) (*)I believe that women do not prefer undergraduate education programs such as computer/software engineer.	30 years and less	154	2.82	1.30	.740
	more than 30 years	84	2.76	1.16	
C3S2) (*)I believe that women are hesitant to enter the IT industry.	30 years and less	146	2.85	1.25	.033
	more than 30 years	92	2.49	1.23	
C3S3) I believe that I am knowledgeable about the work I do.	30 years and less	146	4.32	0.71	Whitney, .073
	more than 30 years	92	4.48	0.69	
C3S4) I believe that my female colleagues are competent for the positions they work in.	30 years and less	146	4.38	0.83	Whitney, .127
	more than 30 years	92	4.20	0.90	
C3S5) I believe that my female colleagues are confident in expressing themselves on work-related matters.	30 years and less	146	4.07	0.97	.357
	more than 30 years	92	4.19	0.91	
C3S6) (*)I believe that female employees take longer to bond with each other.	30 years and less	146	2.39	1.32	.162
	more than 30 years	92	2.14	1.25	
C3S7) (*)I believe that there is less cooperation among female employees.	30 years and less	146	2.09	1.17	.540
	more than 30 years	92	2.19	1.25	
C3S9) (*)I think women are concerned about using computers and other technologies.	30 years and less	146	2.79	1.27	.002
	more than 30 years	92	2.26	1.19	

4.3.3.3. Marital Status

When categorized by marital status, the scores given to the statements can be seen in Figure 27. Significant differences are specified in technology usage according to the t-test and Mann Whitney test results that is presented in Table 31. Married respondents disagree with the notion that women have concerns about using computers and technology, while single respondents remain neutral. They view women as more adept at leveraging technology than their single peers do. This perspective might stem from the enhanced sense of togetherness or shared experiences that marriage introduces.

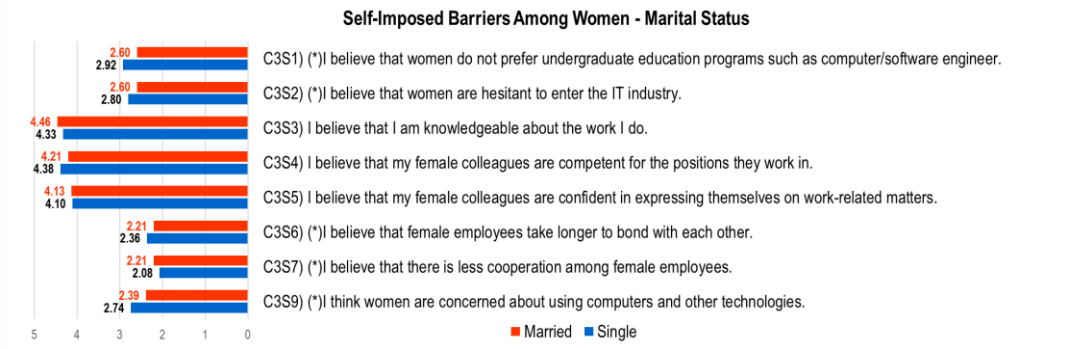

Figure 27 Average Scores of Challenge 3 According to Marital Status

Table 31 t-test Results for Challenge 3 According to Marital Status

Item	Marital Status	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C3S1) (*)I believe that women do not prefer undergraduate education programs such as computer/software engineer.	Single	146	2.92	1.24	.049
	Married	92	2.60	1.24	
C3S2) (*)I believe that women are hesitant to enter the IT industry.	Single	146	2.80	1.26	.223
	Married	92	2.60	1.24	
C3S3) I believe that I am knowledgeable about the work I do.	Single	146	4.33	0.72	Whitney, .129
	Married	92	4.46	0.69	
C3S4) I believe that my female colleagues are competent for the positions they work in.	Single	146	4.38	0.79	Whitney, .195
	Married	92	4.21	0.94	
C3S5) I believe that my female colleagues are confident in expressing themselves on work-related matters.	Single	146	4.10	0.94	.827
	Married	92	4.13	0.96	
C3S6) (*)I believe that female employees take longer to bond with each other.	Single	146	2.36	1.30	.367
	Married	92	2.21	1.30	
C3S7) (*)I believe that there is less cooperation among female employees.	Single	146	2.08	1.16	.411
	Married	92	2.21	1.25	
C3S9) (*)I think women are concerned about using computers and other technologies.	Single	146	2.74	1.29	.039
	Married	92	2.39	1.21	

4.3.3.4. Parental Status

The given scores of statements related to self-imposed barriers of women categorized by parental status can be seen in Figure 28. The t-test and Mann Whitney test are applied to check any significant differences between groups, the results can be seen in Table 32. For parental status, there is no significant difference in responses based on whether the participants have children or not.

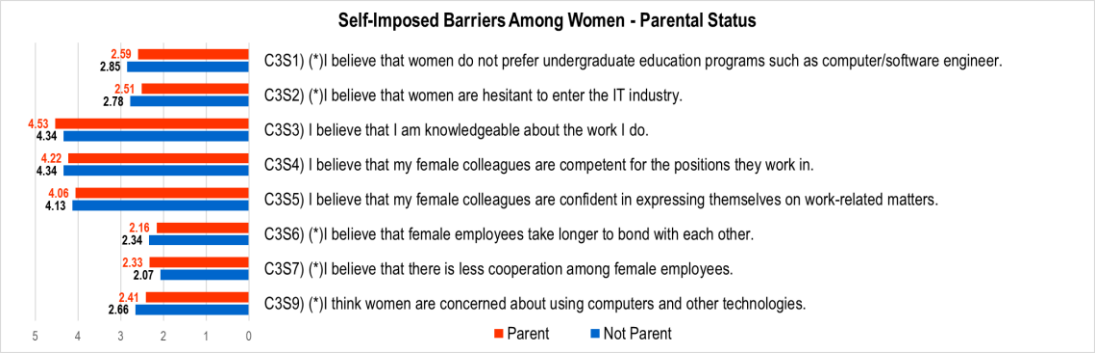

Figure 28 Average Scores of Challenge 3 According to Parental Status

Table 32 t-test Results for Challenge 3 According to Parental Status

Item	Parental Status	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C3S1) (*)I believe that women do not prefer undergraduate education programs such as computer/software engineer.	Parent	49	2.59	1.31	.194
	Not Parent	189	2.85	1.23	
C3S2) (*)I believe that women are hesitant to enter the IT industry.	Parent	49	2.51	1.31	.183
	Not Parent	189	2.78	1.23	
C3S3) I believe that I am knowledgeable about the work I do.	Parent	49	4.53	0.74	Whitney, .027
	Not Parent	189	4.34	0.69	
C3S4) I believe that my female colleagues are competent for the positions they work in.	Parent	49	4.22	0.87	Whitney, .366
	Not Parent	189	4.34	0.85	
C3S5) I believe that my female colleagues are confident in expressing themselves on work-related matters.	Parent	49	4.06	1.01	.667
	Not Parent	189	4.13	0.94	
C3S6) (*)I believe that female employees take longer to bond with each other.	Parent	49	2.16	1.33	.401
	Not Parent	189	2.34	1.29	
C3S7) (*)I believe that there is less cooperation among female employees.	Parent	49	2.33	1.36	.237
	Not Parent	189	2.07	1.15	
C3S9) (*)I think women are concerned about using computers and other technologies.	Parent	49	2.41	1.22	.223
	Not Parent	189	2.66	1.28	

4.3.3.5. Education Level

The given scores of statements related to self-imposed barriers of women categorized by education level of the participants can be seen in Figure 29. The t-test and Mann Whitney tests were applied to check any significant differences between groups, the results can be seen in Table 33. For education level of the participants, there is no significant difference in responses based on whether the participants holding bachelor's degree, master's degree or PhD.

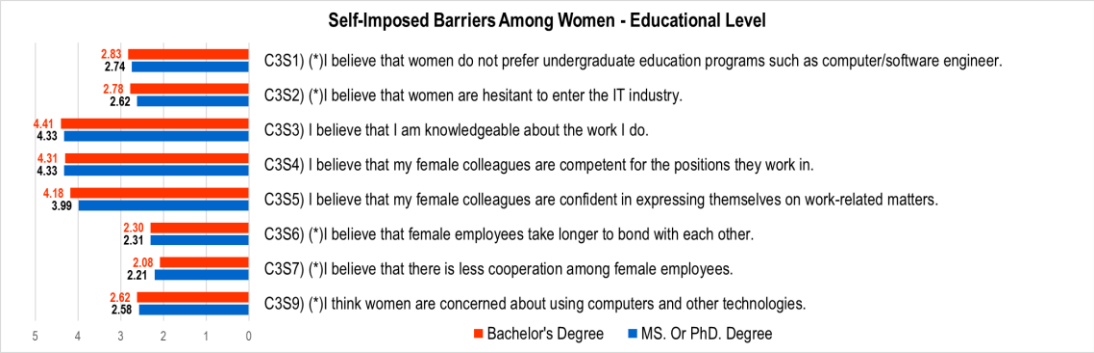

Figure 29 Average Scores of Challenge 3 According to Education Level

Table 33 t-test Results for Challenge 3 According to Education Level

Item	Educational Level	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C3S1) (*)I believe that women do not prefer undergraduate education programs such as computer/software engineer.	Bachelor's Degree	153	2.83	1.27	.600
	MS. Or PhD. Degree	85	2.74	1.21	
C3S2) (*)I believe that women are hesitant to enter the IT industry.	Bachelor's Degree	153	2.78	1.29	.364
	MS. Or PhD. Degree	85	2.62	1.18	
C3S3) I believe that I am knowledgeable about the work I do.	Bachelor's Degree	153	4.41	0.71	Whitney, .336
	MS. Or PhD. Degree	85	4.33	0.70	
C3S4) I believe that my female colleagues are competent for the positions they work in.	Bachelor's Degree	153	4.31	0.91	Whitney, .701
	MS. Or PhD. Degree	85	4.33	0.76	
C3S5) I believe that my female colleagues are confident in expressing themselves on work-related matters.	Bachelor's Degree	153	4.18	0.93	.130
	MS. Or PhD. Degree	85	3.99	0.97	
C3S6) (*)I believe that female employees take longer to bond with each other.	Bachelor's Degree	153	2.30	1.32	.976
	MS. Or PhD. Degree	85	2.31	1.26	
C3S7) (*)I believe that there is less cooperation among female employees.	Bachelor's Degree	153	2.08	1.19	.410
	MS. Or PhD. Degree	85	2.21	1.21	
C3S9) (*)I think women are concerned about using computers and other technologies.	Bachelor's Degree	153	2.62	1.28	.796
	MS. Or PhD. Degree	85	2.58	1.25	

4.3.3.6. Years of Experience in the Same Role

The scores of given statements related to self-imposed barriers of women in terms of experience level can be seen in Figure 30.

Homogeneity of variances were checked and for items having not equal variances, Welch test was applied instead of ANOVA. For others, ANOVA was conducted in order to see if there exist any significant difference between experience level categorized. Moreover, for statements that are violating normality assumption, Kruskal Wallis test was applied. According to the results, that are presented in Table 34, there exist 4 statements having significant difference regarding to experience level.

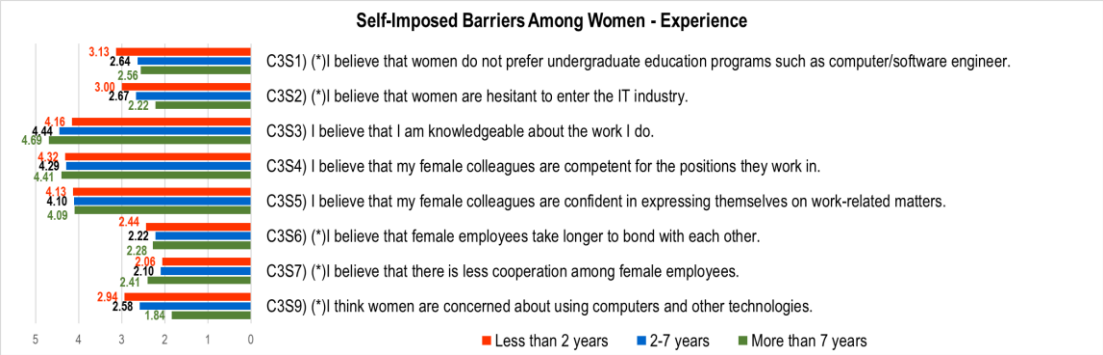

Figure 30 Average Scores of Challenge 3 According to Experience of Participants

Table 34 t-test Results for Challenge 3 According to Experience of Participants

Item	Experience	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C3S1) (*)I believe that women do not prefer undergraduate education programs such as computer/software engineer.	Less than 2 years	82	3.13	1.17	.010
	2-7 years	124	2.64	1.25	
	More than 7 years	32	2.56	1.27	
C3S2) (*)I believe that women are hesitant to enter the IT industry.	Less than 2 years	82	3.00	1.23	.008
	2-7 years	124	2.67	1.25	
	More than 7 years	32	2.22	1.18	
C3S3) I believe that I am knowledgeable about the work I do.	Less than 2 years	82	4.16	0.79	K. Wallis, .001
	2-7 years	124	4.44	0.65	
	More than 7 years	32	4.69	0.47	
C3S4) I believe that my female colleagues are competent for the positions they work in.	Less than 2 years	82	4.32	0.91	K. Wallis, .861
	2-7 years	124	4.29	0.86	
	More than 7 years	32	4.41	0.67	
C3S5) I believe that my female colleagues are confident in expressing themselves on work-related matters.	Less than 2 years	82	4.13	0.87	.969
	2-7 years	124	4.10	0.99	
	More than 7 years	32	4.09	1.03	
C3S6) (*)I believe that female employees take longer to bond with each other.	Less than 2 years	82	2.44	1.29	.488
	2-7 years	124	2.22	1.29	
	More than 7 years	32	2.28	1.37	
C3S7) (*)I believe that there is less cooperation among female employees.	Less than 2 years	82	2.06	1.06	.388
	2-7 years	124	2.10	1.26	
	More than 7 years	32	2.41	1.27	
C3S9) (*)I think women are concerned about using computers and other technologies.	Less than 2 years	82	2.94	1.27	.000
	2-7 years	124	2.58	1.22	
	More than 7 years	32	1.84	1.11	

For the statements having significant difference between groups, post-hoc tests were conducted in order to see the source of the difference. The results of post-hoc tests are presented in Table 35.

Table 35 Post-hoc Test Results for Challenge 3 according to the Experience of Participants

Item	Post-Hoc Test	Experience (I) x Experience (J)	Sig.
C3S1) (*) I believe that women do not prefer undergraduate education programs such as computer/software engineer.	Gabriel's	Less than 2 years & 2-7 years	,014
		Less than 2 years & More than 7 years	,067
		2-7 years & More than 7 years	,984
C3S2) (*) I believe that women are hesitant to enter the IT industry.	Gabriel's	Less than 2 years & 2-7 years	,167
		Less than 2 years & More than 7 years	,006
		2-7 years & More than 7 years	,152
C3S9) (*) I think women are concerned about using computers and other technologies.	Gabriel's	Less than 2 years & 2-7 years	,115
		Less than 2 years & More than 7 years	,000
		2-7 years & More than 7 years	,005

Participants having experience less than 2 years and between 2-7 years remain neutral about the statement women's not preferring undergraduate education programs such as SE, while the group having experience more than 7 years disagreed. Interestingly, the highest score for this statement belongs to participants having least experience level, which may be categorized as "juniors". Since they were graduated later than other groups, they may know the situation at the institutions more than the others.

For the statement C3S2, "I believe that women are hesitant to enter the IT industry", the groups less than 2 years of experience and between 2-7 years seems uncertain about it while group having experience more than 7 years disagree about it. Similar to the above interpretation, participants having less experience may know the timely trends among professionals and choose neutrality for the women's preference of IT sector.

As expected, as the experience level increases, participants given scores for the statements regarding to their knowledge related to their job increases.

And the final statement having significant difference between groups is about women's concern about using computers and other technologies. The thoughts of the groups are changing from strong disagreement to a neutrality. Therefore, it can be referred that according to the participants, women do not have a concern about using computers and other technologies.

4.3.3.7.Working Style

The scores given to the statements together with the grouping of working style can be seen in Figure 31. Homogeneity of variances were checked and for items having not equal variances, Welch test was applied instead of ANOVA. For others, ANOVA was conducted in order to see if there exist any significant difference between experience level categorized. Moreover, for statements that are violating normality assumption, Kruskal Wallis test was applied. According to the test results, shown in Table 36, there exist no significant difference between groups; whether participants are working remote, on-site or hybrid.

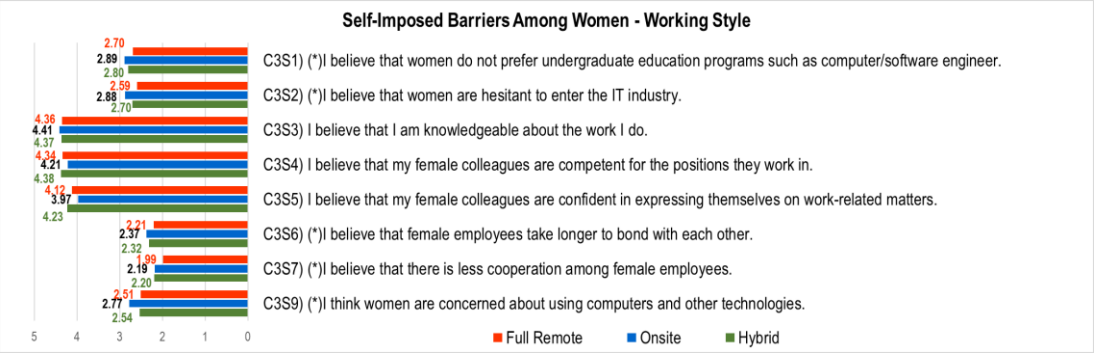

Figure 31 Average Scores of Challenge 3 According to Working Style of ParCticipants

Table 36 t-test Results for Challenge 3 According to Working Style of Participants

Item	Working Style	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C3S1) (*)I believe that women do not prefer undergraduate education programs such as computer/software engineer.	Hybrid	87	2.80	1.33	.628
	Onsite	75	2.89	1.21	
	Full Remote	76	2.70	1.19	
C3S2) (*)I believe that women are hesitant to enter the IT industry.	Hybrid	87	2.70	1.34	Welch, .326
	Onsite	75	2.88	1.13	
	Full Remote	76	2.59	1.27	
C3S3) I believe that I am knowledgeable about the work I do.	Hybrid	87	4.37	0.70	K. Wallis, .963
	Onsite	75	4.41	0.64	
	Full Remote	76	4.36	0.78	
C3S4) I believe that my female colleagues are competent for the positions they work in.	Hybrid	87	4.38	0.78	K. Wallis, .684
	Onsite	75	4.21	0.98	
	Full Remote	76	4.34	0.81	
C3S5) I believe that my female colleagues are confident in expressing themselves on work-related matters.	Hybrid	87	4.23	0.90	.231
	Onsite	75	3.97	1.07	
	Full Remote	76	4.12	0.88	
C3S6) (*)I believe that female employees take longer to bond with each other.	Hybrid	87	2.32	1.32	.734
	Onsite	75	2.37	1.28	
	Full Remote	76	2.21	1.31	
C3S7) (*)I believe that there is less cooperation among female employees.	Hybrid	87	2.20	1.25	.470
	Onsite	75	2.19	1.12	
	Full Remote	76	1.99	1.21	
C3S9) (*)I think women are concerned about using computers and other technologies.	Hybrid	87	2.54	1.32	.379
	Onsite	75	2.77	1.18	
	Full Remote	76	2.51	1.29	

4.3.4. Challenge 4: Ensuring Work-Life Balance

4.3.4.1. Gender

This challenge includes statements aimed to reveal that if participants having difficulties while trying to find a balance between work and their personal lives. The scores given to the statements categorized by gender can be seen in Figure 32.

The difference between scores given to the statements among males and females was analyzed using t-test, results can be seen in Table 37.

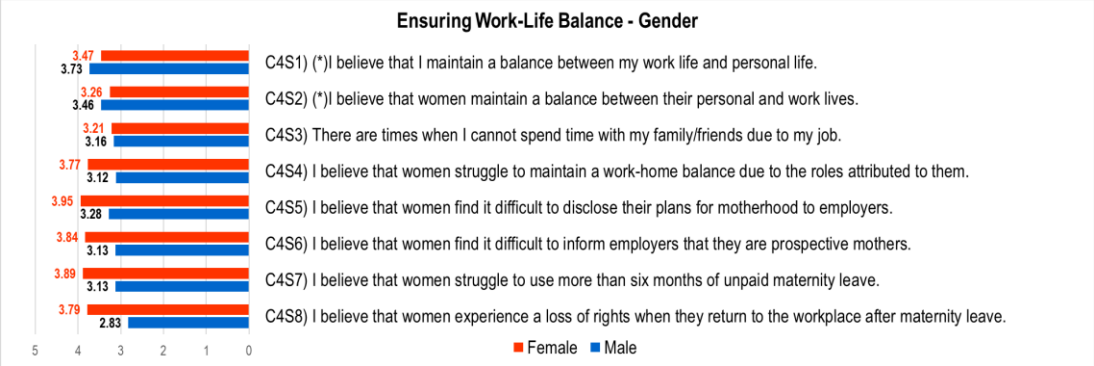

Figure 32 Average Scores of Challenge 4 According to Gender

Table 37 t-test Results for Challenge 3 According to Gender

Item	Gender	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C4S1) (*)I believe that I maintain a balance between my work life and personal life.	Female	146	3.47	1.24	.112
	Male	92	3.73	1.22	
C4S2) (*)I believe that women maintain a balance between their personal and work lives.	Female	146	3.26	1.10	.173
	Male	92	3.46	1.05	
C4S3) There are times when I cannot spend time with my family/friends due to my job.	Female	146	3.21	1.28	.774
	Male	92	3.16	1.30	
C4S4) I believe that women struggle to maintain a work-home balance due to the roles attributed to them.	Female	146	3.77	1.09	.000
	Male	92	3.12	1.24	
C4S5) I believe that women find it difficult to disclose their plans for motherhood to employers.	Female	146	3.95	1.14	.000
	Male	92	3.28	1.39	
C4S6) I believe that women find it difficult to inform employers that they are prospective mothers.	Female	146	3.84	1.14	.000
	Male	92	3.13	1.42	
C4S7) I believe that women struggle to use more than six months of unpaid maternity leave.	Female	146	3.89	1.14	.000
	Male	92	3.13	1.39	
C4S8) I believe that women experience a loss of rights when they return to the workplace after maternity leave.	Female	146	3.79	1.10	.000
	Male	92	2.83	1.22	

The t-test results for this section reveal that male workers are neutral about the challenges that female workers face in balancing work and home life due to the roles that society imposes on them. In contrast, female workers largely agree with this feeling. When it comes to disclosing plans for pregnancy or an existing pregnancy to employers, a significant number of women report discomfort. Interestingly, while males generally remain neutral on the difficulty female colleagues might experience when discussing pregnancy matters with their employers. This highlights the pressure many female workers feel concerning personal choices, such as deciding to become parents. The male perspective's neutrality suggests they do not perceive this as a significant challenge and shows that they do not see this as a pressure or hard thing to say.

Furthermore, female workers commonly report challenges with taking more than six months of unpaid maternity leave and face a loss of rights upon returning to work post-maternity. Males, on the other hand, are ambivalent about these concerns. This is also an important indicator of the pressure that female workers feel on themselves about their personal decisions, like giving a decision of being a parent. The t-test results indicate differences in the perceptions of these issues between male and female respondents.

4.3.4.2.Age

The scores given to the statements were analyzed in terms of grouped ages; "30 and less" and "more than 30". The comparison of scores attributed to statements categorized by age can be seen in Figure 33. To be able to see those differences between age groups were significant or not, the t-test was applied (see Table 38).

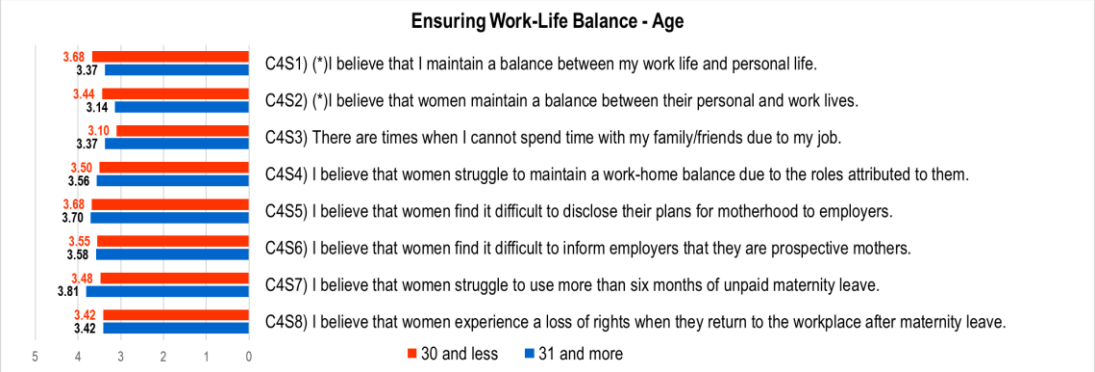

Figure 33 Average Scores of Challenge 4 According to Age

Table 38 t-test Results for Challenge 4 According to Age

Item	Age	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C4S1) (*)I believe that I maintain a balance between my work life and personal life.	30 years and less	154	3.68	1.17	.081
	more than 30 years	84	3.37	1.34	
C4S2) (*)I believe that women maintain a balance between their personal and work lives.	30 years and less	146	3.44	1.03	.041
	more than 30 years	92	3.14	1.15	
C4S3) There are times when I cannot spend time with my family/friends due to my job.	30 years and less	146	3.10	1.29	.119
	more than 30 years	92	3.37	1.27	
C4S4) I believe that women struggle to maintain a work-home balance due to the roles attributed to them.	30 years and less	146	3.50	1.21	.714
	more than 30 years	92	3.56	1.17	
C4S5) I believe that women find it difficult to disclose their plans for motherhood to employers.	30 years and less	146	3.68	1.22	.906
	more than 30 years	92	3.70	1.39	
C4S6) I believe that women find it difficult to inform employers that they are prospective mothers.	30 years and less	146	3.55	1.25	.859
	more than 30 years	92	3.58	1.40	
C4S7) I believe that women struggle to use more than six months of unpaid maternity leave.	30 years and less	146	3.48	1.30	.061
	more than 30 years	92	3.81	1.27	
C4S8) I believe that women experience a loss of rights when they return to the workplace after maternity leave.	30 years and less	146	3.42	1.21	.995
	more than 30 years	92	3.42	1.30	

According to the t-test results, that can be seen in Table 38, there exist one statement having significant difference between groups; which is "I believe that women maintain a

balance between their personal and work lives." Respondents aging 30 and less agree that women can maintain balance, while the older group stays uncertain about that. Differences in opinions may stem from the fact that younger participants may have fewer responsibilities compared to older participants; they might have assigned scores to the statements by observing women in their environment, who are of similar age, and believing that balance can be maintained. On the other hand, the probability of participants aged 31 and above having a child or being married is higher than that of the younger group. Therefore, the older group may have responded to the statements considering factors such as being married or having children.

4.3.4.3. Marital Status

In terms of marital status while analyzing the given responses to the challenges related to maintaining work-life balance, the scores given categorized by marital status can be seen in Figure 34. According to the t-test results, which can be seen in Table 39, married participants tend to agree with the challenges women face in maintaining a work – personal life balance, while single participants are uncertain about it. Similarly, married respondents agree that women are struggling to use more than six months of unpaid maternity leave while single ones are uncertain about it. The same pattern also being showed for the statement about women's loss of rights when they return to the work after maternity leave.

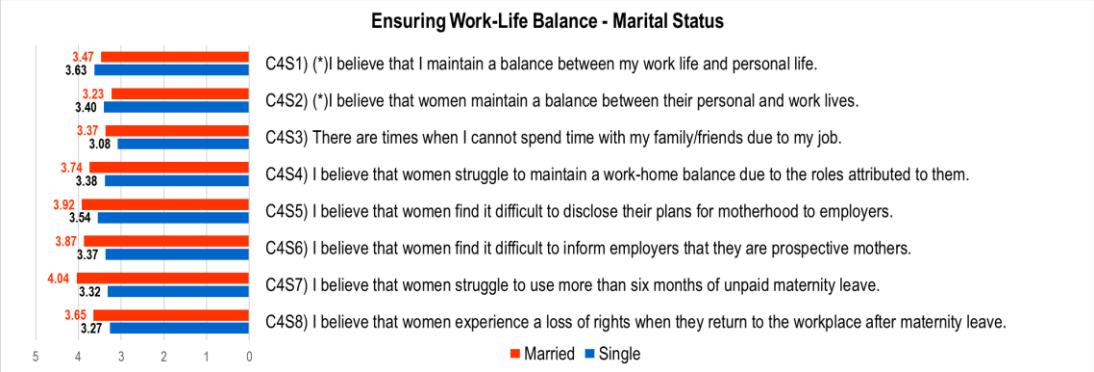

Figure 34 Average Scores of Challenge 4 According to Marital Status

Table 39 t-test Results for Challenge 4 According to Marital Status

Item	Marital Status	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C4S1) (*)I believe that I maintain a balance between my work life and personal life.	Single	146	3.63	1.19	.325
	Married	92	3.47	1.32	
C4S2) (*)I believe that women maintain a balance between their personal and work lives.	Single	146	3.40	1.03	.222
	Married	92	3.23	1.16	
C4S3) There are times when I cannot spend time with my family/friends due to my job.	Single	146	3.08	1.32	.093
	Married	92	3.37	1.22	
C4S4) I believe that women struggle to maintain a work-home balance due to the roles attributed to them.	Single	146	3.38	1.23	.022
	Married	92	3.74	1.11	
C4S5) I believe that women find it difficult to disclose their plans for motherhood to employers.	Single	146	3.54	1.28	.024
	Married	92	3.92	1.25	
C4S6) I believe that women find it difficult to inform employers that they are prospective mothers.	Single	146	3.37	1.30	.004
	Married	92	3.87	1.24	
C4S7) I believe that women struggle to use more than six months of unpaid maternity leave.	Single	146	3.32	1.28	.000
	Married	92	4.04	1.19	
C4S8) I believe that women experience a loss of rights when they return to the workplace after maternity leave.	Single	146	3.27	1.22	.019
	Married	92	3.65	1.24	

4.3.4.4. Parental Status

Parental status is being analyzed in terms of ensuring work-life balance. According to the scores given and t-test conducted to see if there exist any significant difference between respondents who has a kid or not, only one statement has significant difference. The scores given can be seen in Figure 35 and t-test results is presented in Table 40. Not surprisingly, parents are agreeing that there exists a difficulty that women encounter when they want to use more than six months of maternity leave, where non-parents are also agreeing but the level of difference is significant.

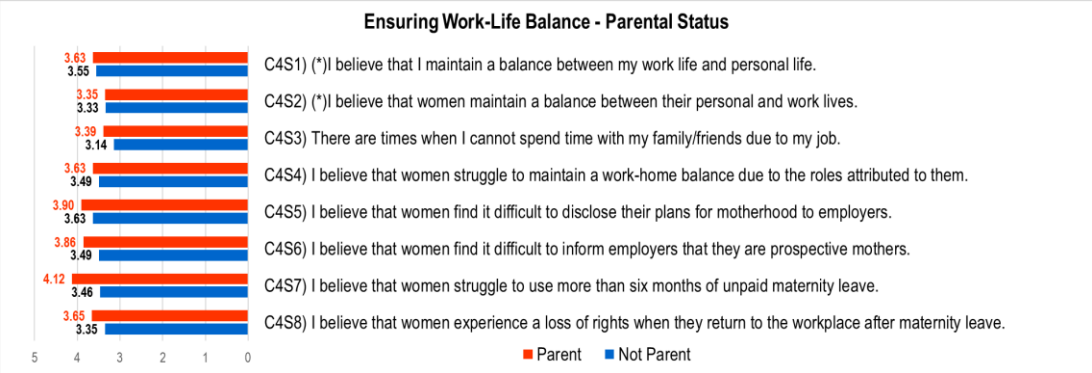

Figure 35 Average Scores of Challenge 4 According to Parental Status

Table 40 t-test Results for Challenge 4 According to Parental Status

Item	Parental Status	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C4S1) (*)I believe that I maintain a balance between my work life and personal life.	Parent	49	3.63	1.32	.679
	Not Parent	189	3.55	1.22	
C4S2) (*)I believe that women maintain a balance between their personal and work lives.	Parent	49	3.35	1.16	.938
	Not Parent	189	3.33	1.06	
C4S3) There are times when I cannot spend time with my family/friends due to my job.	Parent	49	3.39	1.10	.186
	Not Parent	189	3.14	1.33	
C4S4) I believe that women struggle to maintain a work-home balance due to the roles attributed to them.	Parent	49	3.63	1.22	.463
	Not Parent	189	3.49	1.19	
C4S5) I believe that women find it difficult to disclose their plans for motherhood to employers.	Parent	49	3.90	1.36	.201
	Not Parent	189	3.63	1.26	
C4S6) I believe that women find it difficult to inform employers that they are prospective mothers.	Parent	49	3.86	1.31	.075
	Not Parent	189	3.49	1.29	
C4S7) I believe that women struggle to use more than six months of unpaid maternity leave.	Parent	49	4.12	1.32	.001
	Not Parent	189	3.46	1.26	
C4S8) I believe that women experience a loss of rights when they return to the workplace after maternity leave.	Parent	49	3.65	1.30	.133
	Not Parent	189	3.35	1.22	

4.3.4.5. Education Level

Education level of respondents is also another factor that is analyzed. The scores given to the statements categorized by education level of the respondents are presented in Figure 36.

In order to see if the answers given changing according to the education status, t-test was conducted. According to the t-test results, the scores do not change significantly whether the respondent is having Bachelor's Degree or higher. The t-test results can be seen in Table 41.

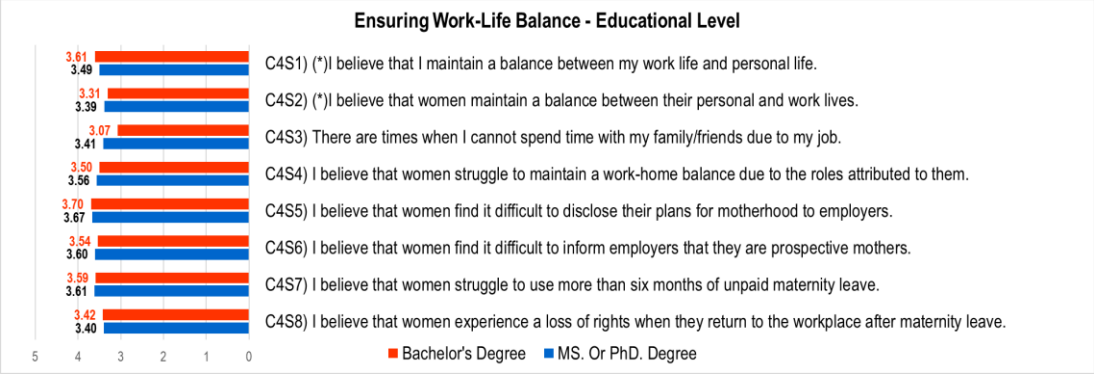

Figure 36 Average Scores of Challenge 4 According to Educational Level

Table 41 t-test Results for Challenge 4 According to Educational Level

Item	Educational Level	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C4S1) (*)I believe that I maintain a balance between my work life and personal life.	Bachelor's Degree	153	3.61	1.21	.499
	MS. Or PhD. Degree	85	3.49	1.30	
C4S2) (*)I believe that women maintain a balance between their personal and work lives.	Bachelor's Degree	153	3.31	1.07	.581
	MS. Or PhD. Degree	85	3.39	1.11	
C4S3) There are times when I cannot spend time with my family/friends due to my job.	Bachelor's Degree	153	3.07	1.29	.050
	MS. Or PhD. Degree	85	3.41	1.25	
C4S4) I believe that women struggle to maintain a work-home balance due to the roles attributed to them.	Bachelor's Degree	153	3.50	1.17	.675
	MS. Or PhD. Degree	85	3.56	1.24	
C4S5) I believe that women find it difficult to disclose their plans for motherhood to employers.	Bachelor's Degree	153	3.70	1.26	.869
	MS. Or PhD. Degree	85	3.67	1.32	
C4S6) I believe that women find it difficult to inform employers that they are prospective mothers.	Bachelor's Degree	153	3.54	1.32	.744
	MS. Or PhD. Degree	85	3.60	1.26	
C4S7) I believe that women struggle to use more than six months of unpaid maternity leave.	Bachelor's Degree	153	3.59	1.27	.893
	MS. Or PhD. Degree	85	3.61	1.35	
C4S8) I believe that women experience a loss of rights when they return to the workplace after maternity leave.	Bachelor's Degree	153	3.42	1.22	.883
	MS. Or PhD. Degree	85	3.40	1.27	

4.3.4.6. Years of Experience in the Same Role

Experience level can be another factor that may affect the scores given to the statement aiming to foster challenges on ensuring work-life balance. The scores given can be seen in Figure 37. Both ANOVA and Welch tests were conducted since some of the statements violates homogeneity of variances assumption. The results of those tests are presented in Table 42.

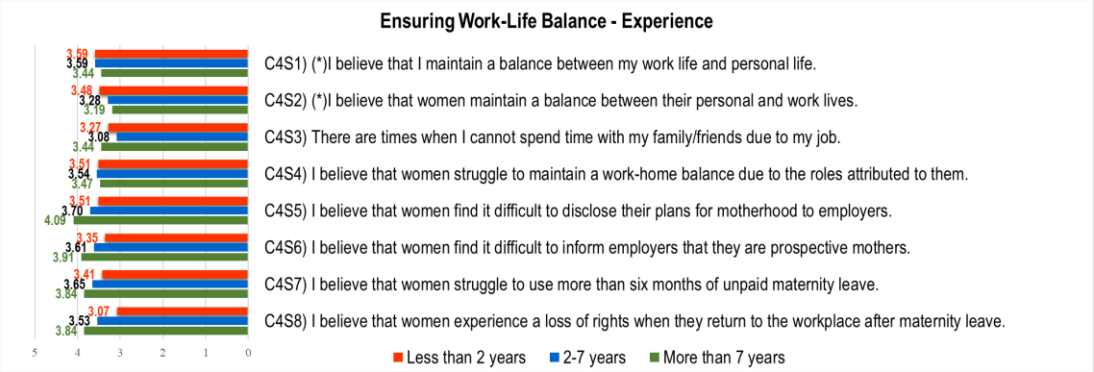

Figure 37 Average Scores of Challenge 4 According to Experience of Participants

Table 42 t-test Results for Challenge 4 According to Experience of Participants

Item	Experience	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C4S1) (*)I believe that I maintain a balance between my work life and personal life.	Less than 2 years	82	3.59	1.30	.818
	2-7 years	124	3.59	1.19	
	More than 7 years	32	3.44	1.32	
C4S2) (*)I believe that women maintain a balance between their personal and work lives.	Less than 2 years	82	3.48	1.03	.322
	2-7 years	124	3.28	1.09	
	More than 7 years	32	3.19	1.18	
C4S3) There are times when I cannot spend time with my family/friends due to my job.	Less than 2 years	82	3.27	1.25	.304
	2-7 years	124	3.08	1.31	
	More than 7 years	32	3.44	1.27	
C4S4) I believe that women struggle to maintain a work-home balance due to the roles attributed to them.	Less than 2 years	82	3.51	1.23	.952
	2-7 years	124	3.54	1.14	
	More than 7 years	32	3.47	1.34	
C4S5) I believe that women find it difficult to disclose their plans for motherhood to employers.	Less than 2 years	82	3.51	1.35	Welch, .034
	2-7 years	124	3.70	1.29	
	More than 7 years	32	4.09	0.93	
C4S6) I believe that women find it difficult to inform employers that they are prospective mothers.	Less than 2 years	82	3.35	1.37	Welch, .082
	2-7 years	124	3.61	1.29	
	More than 7 years	32	3.91	1.09	
C4S7) I believe that women struggle to use more than six months of unpaid maternity leave.	Less than 2 years	82	3.41	1.23	Welch, .173
	2-7 years	124	3.65	1.37	
	More than 7 years	32	3.84	1.11	
C4S8) I believe that women experience a loss of rights when they return to the workplace after maternity leave.	Less than 2 years	82	3.07	1.20	.003
	2-7 years	124	3.53	1.21	
	More than 7 years	32	3.84	1.25	

For the statements having significant differences between groups, related post-hoc tests were conducted to see which groups creates the difference. The post-hoc test results can be seen in Table 43.

Table 43 Post-hoc Test Results for Challenge 4 According to the Experience of Participants

Item	Post-Hoc Test	Experience (I) x Experience (J)	Sig.
C4S5) I believe that women find it difficult to disclose their plans for motherhood to employers.	Games-Howell	Less than 2 years & 2-7 years	,578
		Less than 2 years & More than 7 years	,028
		2-7 years & More than 7 years	,133
C4S8) I believe that women experience a loss of rights when they return to the workplace after maternity leave.	Gabriel's	Less than 2 years & 2-7 years	,024
		Less than 2 years & More than 7 years	,006
		2-7 years & More than 7 years	,437

According to the findings, statement 5 and 8 have significant difference among experience levels. As experience level increases from less than 2 years to more than 7 years, agreement level of respondents increases to "agree" level for women's difficulties to disclosing plans for motherhood. The difference exists between less experienced and most experienced group. Similar pattern is also present for women's experience a loss of rights after returning to work from maternity leave Although all groups are agree with the statement, the significant difference is between less than 2 year of experience group and 2-7 years of experience group. Moreover, group of most experienced and least experienced shows a significant difference.

4.3.4.7.Working Style

Whether a participant working remotely, hybrid or on-site may have an effect on the challenges faced since the exposal level may change according to the working style of the employee. The scores given to the statements can be seen in Figure 38.

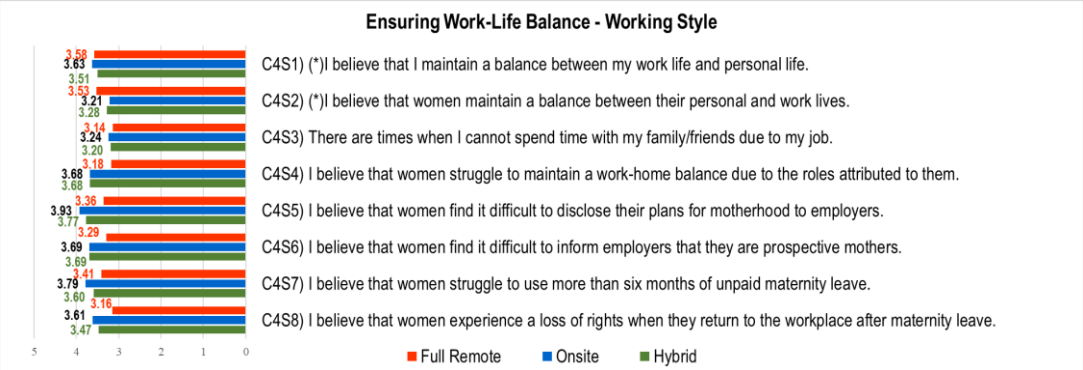

Figure 38 Average Scores of Challenge 4 According to Working Style of Participants

ANOVA was conducted to detect significant differences; results are presented in Table 44. According to the findings, significant differences were encountered in two statements; statement 4 and 5, thus, related post-hoc tests were conducted. The results were presented in Table 45.

Table 44 T-test Results for Challenge 4 According to Working Style of Participants

Item	Working Style	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C4S1) (*)I believe that I maintain a balance between my work life and personal life.	Hybrid	87	3.51	1.18	.823
	Onsite	75	3.63	1.31	
	Full Remote	76	3.58	1.25	
C4S2) (*)I believe that women maintain a balance between their personal and work lives.	Hybrid	87	3.28	1.02	.167
	Onsite	75	3.21	1.20	
	Full Remote	76	3.53	1.01	
C4S3) There are times when I cannot spend time with my family/friends due to my job.	Hybrid	87	3.20	1.22	.902
	Onsite	75	3.24	1.36	
	Full Remote	76	3.14	1.29	
C4S4) I believe that women struggle to maintain a work-home balance due to the roles attributed to them.	Hybrid	87	3.68	1.14	.011
	Onsite	75	3.68	1.16	
	Full Remote	76	3.18	1.23	
C4S5) I believe that women find it difficult to disclose their plans for motherhood to employers.	Hybrid	87	3.77	1.21	.016
	Onsite	75	3.93	1.27	
	Full Remote	76	3.36	1.32	
C4S6) I believe that women find it difficult to inform employers that they are prospective mothers.	Hybrid	87	3.69	1.23	.084
	Onsite	75	3.69	1.38	
	Full Remote	76	3.29	1.27	
C4S7) I believe that women struggle to use more than six months of unpaid maternity leave.	Hybrid	87	3.60	1.36	.199
	Onsite	75	3.79	1.31	
	Full Remote	76	3.41	1.19	
C4S8) I believe that women experience a loss of rights when they return to the workplace after maternity leave.	Hybrid	87	3.47	1.27	.068
	Onsite	75	3.61	1.28	
	Full Remote	76	3.16	1.13	

Table 45 Post-hoc Test Results for Challenge 4 According to Working Style of Participants

Item	Post-Hoc Test	Working Style (I) x Working Style (J)	Sig.
C4S4) I believe that women struggle to maintain a work-home balance due to the roles attributed to them.	Gabriel's	Hybrid & On-site	1
		Hybrid & Remote	,024
		On-site & Remote	,030
C4S5) I believe that women find it difficult to disclose their plans for motherhood to employers.	Gabriel's	Hybrid & On-site	,797
		Hybrid & Remote	,108
		On-site & Remote	,016

Remote workers are experiencing uncertainty regarding women's struggle to maintain work-life balance due to the roles attributed to them, while on-site and hybrid workers agree on this matter. The difference is existing between hybrid-remote and on-site-remote. These differences between groups may be attributed to the fact that remote workers do not lose time in traffic, wake up later than the other groups, and have more time at home, resulting in less discomfort in terms of work-life balance. Similarly, remote workers are uncertain that it is hard for women to disclose plans for motherhood to their employers while onsite and hybrid workers are agreeing that it is hard to disclose. The difference is visible between on-site and remote workers. The reason behind this difference may because remote workers do not feel attached to the company they work for; or experience negative cases about disclosing pregnancy while other groups of participants experience more things at the workplace and encounter difficulties.

4.3.5. Challenge 5: Accessibility to Technology

4.3.5.1. Gender

Accessibility of female students to technological tools, IT education or women's access to technology-oriented jobs can be limited. According to literature study conducted, some geographical areas face serious issues related to internet and computer access. The lack of access to these resources impacts people's participation in education. This, in turn, limits women's orientation to IT sector.

The survey includes items to measure the effects of this challenge. The scores given to the statements related to this challenge categorized by gender can be seen in Figure 39. In order to check if there exist significant difference according to the gender, both t-test and Mann Whitney tests were conducted since 2 out of 3 statements are violating normality assumption. The results of t-test and Mann Whitney tests can be seen in Table 46.

All items under this challenge category have significant difference between gender. For all items, both genders are agreeing; meaning that if women and female students were guided to IS education, or exposed to IS through a role model, their interest and participation to this sector would increase. Interesting thing here is that, even females are strongly agreeing with the statements, but men are somewhat less in agreement with the statements.

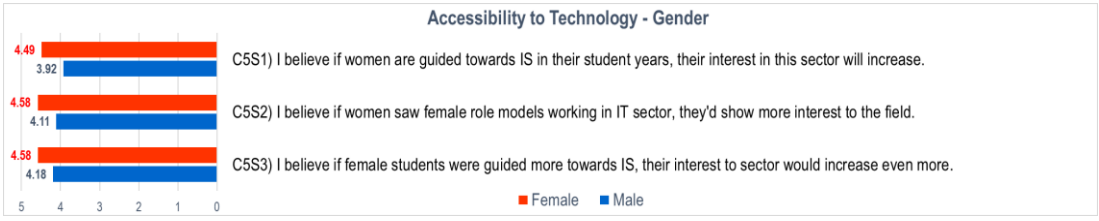

Figure 39 Average Scores of Challenge 5 According to Gender

Table 46 t-test Results for Challenge 5 According to Gender

Item	Gender	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C5S1) I believe if women are guided towards IS in their student years, their interest in this sector will increase.	Female	146	4.49	0.66	.000
	Male	92	3.92	1.03	
C5S2) I believe if women saw female role models working in IT sector, they'd show more interest to the field.	Female	146	4.58	0.70	Whitney, .000
	Male	92	4.11	1.01	
C5S3) I believe if female students were guided more towards IS, their interest to sector would increase even more.	Female	146	4.58	0.66	Whitney, .001
	Male	92	4.18	0.99	

4.3.5.2. Age

All age groups which are 30 and less and more than 30 are agree about the statements regarding the challenge of accessibility. The scores given to the statements categorized by age groups can be seen in Figure 40. To check if there exist significant differences between groups; t-test and Mann Whitney tests were conducted, since 2 out of 3 statements under this category violates normality assumption. The results are presented in Table 47.

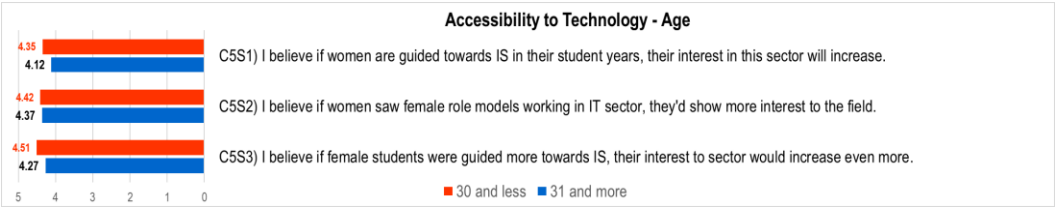

Figure 40 Average Scores of Challenge 5 According to Age

Table 47 t-test Results for Challenge 5 According to Age

Item	Age	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C5S1) I believe if women are guided towards IS in their student years, their interest in this sector will increase.	30 years and less	154	4.35	0.82	.048
	more than 30 years	84	4.12	0.92	
C5S2) I believe if women saw female role models working in IT sector, they'd show more interest to the field.	30 years and less	146	4.42	0.89	Whitney, .461
	more than 30 years	92	4.37	0.82	
C5S3) I believe if female students were guided more towards IS, their interest to sector would increase even more.	30 years and less	146	4.51	0.77	Whitney, .043
	more than 30 years	92	4.27	0.91	

According to the findings, younger group strongly believe that if women are guided towards Information Systems during their student years, their interest in this sector will

increase while older group agree with that. Similar pattern is visible for believing that if female students were guided more towards information systems, their interest in this sector would increase even more.

4.3.5.3. Marital Status

The effect of marriage to the statements regarding technology is analyzed. For all items, both group members are agreeing; meaning that if women and female students were guided to IS education, or exposed to IS through a role model, their interest and participation to this sector would increase. The scores given to the statements can be seen in Figure 41. According to the findings, there exist no significant difference between responses whether the participant is married or not. The findings together with the test applied are presented in Table 48.

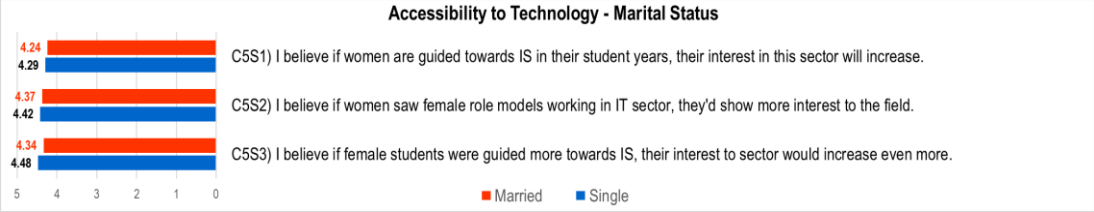

Figure 41 Average Scores of Challenge 5 According to Marital Status

Table 48 t-test Results for Challenge 5 According to Marital Status

Item	Marital Status	N	$\bar{x}$	Std. D.	Sig. (2
C5S1) I believe if women are guided towards IS in their student years, their interest in this sector will increase.	Single	146	4.29	0.91	.674
	Married	92	4.24	0.79	
C5S2) I believe if women saw female role models working in IT sector, they'd show more interest to the field.	Single	146	4.42	0.85	Whitney, .744
	Married	92	4.37	0.89	
C5S3) I believe if female students were guided more towards IS, their interest to sector would increase even more.	Single	146	4.48	0.81	Whitney, .164
	Married	92	4.34	0.86	

4.3.5.4. Parental Status

Similar to the marital status, both groups are agreeing with the statements under this category. The scores given to the statements and results of parametric and non-parametric tests can be seen in Figure 42 and Table 49, respectively. The findings show that there exists no significant difference between the scores given to the statements whether respondent is a parent or not.

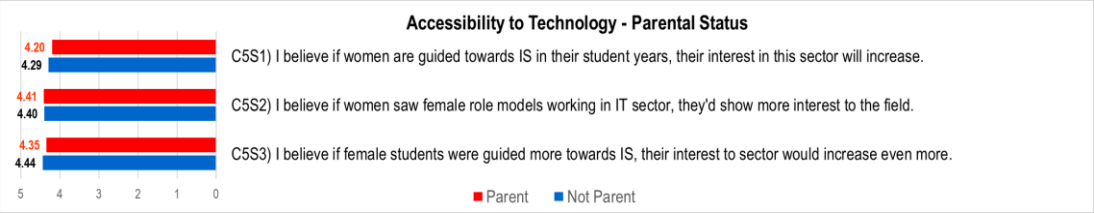

Figure 42 Average Scores of Challenge 5 According to Parental Status

Table 49 t-test Results for Challenge 5 According to Parental Status

Item	Parental Status	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C5S1) I believe if women are guided towards IS in their student years, their interest in this sector will increase.	Parent	49	4.20	0.82	.557
	Not Parent	189	4.29	0.88	
C5S2) I believe if women saw female role models working in IT sector, they'd show more interest to the field.	Parent	49	4.41	0.93	Whitney, .523
	Not Parent	189	4.40	0.85	
C5S3) I believe if female students were guided more towards IS, their interest to sector would increase even more.	Parent	49	4.35	0.86	Whitney, .496
	Not Parent	189	4.44	0.82	

4.3.5.5. Education Level

The effect of education level of the participants to the statements regarding technology is analyzed. For all items, both group members are agreeing; meaning that if women and female students were guided to IS education, or exposed to IS through a role model, their interest and participation to this sector would increase. The scores given to the statements can be seen in Figure 43. According to the findings, there exist no significant difference between responses regarding respondent's educational status. The findings together with the test applied are presented in Table 50.

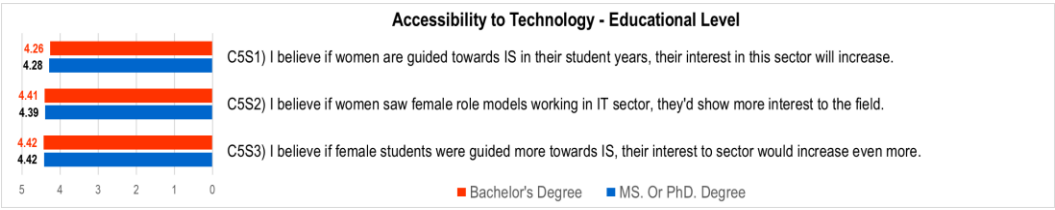

Figure 43 Average Scores of Challenge 5 According to Educational Level

Table 50 t-test Results for Challenge 5 According to Educational Level

Item	Educational Level	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C5S1) I believe if women are guided towards IS in their student years, their interest in this sector will increase.	Bachelor's Degree	153	4.26	0.88	.858
	MS. Or PhD. Degree	85	4.28	0.84	
C5S2) I believe if women saw female role models working in IT sector, they'd show more interest to the field.	Bachelor's Degree	153	4.41	0.87	Whitney, .809
	MS. Or PhD. Degree	85	4.39	0.86	
C5S3) I believe if female students were guided more towards IS, their interest to sector would increase even more.	Bachelor's Degree	153	4.42	0.85	Whitney, .765
	MS. Or PhD. Degree	85	4.42	0.79	

4.3.5.6. Years of Experience in the Same Role

Similar to the other factors mentioned in above sections, all three groups categorized by experience level are agreeing with the statements under this category. The scores given to the statements and results of ANOVA and Kruskal Wallis tests can be seen in Figure 44 and Table 51, respectively. The findings show that there exists no significant difference between the scores given to the statements regarding the experience level of the participants.

Figure 44 Average Scores of Challenge 5 According to Experience of Participants

Table 51 t-test Results for Challenge 5 According to Experience of Participants

Item	Experience	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C5S1) I believe if women are guided towards IS in their student years, their interest in this sector will increase.	Less than 2 years	82	4.195	0.949	.431
	2-7 years	124	4.339	0.795	
	More than 7 years	32	4.188	0.896	
C5S2) I believe if women saw female role models working in IT sector, they'd show more interest to the field.	Less than 2 years	82	4.366	0.910	K. Wallis, .822
	2-7 years	124	4.427	0.848	
	More than 7 years	32	4.375	0.833	
C5S3) I believe if female students were guided more towards IS, their interest to sector would increase even more.	Less than 2 years	82	4.402	0.928	K. Wallis, .557
	2-7 years	124	4.468	0.759	
	More than 7 years	32	4.313	0.821	

4.3.5.7. Working Style

The effect of working style of the participants to the statements regarding technology is analyzed. For all items, both group members are agreeing; meaning that if women and female students were guided to IS education, or exposed to IS through a role model, their interest and participation to this sector would increase. The scores given to the statements can be seen in Figure 45. According to the findings, there exist no significant difference between responses whether the respondent is working remotely, on-site or hybrid. The findings together with the test applied are presented in Table 52

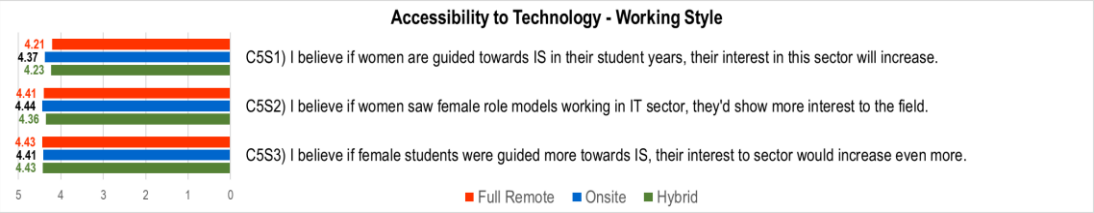

Figure 45 Average Scores of Challenge 5 According to Working Style of Participants

Table 52 t-test Results for Challenge 5 According to Working Style of Participants

Item	Working Style	N	$\bar{x}$	Std. D.	Sig. (2 tailed)
C5S1) I believe if women are guided towards IS in their student years, their interest in this sector will increase.	Hybrid	76	4.23	0.91	.446
	Onsite	75	4.37	0.78	
	Full Remote	87	4.21	0.88	
C5S2) I believe if women saw female role models working in IT sector, they'd show more interest to the field.	Hybrid	76	4.36	0.94	K. Wallis, .769
	Onsite	75	4.44	0.87	
	Full Remote	87	4.41	0.77	
C5S3) I believe if female students were guided more towards IS, their interest to sector would increase even more.	Hybrid	76	4.43	0.90	K. Wallis, .887
	Onsite	75	4.41	0.81	
	Full Remote	87	4.43	0.77	

4.4. Recommendations for the Wellbeing of the Employees

In order to answer RQ3: "*What are the recommendations for organizations to increase the wellbeing of their employees to hinder the challenges/ barriers that females encounter with?"*, it was firstly needed the existing practices in the workplaces. There were two questions in the questionnaire in order to get data from the participants regarding the applications in the companies that respondent is working for. The first question is as follows:

- What practices do you have in your workplace to ensure the work-private life balance of your employees? (if not available, you can tick "Other" and write "None")

For the first question where we aimed to get the existing practices, the answers given together with the number of participants chosen them was presented in Table 53. It was revealed that having a "Marriage Leave" is the most encountered type of leave/practice applied in the organizations of employees who attended this survey. According to the findings, the most applied practices, which are "Marriage Leave", "Breastfeeding Leave", "Health Service at the Workplace" and "Parental Leave" are the ones mandated by Turkish state laws which require employers to provide to their employees legally. Therefore, it is not a favor that employers are providing to their employees, these are the legal rights of the employees.

However, there are some interesting answers here according to the results. For example, daycare service provided to the children of employees working on company campuses. Through this service, employees can enroll their children in nearby daycares either for free or at a nominal fee. This arrangement significantly contributes to the work-life balance of employees both spiritually and financially. However, the availability of this opportunity varies depending on the size of the company facility and its financial capacity. Similarly, hairdresser/barber service, carwash service opportunities and sports complex service depend again on the size of the company facility and cannot be provided if resources are not enough.

Table 53 Frequency of practices to ensure the work-private life balance

Practices	**Frequency of practice**
Marriage Leave	203
Breastfeeding Leave	162
Health Service at The Workplace	156
Remote Working Opportunity	154
Parental Leave	153
Daycare Service for Children	52
Sports Complex Service	43
Hairdresser/Barber Service	38
Carwash Service	20
Birthday Leave	2
Flexible Working Hours	1
Holiday Gift	1
Psychological Support Service	1
Taxi Service	1
Excuse Leave	1

As it can be seen from the Table 53, frequencies of some practices are very low, which are birthday leave, flexible working hours, taxi service and excuse leave. Despite being applied rarely in some of the companies, these opportunities would affect the happiness of the employees and increase their work-life balance significantly. Moreover, unlike daycare service, hairdresser/barber service or sports complex facilities, these practices are not requiring an area or excessive amount of investments to the companies. Companies can provide an extra one day of leave for the birthdays of their companies. Flexible working hours also very beneficial for the people since sometimes people need to do some things in working hours and they need to take leave for a day just to spend 1-2 hours at a government office. If employees are having rights to work flexibly, they can start their shifts 1-2 hours late and compensate their missing hours by working 1-2 hours. Again, this would not be a burden for management but a good favor for employees.

The second to get data from the participants regarding the applications in the companies that respondent is working for to answer RQ3 is as follows:

- Are there special practices for female employees in your workplace? If so, please specify. (e.g. Lactation Room, etc.)

The results are generally partitioned as "No", "Not Sure" and "Yes". For the positive answers, the special practices existing for female employees were given as response. There exist responses categorized as "Not Sure" since some of the participants working full remote and do not know if special practices or arrangements do exist or not. Similarly, since there exist male respondents, they may do not know the arrangements specialized for women. The distribution of answers can be seen in Figure 46.

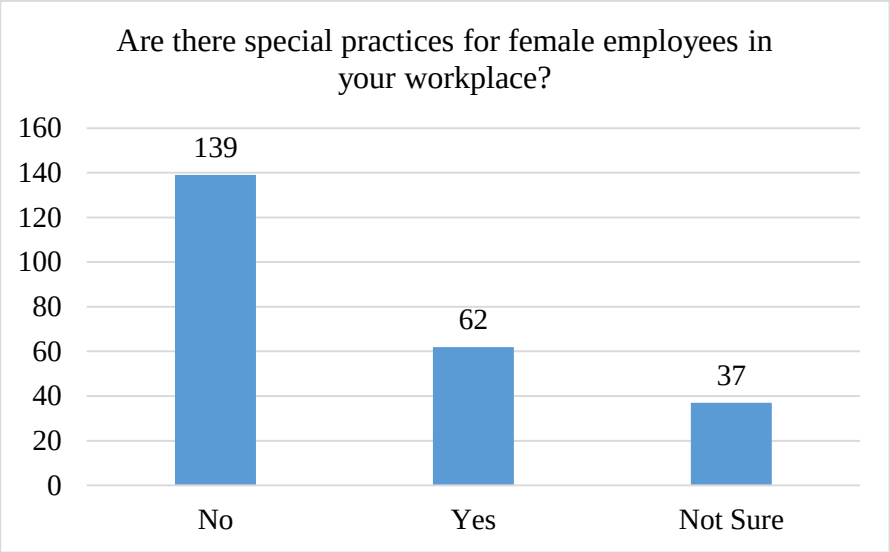

Figure 46 Distribution of Answers for special practices for female employees

For the ones having said that there exist special practices for female employees in their workplaces, the distribution of answers is presented in Table 54.

Table 54 Frequency of special practices for female employees

Practices	**Frequency of practice**
Lactation Room	35
"No Answer"	9
Menstrual Leave	3
Diaper/Tampex at the WC	3
Maternity Leave more than regulations	2
Hpv Vaccination Opportunity	2
Pilates/ Yoga Room	2
Masjid	2

Table 54 (cont.)

Gender-Seperated Sleeping/Resting Room	2
Women's Day Gift	1
Report Card Day Leave	1
In Vitro Fertilization Treatment Leave	1
Special Leaves for Mothers	1
Children Room at the Office	1
Financial Aid for Parents	1

As it can be understood from the answers, the most encountered practice for women is the "Lactation Room" at the workplaces. There exist responses having no example to the practice applying but still choosing "Yes" option to the question. According to the results, the frequencies are very low but still there exists interesting applications. The applications "Pilates/Yoga Room", "Masjid", "Children Room at the Office", "Gender-Separated Sleeping/Resting Rooms", "Report Card Day Leave", "Financial Aid for Parents" and "In Vitro Fertilization Treatment Leave" are the applications valid for both genders, not especially for females but still they are valuable. For example, "Pilates/Yoga Room" is an innovative idea for employees to spend time in their lunch or after work times for ones who are interested in sports. Having a "Masjid" in the workplace is valuable for ones who want to pray in a specialized room. "Children Room at the Office" is another application for ones who need to bring their children at the office at some times, so they can spend good time when their parents are dealing with work. "Gender-Separated Sleeping/Resting Rooms" are beneficial for both genders to relax throughout the day. "Report Card Day Leave" is a type of a thoughtful leave given to both gendered parents in order for them to be together with their children in their important days. "Financial Aid for Parents" is also another type of aid that companies granting to parents. "In Vitro Fertilization Treatment Leave" is for the ones who are trying to be parents and need to go regular treatments but can be conceivable as "private" according to some group of people, but still valuable in terms of employee.

Among existing applications are valid only for females, which are "Menstrual Leave", "Special Leaves for Mothers", "Diaper/Tampex at the WC", "Maternity Leave more than regulations", "Hpv Vaccination Opportunity" and "Women's Day Gift".

Menstrual leave application is very popular especially for the last 2 years both in Türkiye and throughout world and it is actually a very controversial issue. According to a study featured on CNN [58] and conducted on over 30.000 women, menstrual pain leads to a loss of productivity for nine days per year. Although Spain is one of the leading European countries in the world that puts into action this application to the women workers in the workplaces [59], the other countries having this application is Japan, The Filipins, India and France. There are some companies applying menstrual leave in Türkiye, but the number is less. It is a controversial issue because most of the people believe that it is unfair for male workers, and it creates imbalance between male and female workers' rights at

the workplaces. On the other hand, it is a biology that creates a difference between two genders, women do not opt for being on a period. Moreover, according to some group of people, it creates violation of privacy. A female's manager and responsible HR personnel who are dealing with leaves of employees would know the female employee's reasons when they want to use their menstrual leave and some women do not want to disclose it to their managers or HR responsible. Although the issue is sensitive for some people, these are the facts of life.

As a recommendation, companies should give menstrual leave to the female employees, it's their own decision to use it or not. Moreover, in order not to create imbalance between males and females, the same number of leave right may be added to the male employee's annual leave.

Actually, it is not clear what was meant about "Special Leaves for Mothers" if it is not including breastfeeding leave or maternity leave, but it is still valuable that companies granting such kind of special leaves.

Providing Diaper/Tampex at the WC is another application for females, it is useful, but it is generally for commercial purposes since there exist companies for that vending machines and there is an agreement between those two companies who are providing the machines and who are buying the service.

Using maternity leave more than regulations is another practice. It is usually depending on the choice of the employee to use more than regulations, but some companies give that option to use more than the regulations, but it comes with its cons, because companies generally categorize that extra maternity leave as "unpaid leave". Therefore, it cannot be thought as a "favor" that companies are granting.

HPV vaccination is a type of vaccine that costs more than the regular vaccines and many of the private health insurances do not cover that. Therefore, providing this opportunity to their female employees is a goodwill gesture, and it should become widespread in other companies, too.

As mentioned before, in order to answer RQ3: "*What are the recommendations for organizations to increase the wellbeing of their employees to hinder the challenges/ barriers that females encounter with?"*, the existing applications are gathered at first from the respondents and they are analyzed together with their advantages and disadvantages.

According to the findings, the number of applications existing in the companies that participants are working for are not very common and various. In order for companies to increase the well-being of their employees, the recommendations are given; they can grant menstrual leave for females, special leaves and financial aids for employees who are actually parents, they can adopt flexible shift practices so that employees can handle with their special issues to deal in daytime without losing their annual leaves.

Not only in terms of increasing well-being of existing employees, but companies should also adopt some applications to hinder the possible challenges that females already encountering or will encounter. For example, in order to balance the number of males and females, they can priorities females in hiring processes if there exist a huge imbalance between the genders, so that they can increase the women's participation rate and this will also help their countries social and political well-beings. There may be some governmental regulations to the companies make them balance the number of both genders.

In order to encourage more females, especially young female students, they can initiate campaigns that introducing IT to the students. In international companies such as Microsoft, Google and Mozilla, they implemented initiations to reduce gender gap and provide better working conditions free from discrimination and bias; Microsoft's Global Diversity and Inclusion program, Google's Diversity campaign and Mozilla's Diversity and Inclusion Strategy are the examples of those [31].

There exist companies also in Türkiye organizing such kind of events and initiations; for example, Vodafone's "Vodafone Yarını Kodlayanlar" project, they provided training about online coding for 30 female students [60]. Some companies are also collaborating with government, within the scope of the cooperation protocol signed between the Reader Technology Industry and Türkiye Ministry of National Education Vocational and Technical Education General Directorate, they announced that it has reached 2680 female students studying in vocational and technical Anatolian high schools in its first year with online training sessions committed to reaching 2500 students, the project named as "Girls Do Code with Reeder" [61]. Similarly, one of the leading R&D group company of Türkiye, Arçelik A.Ş. is initiated "GirlCode" platform aiming to prepare girls for the digitalized world and break gender biases in career choices. Within this project, they hosted female students at their different workplaces and conducted projects together [-62].

Every developed company having enough resources, or within their own budget, should initiate such kinds of programs with the aim of developing both male and female students, but especially girls, because companies are playing important role in providing technology education, especially those living in disadvantaged areas.

CHAPTER 5

DISCUSSION

This thesis study aims to investigate the challenges that female IT employees encounter in the IT industry in Türkiye and investigate IT worker's perspectives on those challenges. Moreover, how the participants' opinions varied based on the demographic factors such as gender, marital status, parental status, and work-setup, such as working in a remote, hybrid or on-site style was also investigated. Based on the findings of the survey conducted in the scope of this thesis, recommendations to the organizations to overcome those challenges are proposed.

The first research question explored the challenges that women encounter in their career paths in the IT sector in Türkiye. Since those possible challenges may differ according to some demographics, such as respondent's gender, age, marital and parental status, and working setup, the effect of those demographics on the challenges were examined through second research question. Finally, the third research question aimed to explore the existing applications in the organizations in order to increase the wellbeing of employees and accordingly, to recommend applications to overcome those barriers.

The situation in IT field in terms of gender gap is a commonly encountered topic. There exist many research and papers that are addressed in both in IEEE and ACM libraries in different countries belonging different cultures. The differences in behaviors according to the gender are explored in different perspectives; like hiring policies, positioning less technical roles for women, having fewer female students in IT related education fields, etc. For example, Wang and Redmiles [17] reported that gender bias clearly exists in hiring decisions of the companies. In parallel with Wang and Redmiles, Ben [18] mentioned in his study that managers are locating women to the positions according to the social interaction level of the position although they are capable of doing tasks related to software engineering and having education about the field. The findings of our study do not conform with them since the participants do not agree with the statement that there are not enough opportunities given to females for technical positions in hiring processes.

Not only in hiring or positioning, but there also exist gender gap in salary policies in the companies. Kim [63] presented in his study that there exists workplace gender discrimination since his findings show that females are less likely to get promoted and need to prove themselves more than male counterparts to win a promotion. Similarly, Michelmore and Sassler [64] presented a study to explain the gender wage gap in STEM and they reported that there exists a persistent gap in the wages of males and females in computer science field according to study's results and they correlate a reason for this wage gap to be the decreasing proportion of females on colleges in computer science. In

line with our findings, female participants agree more than male respondents that male employees often receive higher performance scores in their companies.

Within the light of the existing studies [12, 51], possible items to uncover challenges that are mentioned in previous studies are created and a survey was constructed. For each challenge category, answers given to the survey items were statistically analyzed. According to the findings, for challenge category one, "Discrimination from Male Dominated Industry", male and female respondents' answers varied in our study but any of them do not draw a certain conclusion that there exists a discrimination from male domination.

As a general outcome of this category, according to the result of our study, female respondents think more than males that females encountering discrimination through team collaborations, value of their opinions or males raising voices, but they do not score this in "agreement" level. The scores showing their opinions averaged in "neutrality" level, which means they neither agree nor disagree that males showing them discrimination.

According to the results of our study, both genders are disagreed about there is a decrease in the number of female employees joining the company over time, but females believe it more than male do and this pattern is also same for the statement about the hiring process; not enough opportunities given to women in technical positions. For the statement about witnessing mobbing towards female employees; both genders are negative about this; meaning that they have not witnessed such kind of a mobbing towards female. Though, the difference is significant, the average score of females are more than males.

As participant's experience in the same role increases, their thought about male employees receives more promotion moves from negative to neutral. Similarly, as participant's experience in the same role increases, he/she believes more that the challenges they faced in the industry are due to male employees, but still all groups are disagreed about it.

Contrary to our expectations, female employees did not attribute the challenges they face in the industry solely to male colleagues. While female participants acknowledged the higher number of male managers, they did not necessarily correlate their industry challenges directly to this male predominance. This is coherent with the results of Hyrynsalmi's findings [15], she reported in her study that women are underrepresented in the field, but respondents found male-dominated industry sometimes challenging because there exist other factors effecting females more than male dominated industry solely.

For challenge category two, "Difficulties in Advancing Managerial Roles", a shared viewpoint among both male and female participants is that female colleagues are perceived as less likely to attain managerial positions in our findings. In comparison to men, female respondents tend to perceive more strongly than their male counterparts that men within their companies have a greater likelihood of ascending to managerial roles. Expanding on this, female participants concur more frequently than male respondents that male employees frequently receive higher performance evaluations within their

companies. These findings underscore the challenges faced by women in IT in progressing to managerial positions, a sentiment shared by male employees as well. For the statement "I believe that male employees at the company I work for receive higher performance ratings/bonuses.", participants with over 12 years of experience tend to hold a neutral stance on the issue, whereas those with less experience tend to disagree. As experience levels increase, participants' opinions transition from disagreement to uncertainty regarding the notion of males receiving higher performance ratings. This shift could stem from individuals with longer tenures in their companies having greater exposure to instances of performance evaluations and outcomes, allowing them to form more nuanced perspectives. It's notable that only participants working on-site tend to agree that male employees have a greater likelihood of advancing to managerial positions in their company, whereas those with hybrid or remote arrangements are more neutral on the matter, with significant differences in scores between the groups. Additionally, while participants in remote or hybrid roles tend to disagree that male employees receive higher performance ratings or bonuses, those working on-site are more neutral about it. This discrepancy could be attributed to the limited opportunity for remote and hybrid employees to observe workplace dynamics and changes compared to their on-site counterparts. They may not express agreement with such challenges because they lack personal experience with them. According to the Tekeli and Baş's literature review [7] including many studies throughout the world investigating women 's place in IT, it was accepted as a fact that female employees are much less exist in managerial positions, this is in line with our survey results that females are seen less likely to become managers according to the respondents, from both male's and female's perspectives.

"Self-Imposed Barriers among Women" was the third category of challenge. The expectation was women encounter with own competency problems and actually, our survey results confirm that. While both genders express neutrality regarding women's interest in SE education, male respondents more often perceive that women are less inclined to pursue SE-related programs compared to female respondents. Interestingly, despite acknowledging their own expertise and competence in the workplace, female participants remain neutral about women's eagerness to enter the IT sector. In contrast, male participants do not perceive this hesitancy among women. These differences highlight the potential existence of internal barriers that women may encounter. These findings are parallel with the Michie and Nelson's findings [33], they underscore the contrast in confidence levels regarding computing abilities between female and male respondents in their study. They raise concerns regarding the potentially obstructive nature of male perceptions toward female technical competencies, which frequently tend to be lower, especially within an industry predominantly dominated by men. Similarly, in Strachan *et. al.* 's study [65] in which they share the experiences of female IT professionals, interviewed female leaders highly recommend women to be aware of self-bias in order to overcome those, as it is crucial to reduce them by firstly recognizing them.

On the other hand, the age group over 30 disagrees with the notion that women are hesitant to enter the IT sector, whereas the other age group appears to be neutral on this topic. Similarly, the older age group believes that women are not apprehensive about utilizing

computers and other technologies, while the younger age group seems uncertain about this. Hence, it appears that in terms of age, it's not straightforward to conclude that women have self-imposed barriers according to our findings.

The fourth challenge category was "Ensuring Work-Life Balance". In nearly all societies, there exist distinctions between the roles typically assigned to women and those typically assigned to men. These societal expectations often link women to tasks like housework, cooking, and childcare, while associating men with more demanding work and providing for the household. Viewing this issue from the perspective of women reveals the challenges and contradictions they face when expected to juggle such responsibilities while also pursuing a busy professional life. These imbalances and contradictions between work and personal life also extend to the IT sector, which is often perceived as more flexible than other industries. According to the results of the survey, it is a clear fact that females are struggling to maintain a balance between personal and professional lives due to the roles attributed to them. On the other hand, male workers are neutral about this. This creates a significant contrast between two gender's perspectives. Similarly, females agree that it is hard for them to disclose their plans for being a mother to their employers. This underscores the pressure experienced by numerous female employees regarding personal decisions, such as opting to start a family. The neutral stance from the male perspective indicates they don't view this as a major challenge and reflects their perception that it's not a source of pressure or difficulty to discuss such matters. Our findings again in line with the studies of Ahuja [36], Way [37] and Armstrong *et. al*. [38] since they emphasize that the role of work-family conflict as a significant source of stress for women in IT since they correlate the challenges on social and structural factors and report that there exists pressure for females to balance work and personal life.

Moreover, female employees frequently cite difficulties associated with taking unpaid maternity leave lasting longer than six months and encounter rights loss upon returning to work following maternity leave, in our findings. In contrast, males show ambivalence towards these issues. This also serves as a significant indication of the pressure female workers experience regarding their personal decisions, such as the choice to become parents. Similar patterns are visible in terms of marriage status. Married participants tend to concur with challenges women encounter in balancing work and personal life, whereas single participants' express uncertainty about it. Similarly, married respondents agree that women face difficulties in taking more than six months of unpaid maternity leave, while single individuals are uncertain about this. The same trend is also evident in the statement concerning women's loss of rights upon returning to work after maternity leave. Remote workers express uncertainty about women's struggle to maintain a work-life balance due to the roles assigned to them, whereas on-site and hybrid workers agree on this issue. This disparity between groups may stem from the fact that remote workers avoid commuting, wake up later than other groups, and have more time at home, resulting in less discomfort in terms of work-life balance.

Similarly, remote workers are unsure about the difficulty women face in disclosing plans for motherhood to their employers, while on-site and hybrid workers agree that it is challenging. This variance may be attributed to remote workers feeling less connected to

their employer or having fewer negative experiences related to disclosing pregnancy, whereas other groups of participants have more workplace interactions and encounter difficulties. A study conducted by Way [37] has the similar findings, as per the results, nine out of ten participants indicated experiencing pressure to manage their work and personal lives due to the sector's demand to be always available and to work long hours. Particularly after becoming parents, participants mentioned feeling that their job demands were incompatible with their personal life needs, prompting them to make decisions regarding their work hours or even contemplate changing careers. Similar to Way, Ragins *et. al*. [42] also reported that IT sector is forcing employees to maintain a work-family balance. In parallel with Way and Ragin's studies, according to Trinkenreich *et. al.* [-66] 's research, in which they conducted an empirical research on the difficulties faced by women in IT they stated that it is really difficult for women to achieve work-life balance, and that the respondents feel stressed, especially when they work for long periods of time, thinking about their responsibilities for their children at home, and this situation harms their psychological health. Therefore, it can easily be said that striving to balance work and family life is a challenge for females, although males do not think like that.

For the last challenge, which is "Accessibility to Technology", the category encompasses situations prevalent in countries with restricted internet access, limited computer availability, or a general lack of technology infrastructure. Additionally, it encompasses women who refrain from participating in the IT sector due to limited exposure or influence, such as the absence of role models, or simply because they are unaware of suitable opportunities within the field. According to the findings of our survey, both genders are agreeing that if women and female students were guided to IS education, or exposed to IS through a role model, their interest and participation to this sector would increase. What is interesting is that although women strongly agreed with these statements, men were less inclined to agree with them; So, this could roughly mean that men are saying that even if women were more exposed to IT, they wouldn't be as interested in the field. For other demographics factor, the opinions do not vary among groups. Accessibility is a real problem that other researchers in the field also focused on and reported similar results like our study. Acilar *et. al.* [44] draw attention to digital gender divide in their paper in 2021. They highlight that despite the global increase in Internet usage among both genders, many women in various regions still encounter significant obstacles in accessing the Internet and other technologies. The unequal access to and utilization of ICT poses a threat to female empowerment within societies. Adoption rates of ICT are lower in less developed areas, and there is a widening gender gap in computer and Internet access and usage, particularly in rural settings. The author further asserts that educational and financial factors are key determinants in technology adoption, with women often facing barriers in obtaining and utilizing ICT. According to a study by Antonio and Tuffley [50], it is estimated that as of 2014, two-thirds of the world's illiterate population are women, and access to education remains a greater challenge for women compared to men. Therefore, it can be concluded that accessibility is a challenge, but it is not a clear conclusion that is drawn from the findings of this thesis study.

In terms of making recommendations to the organizations to increase their work-life balances and to overcome challenges, existing applications in the companies are analyzed. According to the findings, the range and prevalence of applications available in the companies where participants are employed vary considerably. To enhance employee well-being, several recommendations are proposed. These include granting menstrual leave for female employees, offering special leave and financial assistance for employees who are parents, and implementing flexible shift arrangements to accommodate employees' individual needs without depleting their annual leave allowances.

Moreover, companies should not only focus on improving the well-being of existing employees but also take proactive measures to address potential challenges faced by women, both currently and in the future. For instance, to address gender imbalances, companies can prioritize the hiring of females if there is a significant disparity between the genders. This can help increase the participation of women in the workforce, thereby contributing to the social and political well-being of their countries. Additionally, governmental regulations may be enacted to compel companies to maintain gender balance. Furthermore, in order to encourage more females, particularly young female students, companies can launch campaigns aimed at introducing IT to students.

CHAPTER 6

CONCLUSION

Existing studies in the literature have generally focused on a single category of challenges and aimed to investigate and identify the factors causing this category to be challenging. Additionally, data collection in the studies in the literature has often been conducted through direct interviews, having open-ended questions or surveys but resulting limited datasets. The main objective and motivation for this thesis is to comprehensively understand if there exist barriers that female IT workers in Türkiye, what are those barriers and what organizations can do to overcome those challenges.

Our research methodology involved several steps. Firstly, we conducted a literature review for existing studies related with female IT workers and gender divide in the IT industry. The challenge categories were decided according to that literature research, that categorizing studies focusing on different types of barriers. According to the most encountered challenges, five categories were decided. Secondly, we created a survey with the aim of detecting that whether that challenge categories exist or not and conduct the survey firstly as a pilot study. For pilot study, we applied the survey to 25 IT workers in Türkiye, working on IT related roles, or in IT companies. Pilot survey included 56 items in total including demographic questions. The participants of the pilot study were selected in order to protect the gender balance and having people from different companies. Google Forms were used and once we obtained the answers from participants, the data is transferred to SPSS, a statistical software package for preliminary analysis and statistical tests were applied. In order to measure the reliability of the survey items, Cronbach's alpha was tested and accordingly, some of the items in the survey was eliminated and main study included 53 items.

As the final step, with the modifications in the survey items as the result of the pilot study, main survey was published. After publishing the survey with the technoparks in Türkiye and online networking platform, LinkedIn, it has reached 251 participants. Like the pilot study, the data was transferred to SPSS and total number of respondents was eliminated to 238 since 13 of the respondents were not satisfying the criteria to be able to fill out the survey. Similar statistical tests were conducted, and the process was started with analyzing the scores given to the items in terms of gender, age, marital and parental status, years of experience, education level and working style (e.g. hybrid, remote or on-site).

According to the results of the analysis, we were able to validate some of the challenges exist in Türkiye and some of are not. These can be summarized as follows together with the recommendations:

- Female respondents participated this survey do not attribute the challenges they face in the industry solely to male colleagues. They neither scored the statements related male domination as an agreement level nor disagreement level. The averages remain at the level of neutrality. Therefore, we cannot say discrimination from male dominated industry is a challenge for female IT workers in Türkiye.

- For challenge category one "Difficulties in Advancing Managerial Roles", similar to the first challenge category, both genders scored the items as a level of uncertainty. Even if the results are at the level of neutrality, it is clear that the possibility of women becoming managers is viewed as clearly improbable by both gender's perspectives since the average results for items related to this fall into "disagreement" level. Therefore, it can be said that females are not seen as candidates for managerial roles, which can be thought as a barrier.

- In terms of challenge three, which is Self-Imposed Barriers among Women, although females score themselves strong competence in the position they work on, female participants remain neutral about women's eagerness to enter the IT sector. In contrast, male participants do not perceive this hesitancy among women. These differences highlight the potential existence of internal barriers that women may encounter.

- For challenge category four, "Ensuring Work-Life Balance", it is a clear fact that females are struggling to maintain a balance between personal and professional lives due to the roles attributed to them with the lights of the findings. On the other hand, male workers are neutral about this. This creates a significant contrast between two gender's perspectives.

- For last category, "Accessibility to Technology", according to the findings of the survey, all demographic groups; different genders, different age groups, etc. are agreeing that if women and female students were guided to IS education, or exposed to IS through a role model, their interest and participation to this sector would increase. It can be concluded that accessibility is a challenge, but it is not a clear conclusion that is drawn from the findings of this thesis study since statements regarding this challenge are not suitable to measure this challenge category.

- Several recommendations are proposed to the organizations to increase employee's conditions and to overcome challenges. These include granting menstrual leave for female employees, offering special leave and financial assistance for employees who are parents, and implementing flexible shift arrangements to accommodate employees' individual needs without depleting their annual leave allowances.

- Not only improving conditions of existing employees but also taking proactive measures to defeat potential challenges is crucial. Hiring and salary policies should

be revisited in order to balance gender gap and campaigns to increase female attribution to the IT can be organized.

6.1. Implications for Theory

This section discusses the potential theoretical implications of the research findings. They are listed as follows:

- Addressing Multiple Challenges Faced by Women in the IT Sector

The results of this study shed light on the *multiple* challenges faced by women in the Türkiye's IT sector. Understanding these challenges is vital for IT companies, and policymakers to develop aimed policies and strategies to create a supportive work environment being more inclusive for female IT workers. By recognizing and addressing these challenges, organizations can work to create equal opportunities for all employees regardless of gender.

- Revisiting "Gender Discrimination"

The findings of the study show that female IT workers do not attribute the challenges they faced in the industry only to males and thus, they do not perceive male domination as a significant challenge. Existing signs of gender discrimination within the workplaces should be re-investigated, while gender dynamics may exist, they may not be clearly visible in overt discrimination.

- Addressing Managerial Representation of Females

Both male and females expressed disagreement about the possibility of females holding managerial roles within the IT sector. This indicates there exist barriers to women's advancement and the situation raises questions about the factors contributing to this perception. These findings may suggest academic researchers for the need to explore further into the organizational structures and cultural norms that hinder women's advancement to managerial roles.

- Exploring Factors Contributing Internal Barriers

Different perspectives of males and females regarding women's eagerness to join the IT sector highlights potential internal barriers that women may face. Therefore, exploring factors such as self-confidence and impostor syndrome shaping women's career choices within the IT may be beneficial for future studies.

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6.2. Implications for Practice

This section discusses the potential practical implications of the research findings. They are listed as follows:

- Tailoring Support Mechanisms Based on Demographic Factors

The study presents variations in the perspectives of IT workers related to challenges encountered by women based on demographic factors such as gender, age, marital status, parental status, and work setup. These insights highlight the importance of adopting specific support mechanisms that consider different needs and experiences of female IT professionals. Organizations can adopt initiatives and flexible policies that correspond the specific circumstances of women in different work environments and different life stages.

- Promoting Employee Wellbeing and Gender Inclusivity

One of the important implications of this study is the emphasis on improving well-beings of employees to mitigate the barriers faced by women in the IT sector. Organizations can create a more inclusive and supportive workplace culture by prioritizing measures to improve the mental, physical, and emotional health of all employees regardless of gender. This covers providing resources and support services to address work-life balance problems, promoting diversity and inclusive learning, and promoting a culture of mutual respect and support among colleagues.

- Recommendations for Organizations

Based on the findings of this study, several recommendations can be made to IT companies that want to improve the well-being of their employees and decrease the effects of barriers faced by women in the IT sector:

- Implement flexible work policies that adapt to different needs and lifestyles, including remote or hybrid working options, flexible hours, and parental leave.
- Provide mentoring and career development programs specifically designed for the needs of female IT professionals, including networking, skill-development, and leadership opportunities.
- Promote a culture of diversity and inclusion within the organization by encouraging gender equality initiatives, eliminating unconscious bias and creating room for open dialogue and feedback.
- Conduct regular assessments and surveys to detect and measure employee satisfaction and define areas for improvement in workplace policies and practices.

- Being in cooperation with industry stakeholders, educational institutions, and government agencies for supporting initiatives aimed at increasing the representation of women in STEM fields and lessening the gender gap in the IT industry.

In conclusion, this study provides some insights into the challenges faced by women in the IT sector in Türkiye and offers practical recommendations for organizations to create a more inclusive and supportive work environment for all employees, especially for women.

6.3. Limitations of the Research

This section discusses the limitations of the thesis study. Limitations for the study can be stated as follows:

- Sample Size and Composition

Although the survey collected responses from 238 IT workers in Türkiye, the sample size may not fully reflect the diversity and complexity of the IT industry in the country. Participants may not fully represent all demographic groups, and organizational roles in the IT workforce. Additionally, the survey's reliance on voluntary participation through online platforms such as Google Forms may introduce selection bias, as people who chose to participate may have unique characteristics or experiences compared to those who did not participate.

- Self-Selection Bias

Using an online survey platform to collect data may also introduce self-selection bias, as those who are more interested or invested in the issue of gender barriers in the IT industry may be more likely to participate. This bias could affect the findings and limit the generalizability of the results to the broader population of IT workers in Türkiye.

- Subjectivity of Responses

The data collected in this study was based on participants' self-reported responses; these may be subject to biases. Participants may underestimate or exaggerate their experiences and perceptions of challenges based on their own interpretations. Additionally, the use of closed-ended survey items in the survey may limit the depth of qualitative insights into respondents' experiences and perspectives.

- Likert Scale Analysis

In the survey, Likert scale items were used to foster the challenges faced by women in the IT industry. During the analysis, it was observed that the averages for many Likert items were at neutral level. This suggests that there may be a lack of consensus or

strong disagreement among respondent regarding many of the survey items. This situation may indicate a need for further research or development of the survey instrument to reach more detailed perspectives on the challenges faced by women in the IT industry in Türkiye.

- Cross-Sectional Design

The study adopts a cross-sectional design, capturing data at a single point in time. Although this approach provides information about the challenges faced by women in the IT sector in Türkiye at a given point in time, it does not consider potential changes or trends that may occur over time. Particular studies may be needed to assess the dynamics of gender issues in the IT industry and the effectiveness of interventions and policies to address them.

- Scope of Recommendations

The recommendations presented in this research are based on the analysis of survey data and may not cover all potential strategies to address gender issues in the IT industry. Future research may explore additional factors that affect workplace well-being and gender equality, such as organizational culture, leadership practices, and industry-wide applications. Additionally, implementation of recommendations may differ depending on the unique contexts and constraints faced by organizations within the IT industry in Türkiye.

6.4. Future Research

This section provides the possible future research points for this thesis study. They can be stated as follows:

- Longitudinal Studies

Future research could discuss longitudinal research designs to show the experiences and perceptions of women in the IT industry in Türkiye over time. Longitudinal studies would allow researchers to examine the dynamics of gender challenges in the IT sector. Moreover, the future studies may identify changes and trends in these challenges, and evaluate the effectiveness of interventions aimed at addressing them. By collecting data at multiple time points, longitudinal studies can provide valuable insights into the long-term effects of initiatives taken and industry trends on the retention and advancement of women in IT careers.

- Qualitative Studies

In addition to surveys, future research could be enriched by qualitative methods such as in-depth interviews or focus groups to explore the lived experiences and perspectives of women in the IT industry in Türkiye. It would provide a deeper

understanding of the key factors that contribute to gender issues in the IT industry, including societal norms, organizational culture, and personal experiences of discrimination. Moreover, in order to gather data for the practices applied in the companies, the use of interviews would be beneficial to measure the satisfaction of the employees. By capturing context-specific narratives, qualitative research can complement quantitative findings.

- Comparative Studies

Comparative studies that compare women's experience in the IT industry across countries or regions could further enhance our understanding of the cultural and contextual factors. By investigating differences in workplace policies, cultural, and industry norms, comparative research can highlight the unique challenges encountered by women in Türkiye's IT sector and identify promising practices and strategies from other contexts.

- Evaluation of Interventions

Finally, future research could focus on evaluating the effectiveness of interventions and initiatives to address gender challenges in the IT industry in Türkiye. Evaluating the impact of policies in detail, diversity programs, and industry-wide initiatives through the use of in-depth interviews researchers can identify best practices and lessons learned for encouraging gender equality.

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APPENDICES

APPENDIX A

SURVEY ITEMS – IN TURKISH

Bilişim Sektöründe Kadın Çalışanların Karşılaştığı Durumları/Zorlukları Belirleme Anketi

Bu çalışma, tezli yüksek lisans öğrencisi Zeynep Gürakın tarafından, Orta Doğu Teknik Üniversitesi Bilişim Sistemleri Ana Bilim Dalı'nda Dr. Öğrt. Üyesi Özden Özcan Top ve Doç. Dr. Nurcan Alkış Bayhan danışmanlığında yürütülen bir çalışmadır. Çalışmanın amacı Bilişim Teknolojileri alanında çalışan kadınların yaşadığı zorlukların belirlenmesi ve söz konusu zorlukların azaltılması için işyerlerine uygulanabilir önerilerde bulunmaktır. Anket toplam 56 sorudan oluşmaktadır ve anketin tahmini tamamlanma süresi 10 dakikadır. Çalışmaya cinsiyet ayrımı olmaksızın, bilişim sektöründe çalışıyorsanız ya da diğer sektörlerde çalışıp şirketlerin bilgi teknolojileri ile ilgili departmanlarında rol alıyorsanız bu anketi doldurabilirsiniz.

Çalışmaya katılım tamamiyle gönüllülük temelinde olmalıdır. Çalışmada, sizden kişisel bilgileriniz istenmeyecektir. Çalışmada vereceğiniz yanıtlar tamamen gizli tutulacak olup sadece araştırmacılar tarafından değerlendirilecektir. Çalışma sonuçları yalnızca bilimsel çalışmalarda kullanılacaktır. Çalışma kişisel rahatsızlık verecek soruları içermemektedir. Çalışma ODTÜ İnsan Araştırmaları Etik Kurulu tarafından uygun görülmüştür. Katılım sırasında sorulardan ya da herhangi başka bir nedenden ötürü kendinizi rahatsız hissederseniz cevaplama işini yarıda bırakıp çıkmakta serbestsiniz.

Bu çalışmaya katıldığınız için şimdiden teşekkür ederiz. Ankete vereceğiniz doğru bilgi ve görüşleriniz yaşanan zorlukların ortaya çıkarılması ve çözülmesine önemli katkı sağlayacaktır.

Çalışma hakkında daha fazla bilgi almak için e-posta adresimden iletişim kurabilirsiniz.
Bu çalışmaya tamamen gönüllü olarak katılıyorum ve istediğim zaman yarıda kesip çıkabileceğimi biliyorum. Verdiğim bilgilerin bilimsel amaçlı yayımlarda kullanılmasını kabul ediyorum.

☐ Evet, kabul ediyorum.
☐ Hayır, kabul etmiyorum. (anket otomatik olarak kapatılacaktır)

Bölüm 1: Demografik Sorular

S1) Cinsiyetiniz?:

☐ Erkek ☐ Kadın

S2) Yaşınız?

☐ 30 veya daha az ☐ 31-36 ☐37-42 ☐ 43-49 ☐ 50 veya üstü

S3) Medeni Durumunuz?

☐ Bekar ☐ Evli

S4) Çocuk sahibi misiniz?

☐ Evet ☐ Hayır

S5) Hangi şehirde yaşıyorsunuz? (opsiyonel)

_____

S6) Hangi firmada çalışıyorsunuz? (opsiyonel)

_____

S7) Çalıştığınız firmanın faaliyet alanı nedir?

☐ Telekom & İletişim
☐ Savunma Sanayii
☐ E-Ticaret
☐ Sağlık Uygulamaları
☐ Turizm
☐ Bankacılık & Finans
☐ Sivil Toplum Kuruluşları
☐ Oyun
☐ Reklamcılık
☐ Perakende Satış
☐ Sivil Havacılık
☐ Hızlı Tüketim Ürünleri
☐ Enerji
☐ Diğer (lütfen belirtiniz: ___)

S8) Hangi rolde çalışıyorsunuz?

☐ İş Analisti
☐ Test Uzmanı / Mühendisi
☐ Yazılım Geliştirici / Mühendisi
☐ Proje Yöneticisi
☐ Teknik Destek Personeli

☐ Yazılım / Sistem Mimarı
☐ UI/UX Tasarımcısı
☐ Veritabanı Uzmanı
☐ Veri Mühendisi / Analisti
☐ İş Zekası Uzmanı
☐ Diğer (lütfen belirtiniz: ___)

S9) Kaç yıldır mevcut rolünüzde çalışıyorsunuz?

☐ 2 yıldan az
☐ 2-7 yıl arası
☐ 7-12 yıl arası
☐ 12 yıldan fazla

S10) Çalışma Şekliniz nedir?

☐ Tamamen Uzaktan
☐ Tamamen Ofis
☐ Hibrit

S11) Eğitim Durumunuz?

☐ Lise
☐ Lisans
☐ Yüksek Lisans
☐ Doktora

Bölüm 2: Zorluklar
Bu bölümde iş yerinizde kadın çalışanların karşılaşabileceği veya içinde bulunabileceği çeşitli durumlar/zorluklar listelenmiştir. Şuanda çalıştığınız şirketi/kurumu düşünerek, aşağıda verilen ifadeler ile ilgili ilgili düşüncelerinizi yansıtan en iyi ifadeyi ;
1 - Hiç Katılmıyorum, 2- Kısmen Katılmıyorum, 3- Ne Katılıyorum ne Katılmıyorum, 4- Kısmen Katılıyorum, 5- Tamamen Katılıyorum
seçeneklerinden birini işaretleyerek seçiniz.

	Kesinlikle katılmıyorum	Kısmen Katılmıyorum	Ne Katılıyorum ne Katılmıyorum	Kısmen Katılıyorum	Tamamen Katılıyorum
S12) Kadınlarla çalışmayı erkeklerle çalışmaya tercih ederim.					
S13) Çalıştığım şirkette erkek yönetici sayısı, kadın yönetici sayısından fazladır.					
S14) Çalıştığım şirkette erkeklerin daha çok terfi / iyileştirme aldığını düşünüyorum					
S15) Ekip çalışmalarında kadınların sözünün kesildiğine şahit oldum.					
S16) Ekip çalışmalarında kadınların fikrinin önemsenmediğine şahit oldum.					
S17) Zaman geçtikçe şirket bünyesine katılan kadın çalışan sayısının azaldığını düşünüyorum.					
S18) İşe alımlarda yazılım geliştirme gibi (örn. kodlama) teknik pozisyonlarda kadınlara yeterince fırsat verilmediğini düşünüyorum.					
S19) Sektörde yaşadığım zorlukların kadın çalışanlardan kaynaklandığını düşünüyorum					
S20) Sektörde yaşadığım zorlukların erkek çalışanlardan kaynaklandığını düşünüyorum.					
S21) Çalıştığım şirkette kadınların kendini güvende hissettiğini düşünüyorum.					
S22) Çalıştığım şirkette kadın çalışanlara mobing uygulandığına şahit oldum.					
S23) Çalıştığım şirkette toplantılarda erkeklerin seslerini yükselttiğine şahit oldum.					
S24) Çalıştığım şirkette toplantılarda kadınların seslerini yükselttiğine şahit oldum					
S25) Çalıştığım şirkette, erkek çalışanların yönetici olma ihtimalinin daha yüksek olduğunu düşünüyorum.					
S26) Çalıştığım şirkette, kadın çalışanların, yönetici olma ihtimalinin daha yüksek olduğunu düşünüyorum.					
S27) Çalıştığım şirkette erkek çalışanların daha iyi performans notu/prim aldığını düşünüyorum.					
S28) Çalıştığım şirkette kadın çalışanların daha iyi performans notu/prim aldığını düşünüyorum.					

S29) Kadınların bilgisayar mühendisliği/yazılım mühendisliği gibi lisans eğitimlerini tercih etmediklerini düşünüyorum.					
S30) Kadınların bilişim sektörüne girmekten endişe duyduğunu düşünüyorum					
S31) Yaptığım işe hakim olduğumu düşünüyorum.					
S32) Kadın iş arkadaşlarımın çalıştıkları pozisyona uygun yetkinlikte olduklarını düşünüyorum.					
S33) Kadın iş arkadaşlarımın iş ile ilgili konularda kendilerini ifade etmekte özgüvenli olduklarını düşünüyorum.					
S34) Kadın çalışanların birbirleri ile kaynaşmalarının daha geç olduğunu düşünüyorum.					
S35) Kadın çalışanlar arası yardımlaşmanın daha az olduğunu düşünüyorum.					
S36) Etrafımdaki kadınları/kız öğrencileri bilişim sektöründe çalışmaları için cesaretlendiririm.					
S37) Kadınların bilgisayarları ve diğer teknolojileri kullanma konusunda endişeli olduğunu düşünüyorum.					
S38) İş hayatım ve özel hayatım arasında dengeyi koruduğuma inanıyorum.					
S39) Kadınların özel hayat – iş dengesini koruduğunu düşünüyorum.					
S40) İşimden dolayı aileme/arkadaşlarıma vakit ayıramadığım zamanlar oluyor.					
S41) Kadınlara atfedilen roller dolayısıyla ev/iş dengesini sağlamak konusunda zorlandıklarını düşünüyorum.					
S42) Kadınların anne olma planlarını iş verenlerine açıklamakta zorlandıklarını düşünüyorum.					
S43) Kadınların anne adayı olduklarını iş verenlerine bildirmekte zorlandıklarını düşünüyorum.					
S44) Kadınların altı ayın üzerinde ücretsiz doğum izni kullanmakta zorlandıklarını düşünüyorum.					
S45) Kadınların doğum izinleri sonrası iş yerine döndüklerinde hak kaybına uğradıklarını düşünüyorum.					
S46) Eğer kadınlar öğrencilik dönemlerinde Bilişim Sistemleri alanında yönlendirilirse bu sektöre ilgilerinin artacağını düşünüyorum.					
S47) Kadınlar, etraflarında Bilişim Sektöründe çalışan kadın rol modeller görselerdi bu sektöre daha fazla ilgi göstereceklerini düşünüyorum.					
S48) Eğer kız öğrenciler bilişim sistemleri hakkında daha fazla yönlendirilirse, bu sektöre ilgilerinin çok daha artacağını düşünüyorum.					

Bölüm 3: Uygulamalar Hakkında
Bu kısımda özel hayat - iş dengesinin sağlanmasına yönelik uygulamalar ile ilgili çoktan seçmeli ve açık uçlu olmak üzere toplam iki soru yer almaktadır. Size en uygun olanları seçip, ilgili boşlukları doldurmanızı rica ederim.

S49) İş yerinizde, çalışanlarınızın iş-özel hayat dengesinin sağlanmasına yönelik hangi uygulamalar mevcut? (yok ise, "Diğer" 'i işaretleyip "Yok" yazabilirsiniz)
☐ Süt İzni
☐ Evlilik İzni
☐ Babalık İzni
☐ Kreş Hizmeti
☐ Remote Çalışma İmkanı
☐ Kuaför/Berber Hizmeti
☐ Sağlık Hizmeti (iş yeri hekimi vb.)
☐ Araba Yıkama Hizmeti
☐ Spor Kompleksi
☐ Diğer (lütfen belirtiniz: ___)

S50) İş yerinizde kadın çalışanlara özel uygulamalar mevcut mudur? Varsa, belirtiniz. (Örneğin Emzirme Odasıi vb.)
_____

Bölüm 4: Uzaktan Çalışma
Anketin bu son bölümünde uzaktan çalışma ile ilgili çeşitli sorular ve ifadeler yer almaktadır. Size en uygun yanıtı seçiniz.

S51) Şirketinizde uzaktan çalışma uygulaması var mı?
☐ Evet ☐ Hayır

S52) Şirketinizde uzaktan çalışma uygulaması varsa, ne sıklıkla uygulanmaktadır?
☐ Ayda 5 günden az
☐ Ayda 5-15 gün arası
☐ Ayda 15 günden fazla
☐ Diğer (lütfen belirtin: ___)

S53) Uzaktan çalışıyor olmaktan memnunum, çünkü:
☐ Evdeki sorumluluklarımı yerine getirmek konusunda bana fayda sağlıyor.
☐ Daha verimli çalışıyorum.
☐ Aileme/özel hayatıma daha çok ilgi gösterebildiğimi düşünüyorum.
☐ Memnun Değilim.
☐ Diğer (lütfen belirtin: ___)

S54) Uzaktan çalışmaktan memnun değilim, çünkü:
☐ İşe odaklanamıyorum.
☐ Verimli değil.
☐ Ofis ortamında olmamak yalnız hissettiriyor.
☐ Memnunum.
☐ Diğer (lütfen belirtin: ___)

	Kesinlikle katılmıyorum	Kısmen Katılmıyorum	Ne Katılıyorum ne Katılmıyorum	Kısmen Katılıyorum	Tamamen Katılıyorum
S55) Uzaktan çalışma uygulamasının, kadınların iş – özel hayat dengesini kurmasına olanak sağladığını düşünüyorum.					
S56) Uzaktan çalışma uygulamasının, erkeklerin iş – özel hayat dengesini kurmasına olanak sağladığını düşünüyorum.					
S57) Kadınların evden çalışmaları durumunda ev işlerine yönelik sorumlulukları daha çok üstlendiklerini düşünüyorum.					

APPENDIX B

SURVEY ITEMS – IN ENGLISH

Survey to Identify the Situations/Challenges Faced by Female Employees in the Information Technology Sector

This study is conducted by Zeynep Gürakın, a graduate student pursuing a master's degree, under the supervision of Asst. Prof. Dr. Özden Özcan Top and Assoc. Prof. Dr. Nurcan Alkış Bayhan in the Department of Information Systems at Middle East Technical University. The purpose of this study is to identify the challenges faced by women working in the field of Information Technologies and provide practical recommendations to reduce these challenges in the workplace. The survey consists of a total of 56 questions and is estimated to take about 10 minutes to complete. You can participate in the study regardless of gender if you work in the IT sector or play a role in IT-related departments in other sectors.

Participation in the study is entirely voluntary. Your personal information will not be requested in the study. Your responses will be kept confidential and will only be evaluated by the researchers. The study results will be used solely for scientific purposes. The study does not contain any questions that may cause personal discomfort. The study has been approved by the METU Human Research Ethics Committee. If you feel uncomfortable during participation, for any reason, you are free to stop answering and exit.

We thank you in advance for participating in this study. Your honest information and opinions will contribute significantly to the identification and resolution of the challenges faced.

For more information about the study, you can contact me via my e-mail address.

I am participating in this study entirely voluntarily and I understand that I can stop and leave at any time. I agree to the use of the information I provide for scientific publications.

☐ Yes, I agree.

☐ No, I do not agree (exit automatically from survey)

Section 1: Demographic Questions

Q1) Gender?:
☐ Male ☐ Female

Q2) Please select your age within defined ranges.
☐ 30 and less ☐ 31-36 ☐37-42 ☐ 43-49 ☐ 50 and more

Q3) Marital status?
☐ Single ☐ Married
Q4) Are you a parent?
☐ Yes ☐ No

Q5) Please provide the city you resident. (optional)
_____

Q6) Please provide the company you are currently employed. (optional)
_____

Q7) What is the field of activity of the company you work for?
☐ Telecom & Communication
☐ Defence Industry
☐ E-Commerce
☐ Health Applications
☐ Tourism
☐ Banking & Finance
☐ Civil Society Organisation
☐ Gaming
☐ Advertising
☐ Retailing
☐ Civil Aviation
☐ Fast Moving Consumer Goods (FMCG)
☐ Energy
☐ Other (please provide: ___)

Q8) In what role do you work?
☐ Business Analyst
☐ Test Engineer / Specialist
☐ Software Engineer
☐ Project Manager
☐ Technical Support Personnel

☐ Software / System Architect
☐ UI/UX Designer
☐ Database Specialist
☐ Data Engineer / Analyst
☐ Business Intelligence Specialist
☐ Other (please provide: ___)

Q9) How many years have you been working in your current role?
☐ Less than 2 years
☐ 2-7 years
☐ 7-12 years
☐ More than 12 years

Q10) What is your working style?
☐ Fully Remote
☐ On-site
☐ Hybrid

Q11) What is latest education level?
☐ High School Degree
☐ Bachelor's Degree
☐ Master's Degree
☐ PhD.

Section 2: Challenges
In this section, various situations/challenges that female employees may encounter or be a part of in your workplace are listed. Thinking about your current company/organization, please select the statement that best reflects your thoughts on the given expressions by marking one of the options:
1 - Strongly Disagree 2 - Partially Disagree 3 – Neutral/Uncertain 4 - Partially Agree 5 - Strongly Agree

	Strongly Disagree	Partially Disagree	Neutral/Uncertain	Partially Agree	Strongly Agree
Q12) I prefer working with women over working with men.					
Q13) In the company I work for, the number of male managers is greater than the number of females.					
Q14) I believe that in the company I work for, male employees receive more promotions/improvements.					
Q15) I have witnessed women being interrupted during team collaborations.					
Q16) I have witnessed that women's opinions are not valued in team collaborations.					
Q17) I believe that the number of female employees joining the company has decreased over time.					
Q18) I think that in hiring processes, there aren't enough chances given to women in tech positions e.g SE.					
Q19) I believe that the challenges I have faced in the industry are due to female employees.					
Q20) I believe that the challenges I have faced in the industry are due to male employees.					
Q21) I believe that women feel safe in the company I work for.					
Q22) I have witnessed mobbing (bullying) towards female employees in the company I work for.					
Q23) I have witnessed men raising their voices in meetings at the company I work for.					
Q24) I have witnessed women raising their voices in meetings at the company I work for.					
Q25) In the company I work for, I believe that male employees have a higher probability of becoming managers.					
Q26) In the company I work for, I believe that female employees have a higher probability of becoming managers.					
Q27) I believe that male employees at the company I work for receive higher performance ratings/bonuses.					
Q28) I believe that female employees at the company I work for receive higher performance ratings/bonuses.					
Q29) I believe that women do not prefer undergraduate education programs such as computer/software engineering.					

Q30) I believe that women are hesitant to enter the IT industry.					
Q31) I believe that I am knowledgeable about the work I do.					
Q32) I believe that my female colleagues are competent for the positions they work in.					
Q33) I believe that my female colleagues are confident in expressing themselves on work-related matters.					
Q34) I believe that female employees take longer to bond with each other.					
Q35) I believe that there is less cooperation among female employees.					
Q36) I encourage women/girl students around me to work in the IT sector.					
Q37) I think women are concerned about using computers and other technologies.					
Q38) I believe that I maintain a balance between my work life and personal life.					
Q39) I believe that women maintain a balance between their personal and work lives.					
Q40) There are times when I cannot spend time with my family/friends due to my job.					
Q41) I believe that women struggle to maintain a work-home balance due to the roles attributed to them.					
Q42) I believe that women find it difficult to disclose their plans for motherhood to employers.					
Q43) I believe that women find it difficult to inform employers that they are prospective mothers.					
Q44) I believe that women struggle to use more than six months of unpaid maternity leave.					
Q45) I believe that women experience a loss of rights when they return to the workplace after maternity leave.					
Q46) I believe that if women are guided towards IS during their student years, their interest in this sector will increase.					
Q47) I believe that if women saw female role models working in the IT sector around them, they would show more interest in this field.					
Q48) I believe that if female students were guided more towards IS, their interest in this sector would increase even more.					

Section 3: About Applications in Companies
In this section, there are a total of two questions related to practices aimed at achieving a work-life balance, including both multiple-choice and open-ended questions. Please select the most suitable ones for you and fill in the relevant blanks.

Q49) What practices are in place at your workplace to ensure a work-life balance for employees?
☐ Maternity / Nursing Break
☐ Marriage Leave
☐ Paternity Leave
☐ Kindergarten
☐ Remote Working Opportunity
☐ Hairdresser / Barber Service
☐ Health Service (Workplace Doctor)
☐ Car Wash Service
☐ Sport Facilities Opportunity
☐ Other (please provide: ___)

Q50) Are there any special facilities for female employees at your workplace? If so, please specify (e.g., Nursing Room, etc.).
_____

Section 4: Remote Working
In this final section of the survey, various questions and statements related to remote work are included. Please select the most appropriate response.

Q51) Does your company have a remote working policy?
☐ Yes ☐ No

Q52) If your company has a remote working policy, how often is it implemented?
☐ Less than 5 days in a month
☐ 5-15 days in a month
☐ More than 15 days in a month
☐ Other (please provide: ___)

Q53) I am satisfied with remote working because:
☐ It benefits me to fulfill my responsibilities at home.
☐ I work more efficiently.
☐ I believe I can pay more attention to my family/personal life.
☐ I am not satisfied with remote working.
☐ Other (please provide: ___)

Q54) I am not satisfied with remote working because:

☐ I can't focus on work.

☐ It is not efficient.

☐ Not being in the office makes me feel lonely.

☐ I am satisfied with remote working.

☐ Other (please provide: ___)

	Strongly Disagree	Partially Disagree	Neutral/Uncertain	Partially Agree	Strongly Agree
Q55) I believe that remote working allows women to establish a work-life balance.					
Q56) I believe that remote working allows men to establish a work-life balance.					
Q57) I think that women take on more responsibilities for household chores when they work from home.					

APPENDIX C

ETHICAL APPROVAL

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Konu: Değerlendirme Sonucu 27 OCAK 2023

Gönderen: ODTÜ İnsan Araştırmaları Etik Kurulu (IAEK)

İlgi: İnsan Araştırmaları Etik Kurulu Başvurusu

Sayın Dr. Öğrt. Ü. Özden Özcan Top

Danışmanlığını yürüttüğünüz Zeynep GÜRAKIN'ın **"Bilişim Sektöründe Çalışan Kadınların Karşılaştığı Engeller"** başlıklı araştırmanız İnsan Araştırmaları Etik Kurulu tarafından uygun görülerek **0092-ODTÜİAEK-2023** protokol numarası ile onaylanmıştır.

Bilgilerinize saygılarımla sunarım.