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Women in The Labor Market: Contribution to the Mitigation of Labor Shortages in Industries Involved in the Digital Transformation in Germany

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Abstract:

This paper looks at the possible relationship between labor shortages in industries impacted by technological advances and the challenges women face in pursuing a career and their role in the workforce. It also explores the potential for women to work in fields in technology-oriented professions, ultimately addressing labor shortages while advancing gender equality. Using an exploratory and descriptive perspective, this study adopts a 'multimethod in focus' approach, incorporating qualitative research tools. This approach involved interviews with 14 women experts in gender-related issues, interviews with 18 professionals working in the human resources area within various companies, and an analysis of 20 conveniently selected documents. Furthermore, the study addresses the research question with the insight that indeed encouraging women's labor market participation in industries impacted by digitalization could be helpful to the mitigation of labor shortages faced by companies in these sectors. However, this outcome is contingent upon companies being conscious of the diverse limitations women encounter in Germany in terms of career choices, career advancement, family planning, and sustaining their professional journey. It's important to highlight that while this exploratory analysis provides valuable insights, further in-depth research is needed to formulate more actionable recommendations.

Keywords: Digital Transformation, Women Participation, Skilled Labor Shortages, IT, Digitalization, Innovation.

Acknowledgments:

This thesis is in memory of one of the women I admire the most, who in her lifetime inspired countless women and girls to pursue their dreams, transforming the lives of both adult women and young girls. While life can sometimes be too short to make significant changes, she achieved a great deal, and I hope her passing will not signify the end of her impactful legacy. This thesis is in memory of my aunt Sandra.

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List of Abbreviations

In order to facilitate a better understanding of the various abbreviations and acronyms used throughout this study, a list of the abbreviations and acronyms used is facilitated here with the aim of providing clarity.

Abbreviation	Meaning
AI	Artificial Intelligence
BA	Bundesagentur für Arbeit [Federal Employment Agency]
BAMF	Bundesamt für Migration und Flüchtlinge [Federal Office for Migration and Refugees]
BMAS	Bundesministerium für Arbeit und Soziales [Federal Ministry of Labour and Social Affairs]
BMFSFJ	Bundesministeriums für Familie, Senioren, Frauen und Jugend [Federal Ministry for Family Affairs, Senior Citizens, Women and Youth]
BMWK	Bundesministerium für Wirtschaft und Klimaschutz [Federal Ministry for Economic Affairs and Climate Action of Germany]
DESTATIS	Statistisches Bundesamt [Federal Statistical Office]
DIHK	Deutsche Industrie und Handelskammer [Association of German Chambers of Industry and Commerce]
DIW Berlin	Deutsches Institut für Wirtschaftsforschung [German Institute for Economic Research]
EVP	Employee Value Proposition
FLFP	Female Labor Force Participation
GDI	Gender Role Variation in Digital Industries
GDPR	General Data Protection Regulation
GS	Gender Segregation
HR	Human Resources
ICT	Information and Communications Technology
ILO	International Labour Organization
INQA	Initiative Neue Qualität der Arbeit [New Quality of Work Initiative]
IT	Information Technology
IW	Institut der deutschen Wirtschaft [Cologne Institute for Economic Research]

KI	Künstliche Intelligenz [Artificial Intelligence]
KOFA	Kompetenzzentrum Fachkräftesicherung [Competence center for securing skilled labor]
LOC	Locus of Control
LS	Labor Shortage
MINT	Fachrichtungen Mathematik, Informatik, Naturwissenschaften und Technik [Fields of Mathematics, Computer Science, Natural Sciences and Technology]
OECD	Organisation for Economic Co-operation and Development
SMEs	Small and Medium Enterprises
STEAM	Fields of Mathematics, Computer Science, Natural Sciences and Technology
UNESCO	United Nations Educational, Scientific and Cultural Organization
WifOR Institute	Wirtschaftsforschung Institute [Economic Research Institute]

Chapter 1: Introduction

In Germany, the issues of shortages of skilled workers in specific industries, prolonged job vacancies, and the digitalization of roles have been topics of discussion for several years. Meanwhile, the inclusion of females in the German workforce has been discussed and its effects on the overall economic welfare of the country. Where one permanent insight has been the role of women as caregivers and their disproportionately large burden of housework and family care. Additionally, in the social context, women are often perceived through collective consciousness as less capable than men, particularly in technology management and digital transformation. This perception often hinders their professional development and the achievement of their career objectives. This issue is not unique to Germany, but despite the intense debates of recent decades and considerable progress made, women's significant participation in the labor landscape and in the workforce remains lower, and the possibility of women to work in roles that diverge from traditional gender stereotypes is still underutilized. Increasing the labor contribution from females in jobs requiring a high level of technological expertise is not only a means to alleviate labor shortages but also ensures that females are active participants in the changes and improvements technology presents. This, in turn, can provide them with a competitive edge in specialized knowledge in jobs that are increasingly overshadowed by ongoing technological innovations. Therefore, this study is framed within the following research question: Can women's participation in the German labor market help mitigate Germany's labor shortages in digitally transforming industries?

1.1 Problem Description

The shortages of skilled workers and personnel has become a pressing problem in Germany in recent years. It appears that vacancies are increasing, but not enough people to meet the demand in the labor market. According to a study by the Competence Center for Skilled Workers (KOFA), the number of vacancies for skilled workers were nearly 1,2 million by December 2022. This represented a significant increase of approximately 44,000 job openings

compared to the same month last year, representing a growth of 2.9% (KOFA, 2023). A relatively large increase considering this trend has been occurring for years, but now this number represents the highest number of unfilled non-employee positions since 2011 (KOFA, 2023). In addition, Federal Ministry for Economic Affairs and Climate Action of Germany data show that there are labor shortages in 352 of 801 occupations in Germany in the current year (BMWK, 2023c). This fact is concerning, because it is the companies that are hindered in their development by the labor shortages, which in turn affects the country's economy in general. Unfortunately, over half of the companies in Germany are struggling with the effects of this labor shortage and perceive it as a major risk (BMWK, 2023a). The growing shortage of skilled workers in Germany has raised concerns about its potential impact on the country's economy, productivity, and overall growth. Addressing this problem is critical to maintaining the country's competitiveness and ensuring a stable labor force for years to come.

Moreover, labor shortage is attributed to several causes. First, demographic change in German society is believed to be one of the drivers of this situation. Data show that those born between 1957 and 1969 are reaching retirement age, while the number of people of working age does not match the number of retirees. And furthermore, as stated by the head of the Federal Statistical Office's Labor Market Division. Even if the adjustments in pension policy provide temporary relief, it is crucial to know that the average retirement age in Germany, especially for men, was about 64.1 years in 2021 (Schüller, 2023). Further raising the retirement age does not seem to be the most optimal strategy to address this problem, as shown by the significant shift compared to two decades ago, when male German citizens retired on average two years earlier (Deutsche Rentenversicherung, 2022). While this measure may provide short-term relief, it is not long-term sustainable. In addition, challenges posed by an aging population will continue, as projections indicate that an additional four million people in Germany will reach retirement age by 2035. This means that, according to the Federal Statistical Office data, a total of 20 million people will be of retirement age (Statistisches Bundesamt, 2022).

Moreover, looking at demographic trends, the indicator for the birth rate in Germany shows that the number of babies born in Germany in 2020 was 773,144, according to the country's official data, while the isolated number may be perceived as low, it is essential to consider that there have been even lower birth rates in the past, such as nearly a decade ago in 2011 when the number of births stood at 663,000. This figure remains the lowest reported value since 1964 during the era of the baby boom (Statistisches Bundesamt, 2023c). Thus, the birth rate alone cannot be considered the sole reason for the main problem at hand. Even though birth rates in Germany are not as high as they were in the past, like the peak of 905,675 births in 1990, it is noteworthy that the overall population growth trend remains positive (Statistisches Bundesamt, 2023e). This demographic observation highlights two key factors: While the number of older people reaching retirement age continues to rise, the population in this country continues to grow, albeit at a slower rate than in the 1990s. Furthermore, another cause often attributed to the labor shortage is typically unemployment, which may not exactly be the case for Germany.However, according to German federal agency, the country recorded an impressively low unemployment rate of 1.3% in 2022, a significant drop compared to previous years (Bundesagentur für Arbeit., 2023).

The issue of labor shortage in Germany appears to be a challenge influenced by multiple factors. Whereas there is no single cause, an insightful analysis is required to understand the various factors, processes, and changes that the German economy is currently experiencing. Ultimately, this results in a growing demand for labor and companies facing difficulties in swiftly acquiring personnel to fill these vacancies. Consequently, this situation leads to significant economic losses for businesses. In a survey of 7,500 decision-makers conducted by the Bertelsmann Stiftung, 66% of respondents said they felt a shortage of qualified workers. While the situation varies by sector and region, 48% of companies surveyed reported a shortage of professional profiles in the field, while only 27% reported a shortage of college graduates (Schultz, 2021). According to a report by the German Institute for Economic Research (IW),

there will be many social and economic challenges between now and 2026 if there are not enough qualified workers. This could result in not being able to build wind turbines, not being able to guarantee appropriate health care, not having enough staff to provide places for kids and digitalization falling further behind (Burstedde, 2023).

Although many sectors are affected by this crisis, this study focuses on industries in which technology and digitalization play an important role, although the issue in the labor market affects a wide range of industries in general. In terms of sectors that are currently being transformed by technology and experiencing labor shortages, STEAM occupations are a good example of the crisis in Germany's case. According to the IW, fewer young people are pursuing these disciplines, and currently, 140,000 experts are needed, particularly in the fields of engineering and computer science. The deficit in technical professions amounts to approximately 308,000 job positions (Plünnecke, 2023). The labor shortage is particularly severe in fields such as computer science, engineering, electronics, mechanical engineering, and construction. While these are not the only occupations affected by technological advancements and digitalization, they are the ones consistently reporting the most significant shortages in various studies conducted in the country.

Furthermore, as this issue has persisted in Germany for several years, various strategies and measures have been adopted to counteract the problem and provide solutions from various perspectives. Among the best-known strategies are efforts to attract qualified foreign professionals by reducing migration barriers, improving older people's employment conditions with the aim to encourage them to work longer, including disabled people, and lastly, to enhance women's participation in the labour market. The latter is a particularly noteworthy strategy given that women make up a significant portion of the German population, accounting for more than half of the total population at 42.8 million, compared with 41.6 million men (Statistisches Bundesamt, 2023a). Encouragingly, employment figures for working-age women are positive, with 73.1% of women aged 15-64 in employment in 2022 (Davies, 2023).

Thus, it might be considered that there is no justification for believing that women could be the key to solving the problem of labour shortages in these sectors given the conditions encountered. At first glance, women's employment rates appear to be quite positive. However, the percentage of women in the German labour market remains good just at first glance, the working conditions and the kind of positions differ significantly when it comes to compare it with men. It is therefore crucial to analyze the employment situation of women in Germany in detail.

A closer look at the figures shows that every second female employee works part-time, while only 11% of men fall into this category. On average, women work nine hours less per week than men, resulting in women having a 30% lower average annual workload and in marginal employment and mini-jobs, women make up as much as 60% of the workforce (BMWK, 2023a). Moreover, an in-depth look at women's participation in so-called mini jobs, which are characterized by limited working hours and low wages, reveals that women make up 65% of the workforce in these sectors (Singer & Fleischer, 2023). Moreover, it is also women who work more in part-time jobs. While only 11.5% of men work part-time, a significant proportion of women, about 48.4%, fall into this category (Arbeits Welt, 2023). This discrepancy is closely linked to the traditional family structure that has prevailed in Germany in recent decades. Typically, fathers work full-time, while mothers take on part-time jobs to manage caregiving duties and household responsibilities (Keller & Kahle, 2018). This trend towards women dominating in these jobs can be reflected, for instance, in the differentiation in wages common known as gender pay gap. As per information from the Federal Ministry for Family Affairs, Senior Citizens, Women, and Youth (BMFSFJ), several factors contribute to the wage gap, including women's career choices. In Germany, women often opt for professions in the social or caregiving sector, which allows them to work fewer hours but tends to have lower pay rates compared to technical or engineering fields where men are the majority (BMFSFJ, 2022). In other words, women earn less than men because of the nature of their jobs and the hours they work. However, these differences highlight the potential for women to work more or pursue

jobs in specialized fields influenced by digitization. It is therefore paramount to assess the current employment situation of women to determine to what extent it is plausible to consider that women could play an active role in mitigating labour shortages in industries affected by the digital transformation.

The first point of consideration relates to the considerable improvements observed in recent years in the conditions of employment for women. While remarkable progress has been made, it must also be acknowledged that certain crucial milestones in gender equality have yet to be reached. Nevertheless, today's labor landscape bears little resemblance to that of half a century ago. However, a recurring observation revolves around the role of women in unforeseen circumstances, where they are de facto expected to assume their historical caregiving roles and domestic duties, overshadowing all the gains in equal opportunities that have been achieved in recent years. A clear example of this phenomenon occurred during the COVID-19 pandemic. Statistics on job losses during this period indicate that, in general, women were forced to choose between their employment responsibilities and household duties. As stated by the International Labour Organisation (ILO), approximately 114 million jobs were lost worldwide compared to 2019 figures. This discouraging trend affected women disproportionately, with their rate of job loss exceeding that of men by 5% (ILO, 2023). In fact, in the same COVID-19 scenario in Germany, where women made up a significant part of the workforce in so-called 'mini-jobs", they were highly affected by lockdowns and the inability to perform these jobs. Women were also the most affected for the instability of these jobs. For instance, in North Rhine-Westphalia, only 51.7% of women had full-time employment, compared to 87.9% of men (BA, 2022). Therefore, the proposal to fully involve women in labor-demanding sectors becomes more complex since all of the aforementioned factors must be taken into account. These unforeseen phenomena not only impact women's security but also companies, as unforeseen situations can lead to significant losses of personnel due to these gender roles.

This certainly doesn't mean that it is pointless to expect women in better jobs and break free themselves from these stigmas and pursue careers in labor-demanding industries. In fact, it can be beneficial, women changing paradigms and being able to immerse themselves in different kind of jobs offer more stability and economical independency to them, the labour shortage might be relieved considerably due to an improvement in the supply of labor the large. According to the minister Lisa Paus, the women role in the labor landscape of the country is essential to successful counteract this challenge. If all women with children under the age of six expressed their desire to work, 840,000 job positions could be filled (BMFSFJ, 2022). This might be a breakthrough for the overall economy factors of Germany. However, this progress is only possible if the actual situation of women is taken into account, such as the particular circumstances faced by mothers and their impact and needs when it comes to working longer. Furthermore, in a survey conducted by Statista, women in Germany were asked about the possible drivers for the significant gender gap in leadership positions. The results showed that 39% of women cited the incompatibility of a professional career and raising children as the biggest obstacle. This was followed closely by the perception among 25 % of respondents about a perceived disadvantage for females in the professional landscape (Spiegel, 2011). In order to implement Minister Paus's proposal, it would also require a robust and easily accessible childcare system for mothers of young children. Unfortunately, this is not the current situation. Given current conditions, in which many mothers are obliged to stay at home with their children due to the limited availability of places in kindergartens, as indicated by data from the Bertelsmann Stiftung, an estimated 384,000 daycare spots were needed by 2021(Bertelsmann Stiftung, 2021). And if more women with young children decided to return to work, the demand for these places would increase even further.

On the other hand, the technological advances and innovations of the modern era have led to dramatic changes in countries, their economies, and, of course, in the nature of work itself. The development of robots and artificial intelligence has not only created new employment

opportunities, but has also introduced the digital component into occupations that previously had nothing to do with this field. Using all these changes in the labor market to advance women is not an implausible idea. In the Nordic countries, for example, women are exploiting the potential of technological and digital development more effectively than men. In particular, the service sector is predominantly led by women and has developed positively, both in terms of improving skills and increasing salaries (Rosenberg, 2020). In Germany in particular, projections based on data from wiFOR and PwC suggest that the integration of digitization will offset labor shortages by half by 2030 and overcome the natural decline that would have occurred in the absence of these technological advances (WifoR & PwC, 2016). If a significant leap in digitization can be achieved in sectors where labor shortage is critical and where women have access to these sectors, this would represent a huge economic transformation for Germany. However, to achieve this, women need to become experts in technological progress in the branches, and the current situation shows that there is still much to be done. Despite similar levels of digital skills among men and women in Europe, women represent only 18% of ICT workers and 20% of ICT graduates (Levorato, 2021). In Germany, from the 46.9% of employed women engage in the workforce, just 16.6% specifically is employed in the ICT sector. This places Germany at the 20th position among OECD countries in terms of female inclusion within the ICT sector (Nier, 2018).

The active participation of women can be beneficial to the work, considering that governments around the world are investing in all these advances, and Germany in particular has shown a strong commitment to positioning itself at the forefront of Artificial Intelligence (AI) development with its "KI-Strategie: Artificial Intelligence Made in Germany" (KI Strategie, 2023). If women opt for this branch of AI and educate themselves for the jobs that this field will bring, they are likely to be the ones who lead the industry. Especially considering that despite all efforts, surveys show that knowledge about algorithms, AI and its applications is still limited in the German population (Fischer & Puschmann, 2023). Therefore, the field shows a big scope of learning and improvement. While there are still many doubts and fears in this

specific field concerning the idea of technology will lead to unemployment, technology does enhance better quality life, boost the economy and create new jobs (Guttmann et al., 2023).To address the widespread fear of job loss, the use of artificial intelligence aims to streamline and automate routine tasks to ultimately save time. It is important to know that professions will not disappear completely, but will evolve (Giering, 2022). And if women can actively shape these changes, it can be a breakthrough for both gender and economic growth.

Chapter 2: Literature Review

The existing literature addressing the potential role of women in alleviating labor shortages in technology-driven industries is remarkably limited. Moreover, research and academic attention on this topic remain low, it can be attributed to the relative fast evolve of digitalization and recent perception as a means of empowering women seeking better job opportunities. However, engaging with the constructs involved in framing the research problem open the possibilities to understand this approach and its significance in the academic realm. The aim of this chapter is to briefly outline the contextual overview of the background to enrich the understanding about the topic and to highlight the pertinent literature referred to in the analysis chapter and in the following chapters of this study.

Furthermore, to identify relevant articles, a systematic search of the Web of Science Core Collection database was conducted in July 2023. Through an iterative process of keyword searches and preliminary data analysis, 174 articles were identified that matched the original search query: TI= "Higher labor force participation of women Germany" OR TP= "Higher labor force participation of women Germany" After a brief review of the search results and review of the abstracts, the articles were narrowed down to determine which studies were relevant to the research and which should be excluded. After reviewing the abstracts, 20 articles were selected for in-depth analysis. The main objective of this comprehensive analysis was to identify and define the key findings, which are listed in Table 1.

Table 1 Literature Review With the Key Findings About the Labor Participation of Women in Companies Involved in Digital Transformation

Autors	Title	Methodology	Findings
Ilkay Unay Gailhard	Job Access After Leaving Education: A Comparative Analysis of Young Women and Men in Rural Germany	The study employs gender-specific multinomial logit models	• The study confirms that marital status has a negative impact on female graduates' access to the workforce, while it is positive for their male counterparts (Unay Gailhard, 2016). • The study suggests that marital status plays a special role in the transition to employment for young women and men in rural areas (Unay Gailhard, 2016).
Johann Fuchs	Demography and Labor Shortage. Future Challenges of Labor Market Policy	Analysis of data published by the Employment Research Institute	• Boosting the labor force engagement of women and older workers has initially a positive effect. However, this effect diminishes if the working-age population continues to shrink (Fuchs, 2013). • The currently unemployed often lack the necessary skills (Fuchs, 2013). • Bridging skills gaps and enhancing labor force access conditions for women and older employees is key. (Fuchs, 2013). • Investments in education and health are recommended to improve employability (Fuchs, 2013).
Uwe Blien & Franziska Hirschenauer	Labour Supply and Regional Labour Market Situation	Multiple regressions	• Increasing labor force participation is crucial to address labor shortages due to Germany's aging population (Blien & Hirschenauer, 2020). • Nationwide there are regional deviations in the participation of men and women of different age groups. (Blien & Hirschenauer, 2020). • Access to childcare services that offer better schedules significantly influences the participation rate of

			females and males (Blien & Hirschenauer, 2020). • Higher regional qualification levels correlate positively with labor force participation of middle-aged and older persons (Blien & Hirschenauer, 2020).
Susanne Wanger, Brigitte Weber & Johann Fuchs	Is It Possible to Compensate for the Decreasing Labour Supply by Increasing Working Hours?	Analysis of data	• Extending working hours may not reverse the trend toward a declining labor force, but it could stabilize the overall labor force (Wanger et al., 2013). • This study examines the potential for extending working hours and identifies opportunities for expansion (Wanger et al., 2013).
Feriha Özdemir	Between Shortage of Qualified Staff and Disadvantages in the Labour Market: Towards Managing and Creating New Opportunities	In-depth interviews	• Ethnicity and family factors contribute to greater inequalities (Özdemir, 2015). • Recommendations from the research include creating more opportunities, advocating for proactive and progressive women's policies, and implementing diversity management, especially in larger companies (Özdemir, 2015).
Juliane Hennecke	The Independent Woman-Locus of Control and Female Employment Participation	Analysis of survey data from a survey conducted in Germany	• Females with an internal locus of control are on average 13% probably feel more engage with the working landscape; in addition, this relationship is also reflected in higher employment probabilities in terms of both the decision to work and the number of hours worked (Hennecke, 2023). • The relationship between LOC and labor force participation varies depending on factors such as financial constraints and social work norms (Hennecke, 2023). • The study suggests that LOC influences independence preferences and subjective beliefs about returns to

			investment, providing theoretical explanations for the observed results (Hennecke, 2023).
Michael Wyrwich	Historical and Current Spatial Differences in Female Labour Force Participation: Evidence from Germany	Analysis of data from Germany	• The long-term impact on FLFP (female labor force participation) is not solely due to the persistence of industrial patterns, implying that other historical drivers are at play (Wyrwich, 2018). • Regions with historically high FLFP tend to be more socially accepting attitudes toward female workforce engagement (Wyrwich, 2018). • It is important to consider the historical context of each region when developing policies to increase FLFP (Wyrwich, 2018).
Nadiya Kelle	Combining Employment and Caregiving: How Differing Care Intensities Influence Employment Patterns Among Middle-Aged Women in Germany	Cox regression models for 6,201 employed women	• Females engaged in more intensive caregiving work are likely to get out of the workforce market altogether. In contrast, women with fewer caregiving duties are more able to reconcile work and care responsibilities (Kelle, 2018). • Women aged 45 to 59 with more intensive caregiving responsibilities differ significantly in their socioeconomic characteristics from women with less intensive caregiving responsibilities. Women with higher intensity roles as caregivers tend to have both lower levels of education and lower attachment to the labor force (Kelle, 2018). • Institutions and professionals are required to provide easily accessible and affordable care services, especially for families with modest incomes (Kelle, 2018).
Joachim Moeller & Marion Koenig	Wage Inequality, Labor Participation and	Theoretical modeling is used to assess how wage	• Regional wage levels and indicators of job stability significantly affect labor force participation (Möller & König, 2011).

	Employment Market Forces and Institutional Impacts	dispersion affects labor market participation, and empirical analyses are conducted to support these findings	• The introduction of minimum wage regulation in Germany did not necessarily lead to negative employment effects. In eastern Germany, employment effects were negative, while in western Germany they were generally positive (Möller & König, 2011). • The gender wage gap in Germany varies considerably by region. It is significantly higher in rural areas than in metropolitan areas, although it has decreased in both types of regions over the past three decades (Möller & König, 2011). • Rural young women face a wage gap that is systematically about 10 % points higher than their counterparts in metropolitan areas (Möller & König, 2011).
Christiane Krieger-Boden & Alina Sorgner	Labor Market Opportunities for Women in the Digital Age	Analysis of data	• Policymakers should financially empower women through innovative digital financial tools and e-government initiatives (Krieger-Boden & Sorgner, 2018). • Females need to be encouraged to enhance their soft skills with higher education and advanced digital competencies, as the digital age demands a combination of cognitive and emotional skills (Krieger-Boden & Sorgner, 2018). • Programs to promote digital literacy and interest in STEM subjects among girls and women should be expanded to include women of all age cohorts (Krieger-Boden & Sorgner, 2018). • Digital tools and online platforms can be used to promote women's entrepreneurial skills and provide them with access to mentors and role models (Krieger-Boden & Sorgner, 2018).

Marcus Tamm	Fathers' Parental Leave-Taking, Childcare Involvement and Mothers' Labor Market Participation	Regression models with data from the Socio-Economic Panel	• Time out of the labor market for childcare has long-lasting effects on women's employment, earnings, and wages (Tamm, 2018). • The birth of children, particularly the first one, is a key driver of the employment outcome gap between men and women (Tamm, 2018). • Women tend to have lower employment rates and lower wages compared to men (Tamm, 2018). • Findings suggest that fathers' use of parental leave has a significant impact on their participation in childcare and reduces gender gaps in household work (Tamm, 2018).
Golo Henseke	Against the Grain? Assessing Graduate Labor Market Trends in Germany Through a Task-Based Indicator of Graduate Jobs	The study uses a statistical derived indicator on graduate jobs, which is based on the job qualification requirements obtained from the data on jobs reported by workers in the 2006 and 2012 German employment survey	• Although higher education is booming, the gross demand for graduates is increasing in the German labor market. (Henseke, 2019). • Young women have become the most university-educated demographic group in the labor market. (Henseke, 2019). • Men's wages have increased significantly, while the wage gap for women has remained relatively stagnant (Henseke, 2019). • Underemployment among young female college graduates has declined significantly between 1999 and 2012, approaching the level of men in the same age group (Henseke, 2019).
Petra Ahrens & Alexandra Scheele	Game-Changers for Gender Equality in Germany's Labor Market? Corporate Board Quotas, Pay Transparency and	Document analysis reviewing official documents, legislative records, news articles, and other relevant sources to understand the	• Gender equality in the German labor market has gained attention over the course of Chancellor Merkel's four terms in office. Important policy changes related to gender equality occurred during this time (Ahrens & Scheele, 2022).

	Temporary Part-Time Work	details of each policy	• The policy changes reflect the development of the German labor force model, which aims to promote parity in the workforce (Ahrens & Scheele, 2022).
Stefani Scherer, Giorgio Cutuli, Paolo Barbieri & Raffaele Guetto	Part-Time Employment as a Way to Increase Women's Employment: (Where) Does It Work?	Data Analysis from the European Labor Force Survey (EU-LFS) spanning from 1992 to 2011	• The impact of part-time employment on women's labor market participation varies by country institutional context (Barbieri et al., 2019). • Even though part-time jobs can raise female employment rates, it also contributes to Greater employment segregation along gender lines in the labor market, since females are highly employed in certain sectors (Barbieri et al., 2019).
Katharina Dengler & Anita Tisch	Examining the Relationship Between Digital Transformation and Work Quality: Substitution Potential and Work Exposure in Gender-Specific Occupations	Linear regression models	• Digital technologies can lead to improved working conditions in male-dominated occupations, where tasks can be replaced more by computers. However, this improvement is not observed in female-dominated occupations (Grienberger & Tisch, 2020). • Many women face the challenge of combining family and domestic responsibilities with their work, and time pressure contributes to higher levels of stress. (Grienberger & Tisch, 2020).
Swetlana Franken & Malte Wattenberg	Digital Gender Parity? Gender-Specific Attitudes and Competencies of Young Professionals in Germany	A quantitative online survey with a questionnaire with 28 closed-ended questions on the attitudes and competencies of young professionals in relation to digitalization	• The study found that male respondents held stereotypes that said women had lower IT and media skills and less interest in technology (Franken & Wattenberg, 2019). • Male respondents showed a higher interest in digital technologiesin comparision with their female counterparts and so women could be less open to pursue careers in

			technology-related fields (Franken & Wattenberg, 2019). • While women are active users of digital platforms, their interest does not necessarily extend to the technical aspects of digital technologies (Franken & Wattenberg, 2019). • Efforts to promote gender parity in digitization should focus on raising managers' awareness of gender issues and providing targeted training and support for women (Franken & Wattenberg, 2019). • There is a need to encourage qualified women to become supporters and role models for a new participative leadership in the digital environment (Franken & Wattenberg, 2019).
Ana Santiago Vela & Alexandra Mergener	Gender Over Education Gap in the Digital Age: Can Spatial Flexibility Through Working From Home Close the Gap?	Data analiysy for logistic models for the dichotomised outcome of overeducation	• The study found a gender imbalance in overeducation, with women at higher risk of overeducation compared with men. However, is possible to establish that is more probably that women get jobs where they are overqualified (Santiago-Vela & Mergener, 2022). • Both men and women in non-marital cohabitation benefited from the WfH (work from home) option in terms of reducing the risk of overeducation (Santiago-Vela & Mergener, 2022).
Yvonne Lott	Working Longer With Working-Time Flexibility: Only When Job Commitment Is High and Family Commitment Is Low?	Multivariate analyses were conducted to examine the relationship between working-time flexibility, job commitment, family commitment, and work hours.	• Mothers with flexible work arrangements worked fewer hours compared with childless women, childless men, and fathers, unless they had the same level of work and family engagement as the latter three groups (Lott, 2023). • Gender differences in hours worked are influenced by parental status, and these differences are partially explained by differences in work and family engagement (Lott, 2023).

			• Only workers with high job engagement and low family engagement tended to work longer hours (Lott, 2023).
Neha Vyas	Gender Inequality-Now Available on Digital Platform: An Interplay Between Gender Equality and the Gig Economy in the European Union	Literature review	• Despite the shift from the traditional labor market to the gig economy, problems of gender inequality persist and, in some cases, have even worsened (Vyas, 2020). • Female gig workers (independent contractors) are affected by algorithmic biases that can reinforce gender discrimination and inequality (Vyas, 2020). • The gender pay gap is a persistent problem, with female gig workers earning less than their male counterparts (Vyas, 2020).
Caroline E.Oehlhorn	The Paradox Evaluation of It Stereotypes a Post-hoc Analysis of Women's Missing Interest in It Study Programs	Expert Interviews	• IT-related stereotypes persist and impact women's self-efficacy and outcome expectations when considering IT studies. Negative stereotypes contribute to women's reluctance to pursue IT careers (Oehlhorn, 2018). • Participants expressed fears of not having IT-related skills or knowledge and felt that negative stereotypes diminished their confidence in studying or pursuing an IT career (Oehlhorn, 2018). • Positive stereotypes did not appear to impact on self-efficacy or outcome expectations (Oehlhorn, 2018).

Note: Data collected by author in 2023.

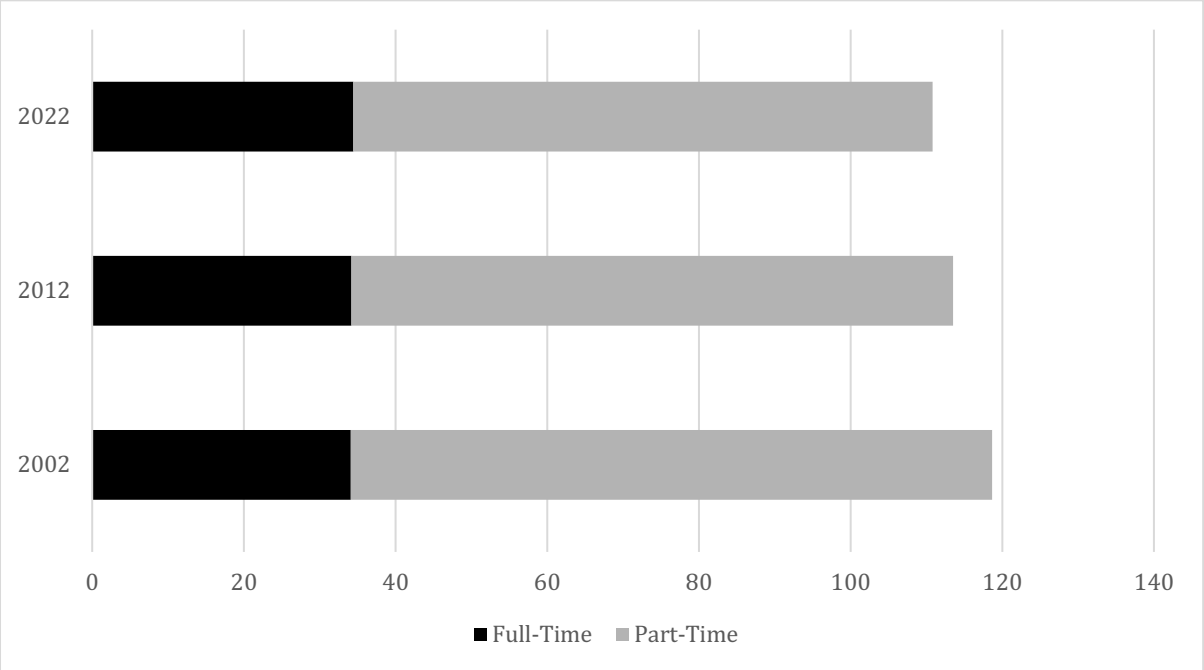
Chapter 3: Theoretical Framework

The proposed theoretical framework for this research is intended to form the basis on which the study unfolds. It provides a comprehensive set of concepts and theories that are essential for the clarity and interpretation of complex phenomena, especially in the different issues addressed in this thesis. Within the framework of this study, which focuses on the contribution of women to alleviating labor shortages and the relevance of technological change in different sectors of the German economy, a solid theoretical framework is of utmost importance. It is essential to understanding the intricate interplay between gender dynamics, the challenges of labor shortages, and the myriad changes and opportunities that digital transformation brings. The theoretical inquiry conducted here serves as a compass to guide the research toward answering the central research question. Moreover, to facilitate this exploration, relevant and contextually significant documents were also carefully filtered out, including studies, books, and official reports that specifically address these issues. Academic databases were used in the selection process to ensure that the most relevant and pertinent information on the three constructs was included.

3.1 Regarding Women in the Workforce

While women are increasingly pursuing careers nowadays, it is crucial to delve deeper into the current situation of women to formulate feasible strategies and programs that truly address their needs. Even tough women are the 50.9% of the total population, according to national statistics, only 46.8% are employed in some form in 2022 (Statistisches Bundesamt, 2023f). While at first glance this percentage does not differ significantly from men's participation in the labor market, a closer look reveals a differentiated picture. Of this 46.8%, only 34.4% of women work full-time, while 76.4% work part-time as can be implied by the Figure 1.

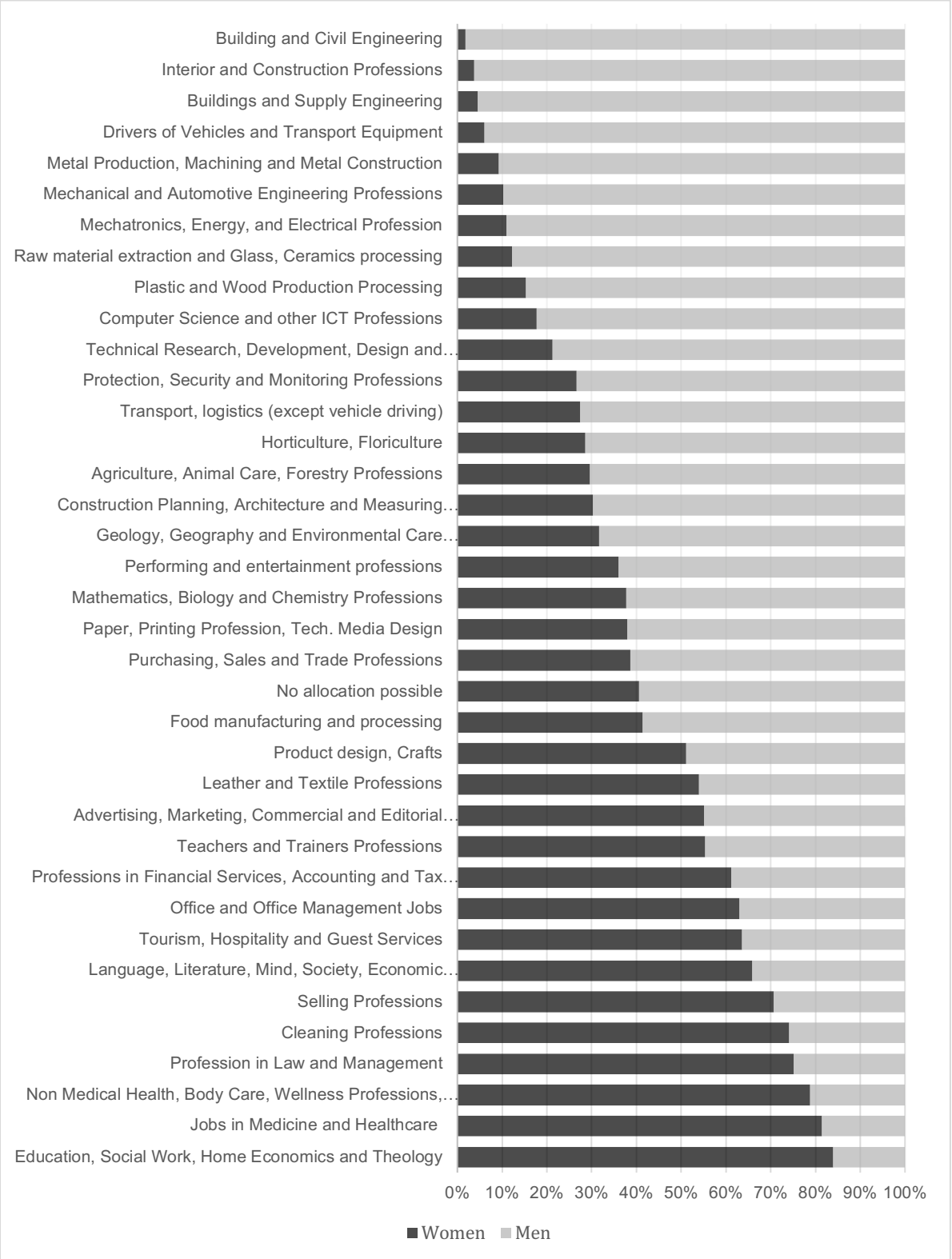
Figure 1 Percentage of Women Working Full-Time and Part-Time in Germany for the Years 2002, 2012 and 2022



Note: Adapter from “Teilhabe von Frauen am Erwerbsleben, Ergebnis der Arbeitskräfteerhebung” by (Statistisches Bundesamt, 2023f). *Destatis.* (https://www.destatis.de/DE/Themen/Arbeit/Arbeitsmarkt/Qualitaet-Arbeit/Dimension-1/teilhabe-frauen-erwerbsleben.html). CopyrightStatistisches Bundesamt (Destatis), 2023.

While the Figure 1 illustrates a decline in the percentage of women employed part-time from 84.6% in 2002 to 76.4% in 2022, this decline is not reflected in the percentage of women employed full-time, which has remained constant at 34% over the past three years. In terms of industry, based on the Federal Employment Agency's latest report regarding women and men workforce insights by 2022, women disproportionately dominate the tertiary sector, while men continue to dominate sectors such as transportation, logistics, construction, and manufacturing (BA, 2022). This immediately reveals a critical disproportion since sectors such as the automotive industry, mechanical engineering, the chemical industry, and the electrical industry are the most robust sectors of the German economy (Orth, 2023). And these sectors are also traditionally dominated by men. The following figure shows an overview of the German workforce landscape per sectors of the economy.

Figure 2 Percentage Share of Men and Women in Economic Sectors in Germany by 2022



Note: Adapter from "Beschäftigte nach Berufen (KldB 2010)" by (Bundesagentur für Arbeit, 2023a) (https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwjk0Yjgpa2CAxVVgf0HHa2_AWsQFnoECBgQAQ&url=https%3A%2F%2Fstatistik.arbeitsagentur.de%2FStatistikdaten%2FDetail%2FAktuell%2Fiiia6%2Fbeschaeftigung-sozbe-kldb2010-zeitreihe%2Fkldb2010-zeitreihe-d-0-xlsx.xlsx&usg=AOvVaw2qv1OCr00_E7C1Z9YMYYAI&opi=89978449). Copyright Bundesagentur für Arbeit 2023.

While the numbers in Figure 1 show a great number in terms of participation of women, Figure 2 shows that the sectors with a higher proportion of men appear particularly attractive, as these sectors correspond to the strongest sectors of the economy. Furthermore, it is high consider that in terms of investment in research and development, sectors such as the automotive industry, electronics, and mechanical engineering are at the forefront. For example, the automotive industry invested 26.00 million euros in 2021 (Federal Ministry of Education and Research, 2023). Considering that this study focuses on the importance of the women role in those industries, where the relationship between women in Germany and ongoing technological innovations is paramount. The following section therefore aims to examine women's participation in digitization and related aspects.

3.2 Women and Digitalization in Germany

Within this section, it explores the relationship between women and digital and technological advances. Moreover, some studies emphasize how digitization could even bridge the gender gap in employment, a topic of great importance in the German government's Third Gender Equality Report of the German Government, which underlines the importance of gender-sensitive digitalization for equal opportunities among females and males (Lambrecht & Yollu-tok, 2021). Achieving this fairness is not an easy task, however, as various factors influence women's access to digitization to varying degrees. In Germany, for example, official data show that women still have limited Internet access, which prevents them from fully benefiting from digitization (Statistisches Bundesamt, 2023d). Perhaps it may seem exaggerated to emphasize these small inequalities, but the reality is that Internet access is essential among females as males in relation to use and excel technology. The lack of internet access or the lack of intention to learn how to use technological tools can lead to a learning bias in children, which ultimately results in their inability to apply for positions that demand knowledge and skills in regard to Internet. This aspect is evident in the OECD's findings on available information from G20 countries: By the age of 15, only 0.5% of young girls aspire to a position in IT, whereas 5% of young boys do. Furthermore, twice as many boys express the desire to

become an engineer, scientist, or architect (OECD, 2019). Moreover, it is not just about Internet access for future professionals, but also about ensuring universal access to this important service regardless of gender. Indeed, Internet access for girls' education can have a profound impact on the quality of their learning experience. This, in turn, can affect literacy and lead to difficulties in subjects such as mathematics or STEM studies (Muheed, 2023).

Furthermore, it is worth highlighting that addressing these issues related to technology also requires attention to what happens in educational institutions. Promoting interest and relationship with areas affected by the digital transformation and requiring staff in which women can also actively participate is crucial. Simple internet access alone does not necessarily promote inclusion. For instance, in countries like Indonesia, a study examined the consequences of internet on an emerging market. The study concluded that mere internet access does not automatically lead to a more female workforce, as some women lack the necessary skills and confidence to use technological tools. As a result, it can be difficult for them to acquire the skills required for highly skilled jobs, which can be counterproductive for women (Kusumawardhani et al., 2021). Nevertheless, this is a sample since the circumstances differ in each country specific context. However, successful technological integrations for women do exist as is the case of China. Even in a remote region that primarily relies on agriculture for sustenance, China has enabled young women to access jobs unrelated to agriculture through the internet. These have resulted in an 8% increase in the proportion of women in these positions and an overall improvement in their quality of life. This emphasizes the importance not only of expanding internet access but also of empowering women with the necessary skills and assistance to effectively leverage digital opportunities (Wang et al., 2022). The key difference lies in technological literacy, which proves crucial when comparing the cases of Indonesia and China.

3.3 Female Leadership and Entrepreneurship in Digital Ecosystems

While women's overall percentage of workforce remains high, the proportion of women in the various employment sectors has hardly changed. Only one in three executives is a woman, or 28.9% in 2022, a slight increase of 0,3% more since 2012 (Statistisches Bundesamt, 2023b). The participation of women in high-level positions and decision-making roles is another aspect that needs to be examined. This is because greater participation of women's participation in these sectors leads to greater benefits for their overall development. The inclusion of diverse groups can help address the challenges posed by digital ecosystems, for example. One sector where women's participation is crucial, for instance, is the field of artificial intelligence (AI). A UNESCO study from 2019 found that only 18% of C-suite positions in large AI start-ups worldwide are held by women (Neff et al., 2022). This imbalance also extends to the development of AI systems and can lead to technology that is inaccessible to and exclude women. However, if women do not actively participate in this type of innovation, these advances will most likely only focus on the visions and understanding of men, indirectly leading to exclusion. Since women are poorly represented in this field, they are constantly confronted with questions and judgments about their ideas, regardless position, or rank, and must constantly prove their credibility and expertise to their male colleagues (Deloitte AI Institute, 2023). This is also reflected in the dominance of all-male groups, which account for nearly 70% of digital startups (Lambrecht & Yollu-tok, 2021).

In terms of women's participation in entrepreneurship, the Bridging the Digital Gender Gap Report indicates the male predominance among investors and decision makers in venture capital firms, making it hard to get support for ideas that address women's challenges (Ullrich, 2017). In addition, a study by KFW shows that the vast majority (83%) of venture capital funding is provided by male founding teams and only a small percentage is provided by mixed or all-female teams (Volk, 2022). In response, the German government has introduced strategies to promote gender diversity in entrepreneurship. Initiatives such as the Future Fund prioritize support for venture capital teams that include women and immigrants, while the

"Gründungsstrategie - EXIST-Frauen" funding program specifically supports business ideas led by women (BMWK, 2022a). Although the impact of these strategies cannot yet be quantified, the percentage of women founders in startups in the liberal professions has increased to 55% (BMWK, 2023b). This program establishes a separate subdivision of the Investment Fund specifically focused on strengthening and supporting women-led business ideas. Although there is currently a lack of statistical data demonstrating the exact impact of these strategies on women's entrepreneurial development, it is worth noting that in 2022 the percentage of women founders in independent professions increased for the second consecutive year, reaching 55% (BMWK, 2023d). Moreover, expected ventures must meet the country's expectations for digital implementation, which means that they must be fully digital (Die Bundesregierung, 2022a).

3.4 Women in the Fields of Digitization and the Role of Governments

Due to the economic implications of digitalization and women's participation in the workforce, it is crucial to analyze the measures taken by the German government to encourage women to become part of the labor market. It's worth noting that, given the historical context of women worldwide, the gender employment imbalance is not exclusive to Germany but is a problem that transcends countries. Global efforts to address the gender digital gap have gained increasing importance. This is demonstrated by the International Women's Day Celebration in 2023 where the central topic was "DigitALL: Innovation and Technology for Gender Equality" (UN Women, 2022). The gender digital divide, or digital divide, encompasses both inequality in access to information technologies and the knowledge to use them effectively (Davaki, 2018). It goes beyond mere access and includes factors such as access to digital devices, technological literacy, and the ability to use technology consciously (Zaramenskikh & Fedorova, 2021). Meanwhile, increasing the proportion of women in the European technology sector could increase the European Union's GDP by 16 billion euros (Koukkides-Procopiou et al., 2023).

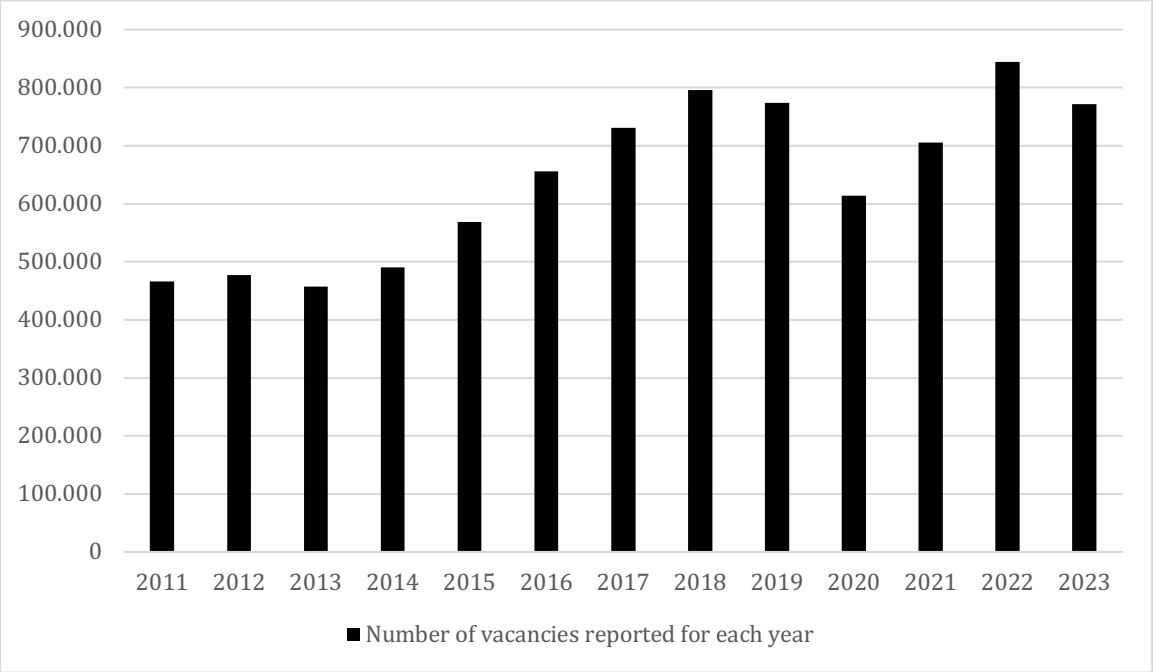
In the case of Germany, the German government has also developed several strategies to tackle this problem. As the Digital D21 initiative that aims to assess the readiness of society to cope with technological progress and the readiness of Germany's inhabitants for digital transformation (Initiative D21, 2023). While it is not specifically designed to help women acquire digital skills, it is anticipated that women can also benefit from this program, which provides information about the digitalization landscape. As a general program, it is measured by various indices, including a specific gender index, the Gender-Specific Digital Index. In 2022, this index scored 57 out of 100, indicating potential for improvement (Initiative D21, 2022). The program also highlighted the gender digital divide, which showed a difference of 11 percentage points among females and males in Germany in 2019 (Initiative D21, 2019).

There are several reasons for the low participation of women in these sectors in the country. One of the reasons is the social and cultural perception of women, where cultural associations link women with "soft skills" and often place them in roles that primarily require such skills (ILO, 2019). The effects of these cultural associations and stigmatization go beyond career choices and employment opportunities, as they directly influence women's self-perception as inferior. Therefore, it is not unexpected that women are underrepresented in science, technology, engineering, and mathematics (STEM) fields resulting in a consequently low percentage of women in STEM professions (UNESCO, 2023). In Germany, only 10.8% of jobs in the fields of mathematics, computer science, natural sciences, and technology (STEM) were held by women in 2019, and only 22.6% of academic professionals in these fields were women (Anger et al., 2022). Figures highlighting women's underrepresentation, also offer opportunities, as current numbers indicate a shortage of around 300,000 professionals in STEM fields, particularly in these areas (Gesing, 2023).

3.5 The Problem of Labor Shortages in Germany

As expressed in this study, the issue of labor shortages in Germany is not a problem with a single cause, and therefore there cannot be a one-size-fits-all solution that addresses all of its effects. The assertion that integrating more women into the labor market would solve this problem ignores the existence of other factors that are different in the various sectors of the German economy. Therefore, it is important to emphasize that while labor shortages are commonly discussed as a construct, the reality is different, and many industries are facing labor shortages without realizing it. According to Statista data, sectors such as transportation, logistics, retail, healthcare professions and skilled trades have the most vacancies. In 2021, only the skilled trades sector reported 60,000 vacancies (Statista Research Department, 2023)**.** Vacancies and their long time it takes to fill them are the indicators that this study uses as evidence of a labor shortages. This problem of finding applicants is directly reflected in the country's overall data, as the number of vacant and unfilled positions has increased from 134,156 in 2012 to 632,488 in 2022, according to data from the Competence Center of Excellence for Skilled Crafts (KOFA, 2023). Figure 3 clearly shows the upward trend in job vacancies between 2010 and 2023.These statistics, compiled by the Employment Agency, not only serve as an indicator of economic growth, but also provide valuable insight into the role of technology and show that it has not caused the expected decline in employment. The labor shortage has cost the country around 100 billion euros in added value (DIHK, 2023b).

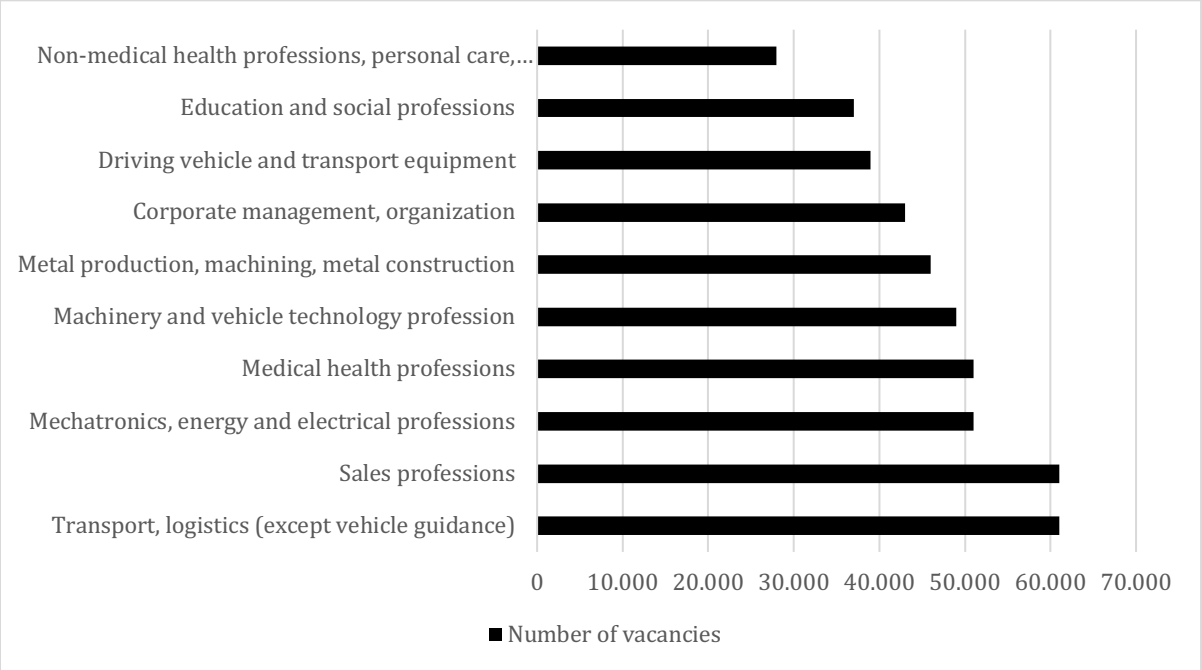
Figure 3 Number of Vacancies Reported to the German Federal Employment Agency From 2011 to 2023



Note: Adapter from "Frühindikatoren für den Arbeitsmarkt by (Bundesagentur für Arbeit, 2023b). (https://statistik.arbeitsagentur.de/SiteGlobals/Forms/Suche/Einzelheftsuche_Formular.html?gtp=15084_list%253D7&topic_f=analyse-fruehindikatoren) Copyright Bundesagentur für Arbeit 2023.

In addition, sectors such as logistics are severely affected by the shortage of truck drivers, making it increasingly difficult to bring end products to market and to supply industry with raw materials and inputs (DIHK, 2023a). On the other hand, vacancies in sectors such as building materials manufacturing, sanitation, and elderly care remain unfilled for long periods of time, with an average duration of 249 days, 241 days, and 251 days, respectively (BMWK, 2023c). This is an extraordinarily long time and affects not only the industry itself, but also its workers, who must compensate for their absence by working overtime. Although many industries are affected by this problem, this study will focus on industries where technology plays an important role. However, to shed light on the problem itself, Figure 4 below illustrates the sectors that were most affected by the labor shortage by August 2023.

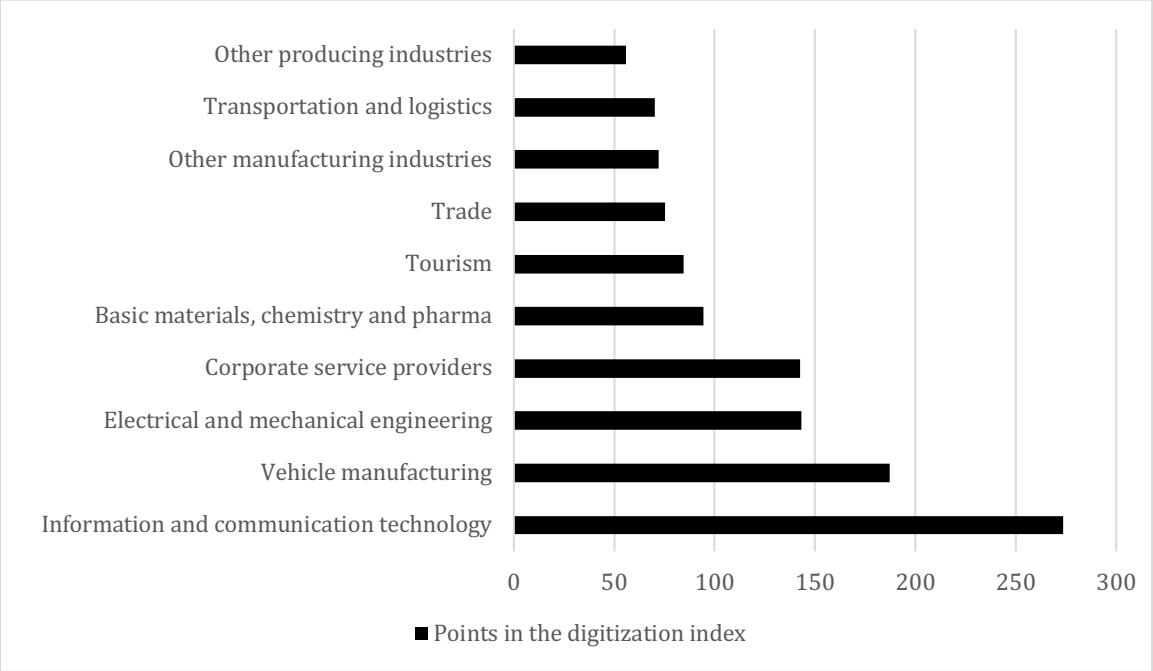
Figure 4 Vacancies Reported to the German Federal Employment Agency for the Month of August 2023 by Sector



Note: Adapter from "Gemeldete Stellen: Top Ten der Berufe", by (Bundesagentur für Arbeit, 2023c). (https://statistik.arbeitsagentur.de/Statistikdaten/Detail/202309/arbeitsmarktberichte/topten-top-ten/top-ten-d-0-202309-pdf.pdf?__blob=publicationFile&v=1). Copyright Bundesagentur für *Arbeit* 2023.

In addition, it is essential to highlight that, based on the information presented in Figure 4, the sectors most significantly affected by labor shortages are those traditionally recognized as male-dominated sectors. When considering the sectors that have encountered the most pronounced impacts from technological and digital transformation, as depicted in Figure 5, it is apparent that specific industries, such as transportation and logistics, find themselves grappling with both labor shortages and the consequences of digital transformation simultaneously.

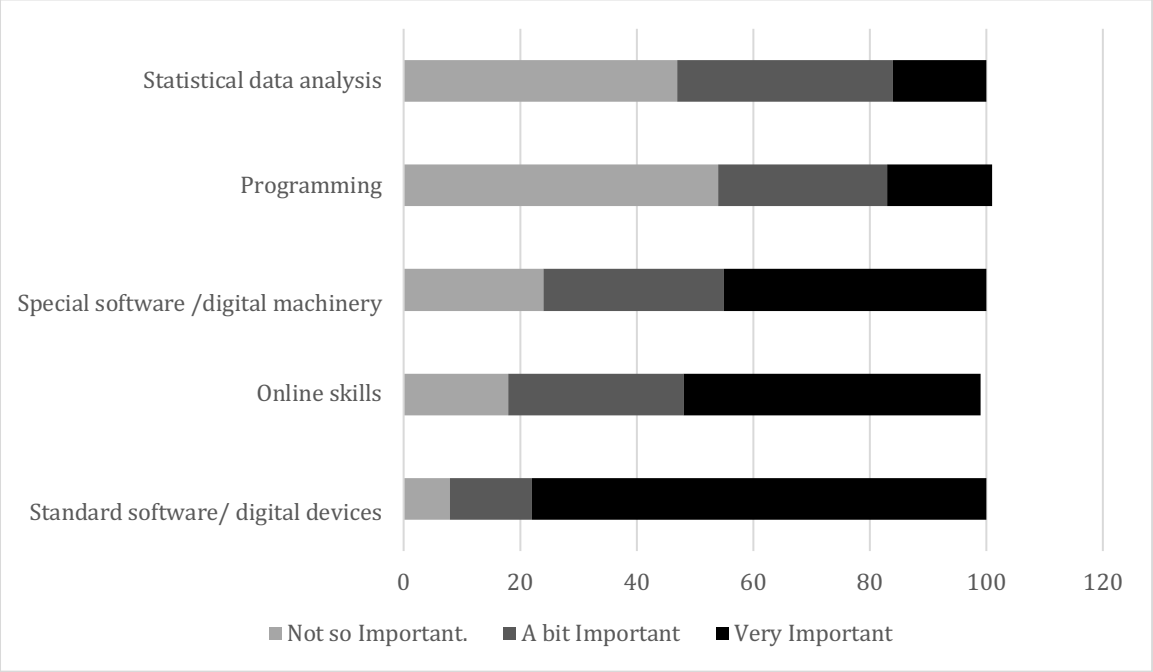
Figure 5 Most Digitised Sectors of the German Economy According to the Digitalisation Index



Note: Adapted from "Digitalisierung der Wirtschaft in Deutschland-Digitalisierungsindex 2021", by (Bundesministerium für Wirtschaft und Klimaschutz, 2022). (https://www.bmwk.de/Redaktion/DE/Publikationen/Digitalisierungsindex/publikation-download-zusammenfassung-ergebnisse-digitalisierungsindex-2021.pdf?__blob=publicationFile&v=) Copyright Bundesministerium für Wirtschaft und Klimaschutz 2022.

Furthermore, it is evident that the sectors that seem to be most influenced by digitalization also tend to have a higher male presence. This presents a great opportunity forwomen who areseeking a stronger presence in these sectors enabling them to reap the benefits of digital transformation. To achieve this, it is crucial to understand the skills that are required in the realm of digital transformation. Figure 6 illustrates the essential skills needed in organizations undergoing technological change. This highlights that encouraging women to become more involved in areas that require technological expertise is not limited to direct involvement in IT roles. Several other sectors that are both directly and indirectly influenced by technology provide women the opportunity to have a successful career.

Figure 6 Basic Skills Required for SMEs in Germany



Note: Adapted from "Digital skills shortage is hampering German SMEs' digital transformation – is upskilling the answer?", by (KfW Research, 2020). (https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-Fokus-Volkswirtschaft/Fokus-englische-Dateien/Fokus-2020-EN/Fokus-Nr.-277-February-2020-Digital-skills.pdf) Copyright KfW Research 2023.

Figure 6 illustrates the digital and technological skills required in German small and medium-sized enterprises (SMEs), as shown by KfW research. When looking at the figure, it becomes clear that skills such as proficiency in standard software and using digital devices are of the utmost importance. This importance is well-founded, as many modern companies work with software programs such as Microsoft and expect their employees to have computer and software application skills. These skills fall within the scope of digital transformation as defined in this study and contribute to its goals, regardless of whether they are classified as basic knowledge.

3.6 New Skilled Labor Strategy to Counteract Labor Shortages

The issue of labor shortages has already been addressed in government strategies and various programs have been implemented to mitigate the impact on the actual market of the German economy. One of the most recent projects that Germany has undertaken is the

program called "Fachkräfte für Deutschland" which consists of five different initiatives. It is worth examining these initiatives in this study as one of them deals directly with the integration of more women into the labor market (Die Bundesregierung, 2022a). The first initiative is modern and dual education that considers digitalization, sustainability, and environmental protection to efficiently and effectively provide companies with skilled workers (BMAS, 2023b). The second initiative is continuous education, which aims to create learning opportunities for people of all ages in Germany. Tools such as the My Now portal (National Online Portal for Continuing Vocational Education) provide a one-stop shop for information on continuing vocational education, guidance, and support in navigating the complex system of continuing education, including information on public funding (BMAS, 2023c). In addition, the Federal Employment Agency offers interactive resources to help individuals find appropriate courses or guide them through career changes (BMAS, 2023a). In addition, the Federal Employment Agency offers several interactive rubrics to help individuals figure out which courses are best for them or what they need to do if they want to make a career change (Bundesagentur für Arbeit, 2023d). The third initiative aims to improve the quality of work and change the work culture, focusing on improving people's quality of life. It is important to find a balance between the opportunities and challenges of digitalization, such as flexible and mobile forms of work, while addressing concerns related to the dissolution of boundaries and densification (DAA Stiftung, 2022). This initiative is supported by the government for companies through the INQA program, which helps companies advance the issue of a better work culture through various multimedia tools (INQA, 2023). The program aims to help companies implement practices that prioritize employee well-being and promote a positive work environment.

Government initiatives are aimed not only at retaining and developing the existing workforce, but also at attracting additional employees to match the labor market's needs. The Modern Immigration Policy aims to simplify the migration process for workers from third countries by expanding post-entry recognition procedures and offering incentives (BMWK, 2022b). Germany aims to become one of the most attractive countries for migration. Therefore, this

initiative is supported by laws such as the right to stay, facilitating the immigration of skilled workers, direct access to integration courses, and more consistent expulsion of criminals (BMI, 2023).

In addition, Germany recognizes the untapped potential of unemployed women, especially mothers, who want to return to employment system. Through initiatives to increase labor force participation, efforts are being made to encourage mothers to re-enter the workforce, while encouraging society to adopt greater flexibility, such as flexible work schedules, and calling on the state to provide more childcare and care spaces to help mothers return to work (Die Bundesregierung, 2022b). This strategy not only encourages mothers to return to work, but also promotes greater flexibility within society, such as flexible work schedules, and calls on the state to provide more childcare and childcare spaces to help mothers return to work. It is worth noting that this initiative not only benefits female nationals born in Germany, but also those arriving as refugees or migrants with university education. However, several challenges still need to be addressed, including legal frameworks, gender roles, lack of childcare facilities, language skills, and recognition of foreign qualifications and experience (Hillmann & Toğral Koca, 2021). This idea is perhaps not illogical given that approximately three-quarters of female refugees in Germany are under the age of 35 (PHINEO, 2018). Since over half of female arrivals in Germany reach productive age, creating optimal conditions for their integration can significantly contribute to reducing Germany's labor shortage. While migration studies have historically viewed migration as a masculine issue, women's and gender studies have played a great role in reshaping this perspective since the late 1970s (Hanewinkel, 2018). The importance of this approach is underscored by the fact that 3.2 million women from third countries lived in Germany in 2021 alone (Bundesamt für Migration und Flüchtlinge, 2023b). Indeed, a simple look at the numbers confirms the extent and potential of the situation. According to the Central Register of Foreigners, there were approximately 11.4 million foreigners living in Germany at the end of 2020 (Bundesamt für Migration und Flüchtlinge,

2023a). Although gender inequality in labor market integration among migrants persists, with a gender gap of 29 percentage points (DIW Berlin, 2019).

On the other hand, the government has implemented several other measures, including the gender quota, which has been in effect since 2016. This quota requires that at least 30% of supervisory boards of listed companies and companies with equal codetermination be made up of women (DIW Berlin, 2021). While this quota encourages companies to diversify their workforce, it is important to recognize that, as shown earlier in this study, inequality begins long before women enter the workforce, and it will be difficult to meet the quota if women do not have the necessary skills for such positions. In addition, the Interdepartmental Equality Strategy emphasizes the importance of equality policy standards in the digital domain, including actions to avoid algorithmic discrimination and guarantee equality considerations during the creation and hiring of digitization-related positions (Dritter Gleichstellungsbericht, 2020). Addressing these inequalities requires a broader perspective on the perception of work that includes feminist perspectives, challenges normative notions, and incorporates diverse experiences. This includes recognizing the importance of social reproduction, home-based care, and understanding the complexity of work and volunteering (Richardson, 2018).

3.7 Digitalization in Germany and Its Impact on the Labor Market

As the digitization of tasks continues, driven by the constant evolution of digital technologies, the nature of work becomes increasingly complex, modular, and decontextualized (Bucher & Fieseler, 2017). This transformative effect of digitization extends to various aspects of life and cannot be underestimated. This section explores how these innovations have penetrated the labor landscape and how they can be used to address gendered perspectives and concerns. Digitization and technological advances have the potential to benefit workers rather than increase their workload and stress. To achieve this, it is critical to develop technological approaches that protect workers from excessive demands and prolonged stress. This can be achieved by involving workers in the development and implementation of technologies

(BMWK, 2016). While the government is implementing various digitization initiatives to provide fair and equal opportunities in the labor market. Specially plausible progress has been made in the areas of Big Data analytics, cloud computing, machine learning, wireless data transmission, and social media, which are fundamentally changing work models and people's lives (Schildt, 2020).

One of the most notorious examples of the transformation of work is the virtualization of spaces, which of course can be crucial for women with special requirements looking for jobs' opportunities. Some authors point out that this could be a driver to close the gender gap in the labor market, especially through the virtualization of workspaces and the exploration of freelance opportunities and technologies in the workplace (Baptista et al., 2020). Virtual workspaces, such as remote work or home offices, allow work to be done from any location that has an Internet connection (Messenger & Gschwind, 2016). The availability of remote jobs can be of great benefit to women living in marginalized areas or villages with limited labor supply. In this context, the prospect of remote work opens a much wider range of options for women, particularly in terms of finding jobs with flexible hours that are better suited to their individual needs. For example, a mother who can only work when her children are in school, or daycare may have a better chance of finding a job that suits her schedule if the option of working from home is available. The research acknowledges women's potential to be part of the solution to the labor shortage. However, to fully realize this potential, it is critical to create optimal conditions that enable their integration into the labor market. This paper examines and explores these conditions in depth using a range of selected research methods. The aim is to provide evidence-based findings that contribute to the discussion.

Chapter 4: Research Question

The German labor market is increasingly changing due to the many technological innovations and improvements brought about by the current age of technology. However, it faces a dual challenge: achieving gender parity and addressing the labor shortages. Despite numerous efforts to empower women and promote their active participation as rights holders in the country, there are still various obstacles to overcome, especially in areas that are commonly considered male-dominated and where digitalization plays an important role. Overcoming these obstacles and encouraging women to take control of their professional lives in these fields is the focus that will be addressed in the upcoming chapters of this study. With the aim of demonstrating that women who want to work more or pursue their professional careers can be well-suited for many of the increasingly available positions in a labor market shaped by digitalization and technology, this study explores the possibility that women can be the key in mitigating labor shortages. It assesses the baseline situation for women to understand the reasons why those who want to work more or start their careers are holding back. This study is exploratory and descriptive. Its aim is to explore this field in order to shed light on the challenges that need to be in consideration. Therefore, the research aims to understand an inclusive labor market that provides equal opportunities for women and meets the needs of the industry. The research question guiding this study is therefore:

Can the Participation of Women in the German Labor Market Contribute to Mitigating Germany's Labor Shortage in Digitally Transforming Industries?

In the aim of answering this question, the following sub-questions were proposed:

- How do companies perceive the role of women in addressing their labor shortages?
- What are the key challenges and barriers that women encounter in the German labor market when they are seeking employment or career advancement in industries facing

labor shortage? and what strategies have the companies implemented to encourage greater women participation in the work force?

- How does the participation of women in the German workforce align with the demand for skilled labor in industries undergoing digital transformation and how do companies support it?

Chapter 5: Research Design

The research methodology chosen to answer the research question is qualitative in nature and uses a "multi-methods in focus" approach. This approach involves an interpretive and naturalistic focus on the study (Denzin & Lincoln, 2005). The choice of this method is determined by the exploratory and descriptive focus of the study. The main objective of this study is to gain insight into the situation of women in the German employment market and to identify whether they could play any role in alleviating the labor shortage currently affecting Germany. This methodological approach was chosen because it allows for comprehensive, intentional, systematic research specifically designed to maximize the discovery of generalizations that contribute to the description and understanding of a particular phenomenon (Mccallum & Howes, 2018). Furthermore, the research is inspired by the German government's "Strong for the Future" initiative," which focuses on eliminating gender inequalities in job search (Bauer, 2023). Moreover, in order to answer the research question and its sub-questions, a triangulation strategy was proposed that combines different qualitative analytical tools (Yin, 2017). Triangulation of methods allows for cross-validation of the collected data, thus increasing the robustness of the conclusions drawn.

In this study, a multifaceted approach to data collection was used in terms of triangulation. First, a document analysis was conducted that included a thorough review of official documents, including digitization strategies, government initiatives, labor market reports, and gender equality policies. This analysis provided a comprehensive overview of the existing

landscape and served as the basis for the research. Second, qualitative interviews were conducted with HR managers in various companies. In this way, insights and perspectives were obtained directly from the corporate sector. These interviews provided valuable information on how companies perceive the role of women in addressing labor shortages and offered a nuanced perspective on the research question. Finally, qualitative interviews were also conducted with women and feminist groups. These interviews provided a deeper understanding of women's current experiences and perceptions in Germany the central topic of the research. These interviews offered a crucial societal perspective and added a qualitative dimension to the research.

5.1 Recruitment, Sampling, and Conducting Expert Interviews

The processes of data collection, sampling, and analysis of the information obtained from the expert interviews constitute a key section in this research project. These aspects have provided the research with the essential data needed to answer the sub-questions of the study, which will be discussed in more detail later in the study. In the context of this study, which is designed to examine the potential of women living in Germany to mitigate the prevailing labor shortage and the technological acumen required to do so, the sample selection and the number of participants were critical to the progress of the study. The following sections detail the procedures used to interview two distinct groups: Women working in organizations that advocate for women's rights and individuals working in recruitment in various companies in Germany.

5.1.1 Expert Interviews With Women´s and Feminist Groups Offering Various Forms of Support

Interview group participants were selected through purposive sampling (Campbell et al., 2020). Because these groups and associations aim to assist women with various issues, it was assumed that individuals who work or volunteer for these groups would have a deeper understanding of women's issues and could make an important contribution to the discussion.

Random and at random sampling was used to facilitate the selection of organizations (Stratton, 2021). In this approach, these organizations were searched and contacted through their websites and provided email contacts. In addition, consultation with the appropriate contact person helped identify the most appropriate interviewees through purposive sampling. It is worth noting that some organizations had a significant number of employees, so more than one person participated in the research. Interviews were performed in August 2023. Initially, a total of 55 organizations were contacted that met the necessary criteria to participate in the study. Ultimately, interviews were conducted with a total of 14 individuals. Detailed information of the sample is presented in Table 2.

Table 2 Overview of the Participants in the Expert Interviews With Women Focus

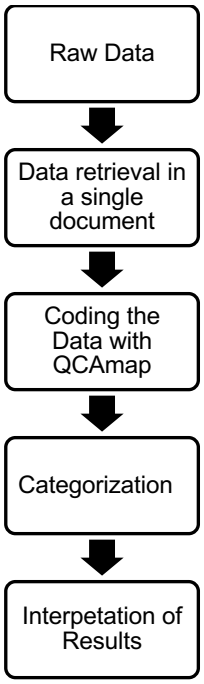
ID	City	Date
E01	*Bonn*	*18/8/2023*
E02	*Potsdam*	*18/8/2023*
E03	*Aachen*	*22/8/2023*
E04	*Kronberg*	*23/8/2023*
E05	*Berlin*	*27/8/2023*
E06	*Oldenburg*	*28/8/2023*
E07	*Köln*	*29/8/2023*
E08	*Frankfurt am Main*	*29/8/2023*
E09	*Frankfurt am Main*	*30/8/2023*
E10	*Berlin*	*30/8/2023*
E11	*Berlin*	*30/8/2023*
E12	*Hamburg*	*30/8/2023*
E13	*Mainz*	*31/8/2023*
E14	*Erkrath*	*31/8/2023*

Note: Data collected by author in 2023. n=14.

Interviews were conducted electronically using a semi-structured guide that included 13 questions of both a demographic and specific thematic nature (for more information, see the appendix of the document in which the guide is provided). Prior to answering the questions, participants were required to provide authorization for the treatment and use of their information and data according with the GDPR agreement (GDPR, 2018). It was agreed that

the information collected during the interviews would be used solely for this document and for academic purposes. In order to ensure the protection of their identities and potential issues, it was decided to keep the names of the participants and the organizations in which they work anonymous. The analysis of the interviews was conducted using a semi-structured approach guided by an inductive focus aimed at the process of abstraction to summarize and categorize data (Kyngäs, 2020). First, all interviews were summarized into a single document. Categories were then formed to group the data into closed categories to narrow the scope of the analysis. Categorization and document processing were facilitated using QCAmap software. Coding guides can likewise be found in the appendix of this document. Figure 7 illustrates the process of data analysis.

Figure 7 Process of Data Analysis of Interviews Conducted for This Study



Note: Figure of the process carried out to analyse the obtained information created by the author.

5.1.2 Expert Interviews with People Involved in Recruitment in Germany

A very particular approach was taken in the selection of individuals to be interviewed during the recruitment process. Specifically, a cluster sampling method was used. This method was chosen because the goal was to gather insights from individuals involved in the recruitment process. Therefore, only individuals working in this field were considered. The cluster sampling method was deemed appropriate because it reduces the sample size for large populations and tends to result in less variation (Berndt, 2020). The LinkedIn platform was used to systematically contact individuals who were involved in recruitment. Only individuals who were identified in the search results and met the criteria for being part of the recruitment cluster were contacted. They received concise messages explaining the purpose of the contact and were invited to participate in the study. Interviews were conducted via telephone during the first three weeks of September 2023. A total of 65 individuals were contacted through the LinkedIn platform. However, interviews were only conducted with 18 individuals who were willing to engage in a call and answer the pre-sent interview questions to establish a higher level of rapport with the interviewees. Details on the characteristics of the sample can be found in Table 3.

Table 3 Overview of the Participants in the Expert Interview Sample HR People Who Work in Recruiting

ID	*Industry*	*Number of Employees*	Date
R01	Emergency Assistance	75	07/09/2023
R02	Saas IT	+ 100	07/09/2023
R03	Tech	600	10/09/2023
R04	Market Research	70	10/09/2023
R05	Business management consultant	50	10/09/2023
R06	Technik	230	12/09/2023
R07	Tech	21500	13/09/2023
R08	Food and confectionery industry	6100	14/09/2023
R09	Science	400	14/09/2023
R10	Science	2500	14/09/2023
R11	Insurance-tech	180	14/09/2023
R12	Glass and Packaging	+10000	17/09/2023
R13	Renewable Enegry	2000	17/09/2023
R14	Tech	42	19/09/2023
R15	Automotive	1695	20/09/2023
R16	Logistics	78000	20/09/2023
R17	Tech	30	20/09/2023
R18	Gaming	280	22/09/2023

Note: Data collected by author in 2023. n=17.

Interviews with employees working in human resources in functions such as talent acquisition or recruitment were conducted using a semi-structured guide consisting of 17 questions divided into the following six sections:

a. *Company Profile*
b. *Labor Shortage Awareness*
c. *Recruitment strategies*
d. *Women Inclusion*
e. *Challenges for Women in employment*
f. *Digital skills and Training*

Prior to conducting the interviews, participants were given the opportunity to read through the questions and were assured that their LinkedIn usernames or other sensitive company-related information would not be used. Before the interviews began, participants were asked for their

consent to use the information they provided In compliance with the regulations outlined in the General Data Protection Regulation (GDPR,2018). They were also assured that the information they provided would not be used for commercial purposes, but only for scientific purposes in this document.

A semi-structured approach was also used to analyze the interview results, using an inductive method, considering the ease with which this method allows the empirical context to be analyzed and creatively presented (Corley et al., 2021). Following the established procedure for analyzing the results, all responses were first compiled into a single document. Then, a quick categorization of the responses to each question was done to identify relationships between the responses and structure the analysis. Categorization was performed using QCAmap software (categorization guidelines can be found in the Appendix of this document). The procedure for analyzing the information collected in this round of interviews is similar to the procedure shown in Figure 7 for the data analysis in the previous section.

5.1.3 Ethical Considerations in the Interviews

Ethical considerations were closely followed in conducting the expert interviews, which included women's groups and associations as well as recruiters working in Germany. The first ethical principle followed was the explicit permission of each expert to use the information they provided only for academic purposes and to fulfill the research objectives. In addition, participants were explicitly informed of their compliance with the data processing agreement in accordance with European regulations to ensure the protection of their identity and to minimize potential future risks for both the participating organizations and the feminist associations. Participants were fully informed about the research objectives and the data processing carried out during the interviews to establish transparency in the interviewer-participant relationship. Regarding ethical disclosure of interviews, there are differing opinions among researchers. Some advocate for a one-time consent upfront, while others consider the possibility of a continuous consent model throughout the interview process (Allmark et al.,

2009). In this study, conventional ethical standards were followed, and pre-consent was obtained to provide participants with a sense of security and trustworthiness (Nii Laryeafio & Ogbewe, 2023).

5.2 Conducting Document Analysis

The baseline data selected for this section include a compilation of official reports from governmental and nongovernmental agencies, private research, and publications from organizations concerned with labor shortages in Germany. These documents come from a variety of authors and institutions, including government websites, academic databases, and websites of private organizations. Document analysis was conducted, with the goal of providing contextual understanding and a theoretical basis for informed conclusions (Bowen, 2009). For this study, document analysis was deemed appropriate because it provided the opportunity to analyze information collected and examined by diverse groups of professionals. This approach provides valuable insight into the purpose of this study, insight that would be difficult to gain through other research methods conducted by a single individual within a short time frame. In addition, the information in these documents is considered reliable and trustworthy because it was produced by reputable institutions with national or international goals.

5.2.1 Data Collection and Classification

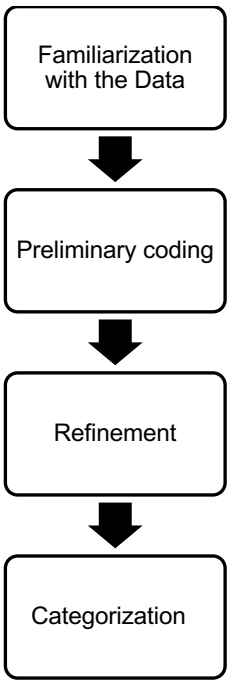
The selection of documents was carried out considering the research's scope and limitations, as access to documents can be deliberately restricted in many contexts (Karppinen & Moe, 2019) Selection was based on relevance to this research. The purposive sampling technique was used to select the sample. Since this method requires selecting studies and articles that are consistent with the scope of the research (Ryzin, 1995), or this specific study, relevant topics were considered central to the document selection phase. Given the significance of the information and the nature of the documents under analysis, the search was conducted using

Google Scholar, primarily with the intention of accessing not only academic resources, but also reports from organizations such as the Federal Employment Agency, the Bertelsmann Foundation and official documents such as those from the Ministry of Economics, Tourism, Agriculture and Forestry of the State of Saxony to name but a few. The documents were selected individually according to their relevance to the topic and their scientific value for the texts cataloged in the appendix of this document and their most important findings. The keywords used were "women, digitization, labor shortage, Germany" Considering the nature of the topic and the research context, these keywords were used in German, so the identified studies and documents were also in German. A total of 20 documents were carefully selected for subsequent review and analysis.

5.2.2 Coding Process

The coding process was conducted using content analysis as it is a systematic and rigorous approach to analyzing documents collected during the research (White & Marsh, 2006). The process that was conducted with the data is shown in Figure 8.

Figure 8 Document Analysis Process



Note: Figure of the process carried out to analyse the obtained results created by the author.

The coding process followed a structured and defined approach in the four steps shown in Figure 2. First, a general reading of the documents familiarized the data and the topic. Then, preliminary codes were assigned to the relevant information on the key topics of women's work, digitization of work, women's digital skills, and labor shortages in Germany. A detailed review of the coding was then conducted, and necessary adjustments were made before the sections were placed into the established categories. MAXQDA content analysis software was used for the categorization process.

5.2.3 Ethical Considerations for the Document Analyses

Ethical considerations in conducting this document analysis were based on respect for the reputation and nature of the information analyzed. Publicly available reports and reports known to citizens were considered with the intent of extracting the information necessary for the analysis and not with the intent of defaming or harming government or private entities. Permissions to use information and the intellectual property rights of authors and organizations

were respected. In addition, the document analysis focused on documents published after 2015 to avoid the pitfalls of analyzing outdated documents that describe the context of a bygone era, thus preventing the bias of outdated information. In addition, special attention was paid to transparency in the analysis so as not to perpetuate or reinforce gender stereotypes that could harm women. Thus, the ethical framework shaped the content analysis, that was guided by the principles of autonomy, beneficence, welfare and justice (Pietilä et al., 2020).

Chapter 6: Data Presentation and Results

In this chapter, the collected and organized data mentioned in the previous chapter are subjected to an examination. It is noteworthy that the analyzes presented here address key issues of concern to professionals involved in corporate recruitment as well as to women in organizations and groups that advocate for women's interests. For a detailed and extensive understanding of the coding and categorization process of the interviews, please refer to the appendix. This section is thoughtfully structured into three distinct subsections, each correspondingly aligned with the three aforementioned research instruments.

6.1 Analysis of Interview Data from HR Professionals

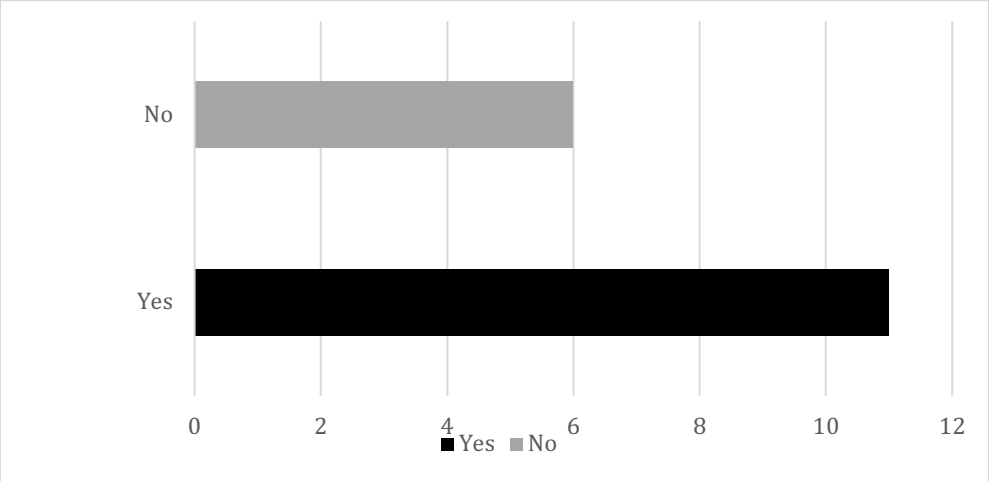
In this segment, the responses provided by the experts during the interview rounds undergo a thorough and comprehensive analysis. This analytical process is conducted with consideration for the domains stipulated in the semi-structured interview guide, allowing for a systematic examination of every facet of the responses. It is noteworthy that this section encompasses the in-depth analysis of the key topics pertinent to the research.

6.1.1 Labor Shortage Awareness

This section delves into inquiries regarding whether the experts know that there is a labor shortage in their respective companies or whether it takes longer to fill vacancies, for example. The aim of this section was to gain insight into the recruiters' views of the country's labor

market situation and the conditions in the companies where they are employed. Regarding the companies' awareness of whether they have a labor shortage, a direct question was asked during the interviews that led to the following results, which are shown in Figure 9.

Figure 9 Companies' Awareness of Whether They Are Experiencing Labor Shortages



Note: Data collected by author in 2023.

However, it can be seen in Figure 9 that almost twice as many respondents confirm that their companies are currently experiencing a labor shortage. It is worth noting that even among the companies that said they were not currently facing a labor shortage, some said they were having difficulty finding suitable staff, but did not consider this to be a crisis in the strict sense With statements like the one made by interviewee R06, who suggests that while it may not be a labor shortage crisis, it is challenging to find the right person to fill the vacancies. Therefore, the awareness parameter is whether the respondent acknowledges a labor shortage, and no deductions are made from the negative responses. In addition, the following main reasons were cited by those who acknowledged a labor shortage:

a. Increased difficulty in finding the perfect candidate.

b. Rapid changes in skill requirements due to industry transformations, making it challenging for individuals to keep up.

c. Viewed as a broader national issue.

d. Discrepancies arising from wage expectations.

While not all the companies represented by the respondents are grappling with a labor shortage, it's worth noting that even those not facing this issue have difficulties finding the ideal candidate. Therefore, it's important to understand that, while the problem of a shortage of qualified workers may, for many companies, seem to be solely about finding a person who fits the profile and the company, from these responses, it can be provisionally deduced that there is no direct mention of needing more men for specific jobs. The problem appears to be more rooted in the lack of specific skills for the jobs, considering what the interviewees have mentioned. However, as this is an exploratory analysis, these results should not be generalized, but rather serve as informative insights into the situation.

Furthermore, considering the problem complexity of those who reported a shortage of labor, they were asked in which specific areas they perceive a greater need for personnel. The purpose of this question was not only to identify the jobs most affected, but also to assess where there might be real opportunities for women seeking to fill labor needs in these industries. The results on this question were quite clear, indicating that this is not a localized problem confined to a single sector, but a challenge that affects multiple sectors. Table 4 shows the main areas mentioned by respondents.

Table 4 Areas of the Respondents' Companies in Which the Labor Shortage Is Most Pronounced

Fields
• Management Positions • Engineers • Technicians • Developers • Data Analysts • Unity developers • AI Specialists • General IT Positions • Logistics Positions • Transport and Drivers • R & D in Electric Vehicle Technology Positions • Operators • Designers

Note: Data collected by author in 2023.

While this is indeed a widespread issue, it is worth highlighting that among the areas mentioned in Table 4, the area of IT-related occupations was undoubtedly the most frequently mentioned by respondents. This underscores that it is a dynamic field that offers significant opportunities for women seeking to expand their employment or launch their careers. For a better understanding of the categorization of the answers given by the respondents, find the guide in the Appendix.

Finally, to gain a deeper insight into the situation of vacancies in companies, it was considered valuable to have an approximate idea of the length of time between the posting of a vacancy and the successful recruitment of an applicant. Moreover, in addition to the acknowledgement of labor shortages, the length of vacancies is one of the most important indicators of this problem. However, the analysis of the responses did not provide exact data, but rather a more nuanced interpretation of the vacancy situation. This is because most respondents indicated that the duration of vacancies is influenced by various factors such as the type of vacancy. For example, vacancies for students tend to be filled more quickly. Qualification requirements also play an important role, as jobs that require very specific skills tend to remain open for

longer. The time of year can also be an important factor, as there tends to be more applicants at certain times of the year with statements such as that of expert R04, who states that the duration varies between two to four months due to the applicants' salary expectations, or the assertion of expert R13, who claims that it takes three months to fill a position and who is aware that the reasons for this vary from position to position, but in general a lack of specific knowledge is considered to be the main reason. Considering all the time periods mentioned by interviewees, Table 5 shows the approximate time spans identified when analyzing the interviews.

Table 5 Length of Time an Open Vacancy Lasts

Minimum	Average (Most Mentioned Answer)	Maximum
15 Days	From 2 months and up	12 months

Note: Data collected by author in 2023.

6.1.2 Recruitment Strategies

The aim of this part of the interviews was to find out whether the experts consider the possibility of implementing action plans for the recruitment of women when they are faced with long-term vacancies. It also aimed to find out what action plans the interviewed professionals use in the industry. Further to understand the strategies employed to find the ideal candidate, a series of questions were asked regarding both general strategies and the existence of specific approaches to attract female candidates. When asked about general strategies, there was initially no consensus on a specific approach. This observation underscores the varying efforts of companies to meet their staffing needs by using different strategies to remain in the labor market as an employer. The different strategies mentioned by respondents are listed in Table 6.

Table 6 General Company's Strategies to Find the Ideal Candidate

Strategies to Find the Right Person
• Networking
• Employer branding
• Good benefits as mobile work
• Presence on job search platforms
• Attractive vacancies
• Job fairs
• Company Reputation
• Additional Training for the applicants
• Well-trained recruitment staff
• Cooperations with stalkholders
• Cooperations with the BA (German labour agency)
• New models for apprenticeship
• Innovation in EVP (Employee Value Proposition)
• Collaboration with universities and technical schools
• Active sourcing
• Internal trainning for upskilling current workforce
• Investing in technology to reduce the labour demand

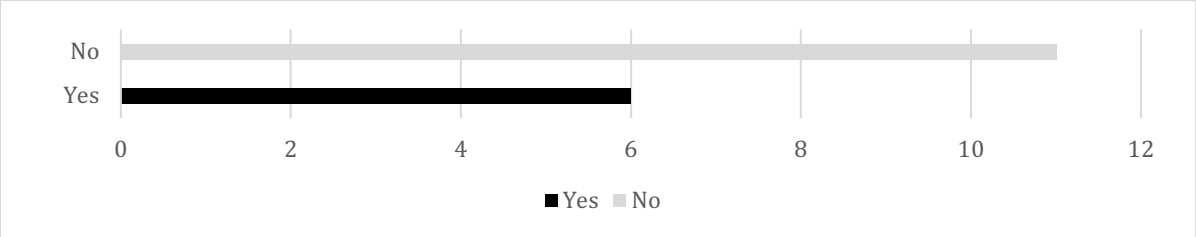
Note: Data collected by author in 2023.

The strategies that the companies have implemented are not standardized. It was therefore considered essential in the analysis to assign the same value to all the strategies mentioned. For this reason, the seventeen strategies mentioned were listed in Table 6. Nevertheless, the experts repeatedly mentioned certain strategies, such as networking and its importance. For instance, expert R01 stated that in such cases it is best to turn to a network. Employer branding was also highlighted as crucial for the company, as expert R08 mentioned. Offering attractive benefits was also emphasized, as expert R04 mentioned that it is best to provide more benefits. These strategies were mentioned most frequently in the interviews.

On the other hand, given the focus of this study, respondents were asked whether they specifically target women in their recruitment strategies. Given the purpose of this research, which aims to understand the opportunities available to women who wish to work in these industries. However, it is important to emphasize that this targeted recruitment is not about

treating women specially or differently, but rather about creating awareness of the situation that many women find themselves in when considering employment. In fact, targeting women who are mothers, for example, is not the same as targeting men who are fathers, as society often ascribes additional responsibilities to women. Although the conditions that women need might be different, targeting women might be an interesting approach for a company that needs workers. Therefore, the question was explicitly asked to find out if companies target women in their strategies, and the results are shown in Figure 10.

Figure 10 Acknowledgement of Whether Respondents' Companies Have Targeted Women in Their Search for Potential Talent



Note: Data collected by author in 2023.

Figure 10 illustrates that most respondents indicated they do not target women when it comes to filling positions in their company. It is worth noting that several interviewees who indicated that they do not specifically target women also indicated that they do not divide their job openings by gender, the experts generally emphasized that their main idea is to find candidates who meet the requirements, regardless of the applicant's gender. This confirms the earlier assertion that the problem of labor shortages is related to a lack of skills rather than gender. None of the experts rejected the possibility of hiring more women as an absurd idea. However, interviewee R07 mentioned that his company is an engineering firm and that there are no strategies targeting women because the field of engineering is dominated by men. It seems that there might be a greater acceptance of women in these fields because of the skills demonstrated.

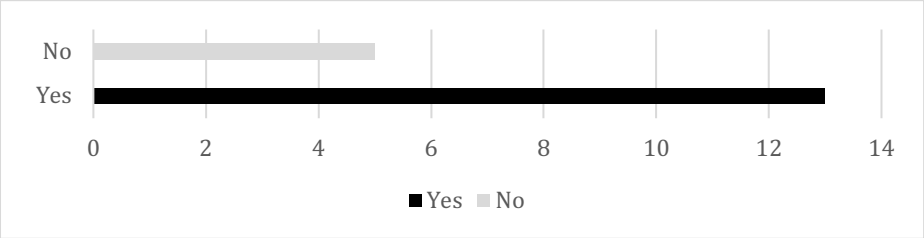
If female candidates meet the required skill and knowledge criteria, companies may consider hiring them with flexible terms and other benefits without explicitly developing strategies that target women. Another interesting finding from the interviews in this sense is the statement of encouraging women indirectly. While they are not explicitly targeting women, some interviewees mentioned that they try to make statements that encourage all applicants to apply, even if they do not meet all the requirements. They do this because they are aware that women may be intimidated if they believe they do not meet all the requirements. While this is a subtle help, it can undoubtedly be a positive first step in encouraging more women to apply and it is important to understand how women perceive these subtle aspects.

Meanwhile, when analyzing those who commented positively on addressing women in their job offers, it was found that offering flexible working hours and part-time positions is more attractive to women and it’s a strategy that company use with the aim to attract women. The experts commented on this, such as interviewee R11, who mentioned that they do indeed reach out to women in terms of job sharing and part-time opportunities, even if they do not use specific channels where only women seek work. While offering part-time jobs may seem attractive at first glance, it only reinforces the already mentioned family structure where one parent works full-time and the other part-time, often the mothers. Furthermore, women without children do not benefit from it, as part-time work is not a decisive opportunity for those who want to work full-time. In terms of flexibility, this may be a promising approach, as it shows that companies understand that women can benefit significantly from this perk, even if it is not exclusively for them. Another notable statement from respondents was the importance of having women in their companies, especially in industries that are predominantly male. They expressed a desire to have more women on their teams. This indicates that they recognized the need to have a more diverse workforce and to offer jobs that meet women's needs. It is important to emphasize that this goal can only be achieved if the selection process is conducted without gender bias, which was also an important theme in the interviews.

6.1.3 Women Inclusion

Regarding the perception of women in the labour market, this section aims to understand the perceptions of companies and their respondents regarding diverse teams that include both men and women. A question was asked on this topic that dealt with the advantages that companies see in mixed teams as can be seen in Figure 11.

Figure 11 Acknowledgement of Benefits of Mixed Work Teams



Note: Data collected by author in 2023.

Moreover, analysing Figure 11 it is possible to find some interesting information, first, that a significant proportion of respondents recognise the benefits of mixed-gender workgroups with answers such as that of interviewee R03, who states that mixed groups are more versatile and create a more creative working environment, or the response given by interviewee R02, who claims that a mixed workforce fosters an increase in good ideas and opportunities to improve the working environment. With these perceptions, 13 out of the 18 interviewees agreed with the statement. Moreover, the interviewees were unanimous about the reasons for these benefits. They largely revolved around greater versatility and diverse perspectives, with responses suggesting that more ideas are generated and better responses to customer needs are formulated. In contrast, those who disagreed with this view cited reasons such as considering too many perspectives, which they found troublesome. Some respondents interpreted gender diversity more broadly, as expert R10 claim that now is still too soon to say something because now diversity involve more than women and men. Finally, some respondents argued that there were not many women on their company's work teams, so they could not see any benefits of gender diversity in their specific context.

6.1.4 Challenges for Women in the Labor Market

It seems, at least superficially, that the problem of labour shortages or the long duration of vacancies does not have a clearly gendered aspect. At first glance, it does not appear that women are being excluded from selection processes, although this is not entirely false. However, it is important to understand the broader context to find out where the problems lie and how women can really play a crucial role in meeting labour needs. Therefore, it was deemed useful to understand the perspective of corporate recruiters on the challenges women face in finding employment. To this end, several questions were asked, beginning with a direct survey about women's perceptions of the challenges they encounter in finding employment or advancing their careers in the industry in which their company operates. The responses to these challenges are shown in Table 7.

Table 7 The Main Challenges Women Face in Finding a Job or Advancing Their Careers in the Industries Where Respondents Work

Women's Challenges Mentioned
• Availability of working hours
• Unequal voting rights in leadership positions
• Taking extra sick days because of their children
• Limiting the jobs mothers can apply for
• Reducing work hours after the birth of a child
• Societal perceptions of being a caregiver and the impact on career decisions
• Balancing personal life with children and career
• Performance changes after becoming a mother
• women are judged more harshly and receive less recognition
• Lack of awareness among male managers of responsibility for children
• Few women trained for blue-collar jobs
• Difference in communication style
• Gender stigmatisation of Jobs
• More women needed in management

Note: Data collected by author in 2023.

Table 7 shows 14 different challenges identified by the experts that indeed shows not only companies' awareness regarding the obstacles women face, but also how clear the problem is, especially for women who become mothers. Considering that seven of the 14 challenges recognized by the respondents are related to the responsibility of motherhood and the resulting change in their situation. It is also notable that expert R04 and expert R13 claim that there are no challenges for women in this regard. Therefore, it is always important to consider the opinions of different experts to understand the perspective of them on each issue. Once the potential challenges identified by the interviewees were clarified, it was also considered important to understand whether the companies that are aware of these challenges are supporting women to overcome them. If there is employer support, the scenario could be more favorable for women who want to enter these industries. When asked how companies support women in overcoming these challenges, respondents provided seventeen ways in which they believe companies support women in their industries. Interestingly, these responses can be categorized into three main groups.

The first category concerns support in the selection process with practices such as "blind recruitment," which is an effective way to make decisions without falling into gender stereotypes, and diversity in the group of interviewers. In terms of supporting mothers in their work, several practices were identified. These include "flexible work shifts" which can benefit them significantly, as well as practices such as "daycare and nursery facilities" and "paternity and maternity leaves" to mention a few. In addition, in the last category to support women in general, "provisions designed to meet the needs of women" and "mentoring and coaching programs" were mentioned, reflecting significant progress in the way companies are addressing not only women but also the well-being of their employees in general. Table 8 shows the full categorization of the 16 Best practices cited by the companies where respondents work.

Table 8 Best Practices of Companies Where Respondents Work to Help Women Overcome Challenges

Support in the Application Process	Support for Working Conditions	Support for Mothers
• Blind hiring practices • Diverse interview Panels • Images of women in job postings	• Flexible work shifts • Conditions for the needs of women • Flexibility in general on the company side • Standar Processes • Remote working • Trusted working hours • Encouraging/paying for training • Promoting a culture of inclusion and respect	• Part-time jobs • Crèche and kindergarten places • Job adaptability for women who become mothers • Possibility to take unpaid leave if needed • Maternity and paternity leave

Note: Data collected by author in 2023.

6.1.5 Digital Skills and Training

The final section of the interviews explored respondents' perceptions of the extent to which women do or do not have digital skills to succeed in professions where digitization and technology have become integral. This addresses the central theme of this research and provides an exploratory understanding of how companies view this topic. Opinions in this section varied. In general, most respondents believe in the potential of women and their skills to perform well in these professions. However, they cited factors such as lack of confidence, lack of motivation, and lack of information, especially about STEM occupations, as possible barriers with responses such as the one given by interviewee R02, who states that he has not yet had the experience of a woman with less knowledge than men, or the assertion by interviewee R10, who claims that skills have nothing to do with gender. On the other hand, some respondents argued that while there might be knowledge differences, they do not consider them critical and emphasize individual responsibility for acquiring skills that will be

useful to them in their professional lives. The different opinions of the respondents on this issue are shown in Table 9.

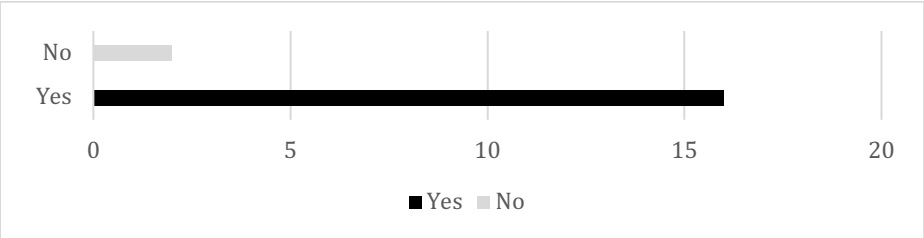
Table 9 Experts' Assessment of Women's Digital Skills for Succeeding in Positions That Require These Skills

Perception of Womens Knowledge by the HR Experts
• Women have the same technology skills as men • Women are more aware of their capabilities than ever before • Women have the skills, but lack confidence • Women have the skills, but lack motivation • Sometimes a little training is needed, but it is not critical

Note: Data collected by author in 2023.

In addition, most of the respondents stated having a program for additional training. These programs are not exclusively for women but are part of the training opportunities offered by the companies. Some responses mentioned specific programs for women, while those who responded negatively emphasized that there are no programs exclusively for women, but that general programs are available. It can be tentatively concluded from this that very few companies offer educational programs that are exclusively for women. However, women interested in this area may benefit from the general learning support programs offered by almost all companies in this small sample. Figure 12 shows the ratio of those who answered "yes" to those who answered "no" with the majority answering "yes" consistent with the previous statement.

Figure 12 Acknowledgement of Whether or Not Companies Offer Training Programs for Women



Note: Data collected by author in 2023.

In the added comments, several respondents provided valuable insights into the study. Some emphasized that there are women who are not interested in their specific industry and are not aware of the opportunities in that industry, which is a potential problem for attracting women to companies. In addition, concerns were raised about companies still not fully trusting hybrid and remote work models, potentially negative not only to attracting women, but also to attracting talent in general. Discrimination against mothers who must adjust their work due to childcare responsibilities was another important point. In addition, the individual responsibility of each person in developing the skills required for their job was mentioned, as well as the position of companies that try to stay at the top of their industry by hiring already qualified employees instead of offering extensive training.

In conclusion, this topic certainly requires more in-depth study and a more extensive data set to reach more general conclusions. Nevertheless, these exploratory findings suggest that companies are increasingly aware of the needs of women, particularly mothers, and are willing to welcome more women into traditionally male-dominated industries.It is also worth noting that many companies are actively seeking to fill vacancies, which could be of great benefit to any strategy aimed at integrating more women into technology and digital-focused positions. These preliminary thoughts are based on the isolated views of those involved in recruiting at the companies. Further analysis will place this information in the broader context of findings from other research tools.

6.2 Analysis of Interview Data from Women Working in Groups and Organizations That Advocate for Women's Rights

The interviews conducted with women who work in groups and organizations that advocate for women's rights in Germany were intended to provide a different perspective on the issue. It is important to recognize that the views of these participants are strongly influenced by the work they do to promote the welfare of women. In this way, they enrich the discussion

contributing with their personal view on the approach of this research. The questions, as explained in the methodology, were formulated through semi-structured interviews that aimed to understand women's perspectives on their competence with technology and, of course, the idea of working more and being part of the solution to Germany's labor shortage. The analyzes presented here are divided into three sections that represent the main themes of the interviews. The first category addresses women's desire to work more and the reasons for the employment gap in the market. The second section looks at women's relationship with jobs related to digitization and technology. Finally, the third section analyzes women's views on whether they can really contribute to solving the problem of labor shortages in these industries.

6.2.1 Women's Desire to Increase Work Participation and the Inequality Between Men's and Women's Work Situations

In this first section of the interviews, the aim was to provide a context for the interviewees' views on the current situation of women. To this end, the first step was to explore the reasons for the existing gender gap in employment. The results show a variety of factors, as shown in Table 10. These factors can be considered the main obstacles to achieving gender equality in the labor market. Reasons such as the continued dominance of men in high-value jobs, as noted by expert E01, who explicitly claimed that men still dominate the good jobs, even though women are often better educated but often take part-time jobs and time off due to family and other pressures. Moreover, lack of flexibility of companies was also mentioned by expert E12, who said that there is no reconciliation of work and care work, no equal pay, and no flexibility in working conditions. This is interesting because just in the previous sections, the experts from the companies mentioned this last point as one of their main strategies when looking for employees. Meanwhile, the cultural and historical perception of industries in Germany, and the underrepresentation of women, among other factors, seem to be, in an exploratory sense, the conditions that affect women and that in turn lead to inequalities.

Table 10 Main Reasons for the Employment Disparity Between Men and Women in Germany

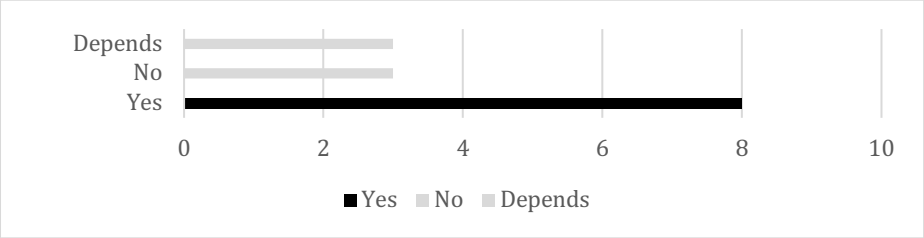
Main Reasons
• Men continue to dominate the good jobs • The perception of women as family caregivers • Women's acceptance of part-time work and time off • Problem of balancing work and caregiving • Work/caregiving compatibility issue • Under-representation of women in public decision making processes • Women are segregated in social jobs (health, and education) where wages are lower • Bad frame conditions of work • Low capacity of kindergartens in terms of time and space • Women's own behavior and lack of spirit • Lack of wage equity • Lack of flexibility in working conditions

Note: Data collected by author in 2023.

Given the context in which the experts understand gender inequality in the labor market, the research also aimed to directly enquire whether women really strive to increase their professional engagement. This research stems from the observation of a significant imbalance in working hours in German society, where most men pursue full-time employment while only a minority of women follow the same pattern. Therefore, if women express a desire to extend their working hours without encountering unfavorable conditions, this could potentially help to alleviate labor shortages. On the other hand, if women do not have such aspirations, there may be no need to consider this as a viable solution. Although this study primarily took a descriptive and exploratory approach, most experts within this limited sample indicated that women do indeed tend to work more. This statement was frequently expressed by the experts. As Figure 13 shows, the majority of respondents claim that women do indeed strive to increase their employment participation. However, it should be emphasized that this claim depends on certain improvements in the factors that currently hinder women in this regard. Foremost among these obstacles, as repeatedly mentioned by the experts, is the problem of unpaid and

unequally distributed domestic duties between fathers and mothers. Women tend to bear a disproportionate burden of these duties.

Figure 13 Acknowledgement of Whether or Not Women Want to Work More



Note: Data collected by author in 2023.

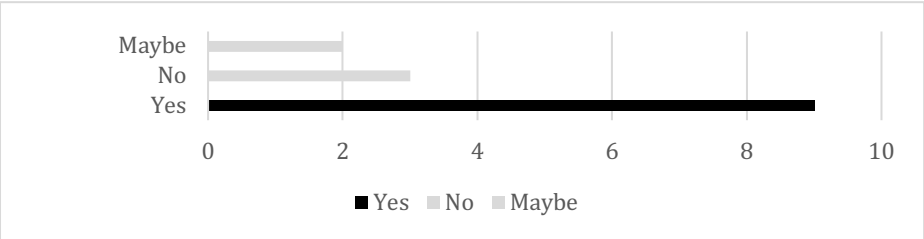
In addition, experts pointed to the need for reforms in the timing and location of educational institutions and childcare facilities to better accommodate the time demands that would allow women to pursue more extensive careers as expressed by expert E06, who, in addition to highlighting the need for more flexibility in kindergartens, also mentioned the active involvement of fathers in childcare and the exploration of job-sharing models by companies. In contrast, in the negative responses, the women respondents advocate for a reduction in the standard workweek as mentioned by expert E11, who stated that younger generations are advocating for reducing the workweek to just four days a week and expert E10 who claim that there is generally no desire to work more, regardless of gender perspective.

6.2.2 Women and Technology Skills

In this segment of the interviews, the aim was to obtain insights from the experts about women's technological skills. This aspect is of utmost importance in the context of the study, as it is essential for women to have a strong affinity for technology and digitization in order to have better employment prospects in professions where these skills are key. It should be noted that the focus here is not just on advanced skills such as programming and artificial intelligence development, although these skills are certainly welcome. The focus is on the general skills expected of workers in fields that are currently undergoing change due to

technological advances. Recognizing that these technological changes can present individuals with both learning challenges and opportunities in their personal and professional lives, respondents were asked for their views on the potential of technological advances to reduce the gender gap in employment. The results, shown in Figure 14, are remarkably positive, with nine of the fourteen respondents expressing confidence in the feasibility of such an outcome. While it is important to recognize that this study is essentially exploratory, there is a possibility that digitization could indeed prove to be an important catalyst for advancing gender equality in the workforce if these findings were confirmed by a larger sample. Given the limitations of the current study, these findings are a promising indication that digitization should be enhance in women's employment and overall labor market dynamics.

Figure 14 Acknowledgement of Whether or Not Digital Advances Can Help Close the Employment Gap Between Men and Women



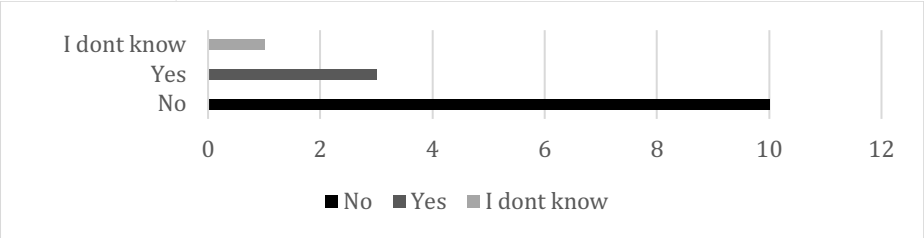
Note: Data collected by author in 2023.

Although most responses tended to be positivein this context, it is important to note thatmost respondents qualified their answers and often expressed a "yes, but" perspective as expressed by expert E10, who mentions that yes, but it is necessary to minimize disparities because the same unjust conditions are replicated from an analog format to a digital format in terms of work. Moreover, of the nine respondents who stated that technological advances could help reduce the gender gap in employment, five emphasized the importance of teleworking (home office). They argued that this arrangement opens greater opportunities for women who want to engage in the labor market. However, they also emphasized that some women work in sectors where remote working is not possible, such as health and care, due to job classification. In contrast, those who held more skeptical views cited the predominant

presence of men in certain areas of technological expertise as the main reason. For example, they pointed to the considerable gender segregation in sectors as artificial intelligence (AI) development and emphasized the potentially negative impact of such an imbalance on overall gender equality.

In addition, the expert's perception of technological know-how and awareness of the differences between men and women is crucial. As Figure 15 shows, a large majority of the 14 experts vehemently reject the notion of gender differences in technology-related knowledge. 10 of the 14 experts reject this claim outright and state unequivocally that there are no discernible differences in the technological knowledge and male and female competencies as expressed by the expert E07 who claim that women possess same skills. However, they criticized certain aspects of the education system, noting that men are often more encouraged to engage with these topics, while women may not be encouraged to the same extent. They also pointed out the constraints women face when choosing a technology-related career, such as the responsibilities associated with childcare and household duties. Cultural factors and gender stigmas, particularly in areas such as toys and hobbies, were also cited as reasons for these inequalities.

Figure 15 Awareness of Whether or Not There Is a Gap Between Females and Males in Terms of Technological Skills in Germany



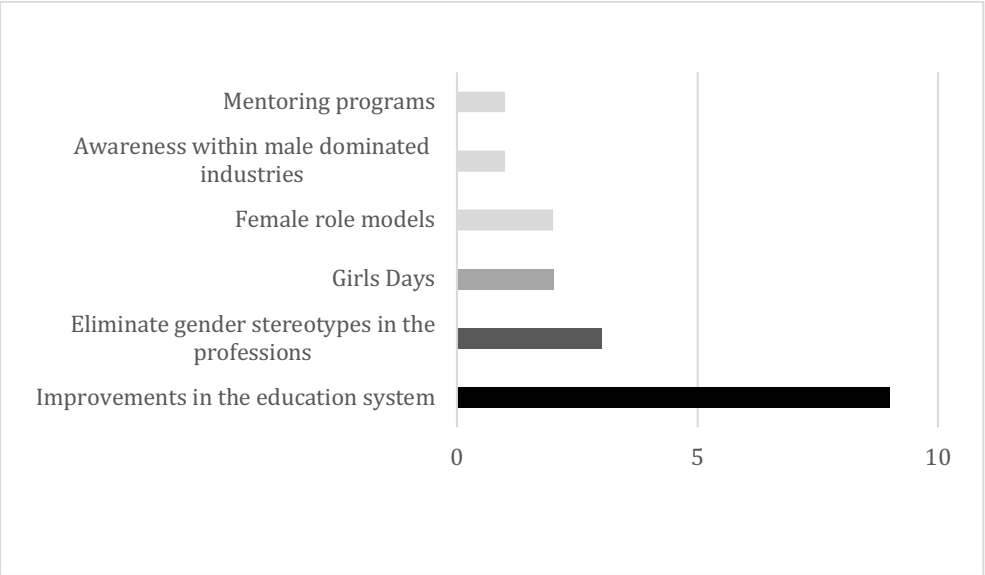
Note: Data collected by author in 2023.

On the contrary, those who acknowledged a difference in technological know-how between men and women cited the preponderance of men in technology-related fields as the main reason. They argued that because of this imbalance in education and occupation, men tend to have more advanced knowledge in these fields and consequently benefit more from jobs in technology as expert E02 state that men still do more technical university degrees and therefore dominated these areas. However, they pointed out that this difference was primarily related to the possession of knowledge rather than practical skills.

Respondents were then asked about how they think girls can be encouraged to learn about technological advances and bridge the digital gender gap discussed in the last chapter. Despite the different perspectives of the experts, six best practices emerged from the interviewees' point of view that could contribute significantly to making this topic more attractive to girls. As shown in Figure 16, the most widely recognized best practice among respondents was improving the education system as stated by expert E04, who directly suggests starting by engaging girls in schools with these fields and stopping the pink and blue way of thinking in childhood. Additionally, expert E12 emphasizes the need for universities and other educational institutions to develop fitting curricula and didactics to empower women and girls. Others argued that a major overhaul of the education system is needed to incorporate these technological advances. They also emphasized the need for female teachers in these areas to serve as role models for girls and advocated for general curriculum reform. The second most frequently cited best practice by respondents was overcoming stereotypes of gender in professions.They emphasized the need to eliminate stereotypes so that girls do not feel pressured to choose traditionally female-dominated occupations or intimidated when choosing fields that are typically considered male-dominated. In addition, the importance of initiatives such as Girl Day in industries that are predominantly male dominated was highlighted. Respondents suggested the introduction of more female role models in these professions and stressed the importance of men advocating for gender

equality in industries where they are the majority. Mentoring programs were also mentioned as potentially valuable in this context.

Figure 16 Best Practices Quoted by Experts to Make Technology Enhanced Learning More Attractive and Bridge the Gender Digital Divide



Note: Data collected by author in 2023.

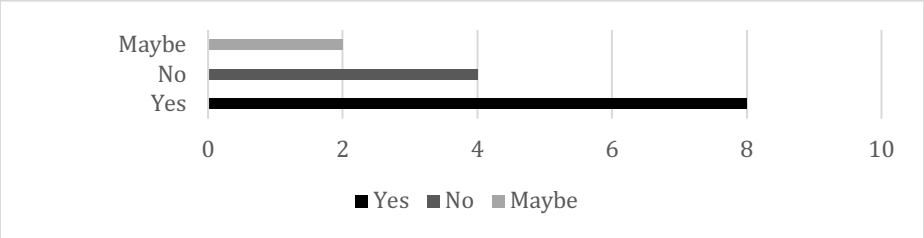
6.2.3 Women and Their Potential Contribution to Mitigate Labor Shortages

Finally, the experiences and knowledge of the women interviewed were considered in relation to the skills and challenges of women in the German economy. The experts were asked whether they truly believe that integrating more women into the labor market and expanding paid work could help mitigate the labor shortages and what measures companies should take to address the gender gap in their industries.

Regarding whether women can help alleviate the labor shortage, the results are shown in Figure 17. While eight of the 14 respondents concluded that women can indeed be the solution to labor shortages in these industries, they conditioned their answer by emphasizing the need for changes and improvements in working conditions in these industries for instance, expert E02 mentioned that women could find these fields attractive if the caregiving and work

conditions are flexible. Furthermore, expert E08 also conditioned her response on job flexibility. Those who answered "maybe" claimed that it is possible but requires change, and they emphasized that men need to be more aware of the unpaid work of their female colleagues and of women in general as expert E05 mentioned. Furthermore, others also think that the newer generations may be more aware of this. However, fourth respondents disagreed with this statement, referring mainly to the small number of women studying in these fields. Like those who thought it was possible, they pointed to childcare and household responsibilities as barriers that prevent women from further development in these areas of knowledge.

Figure 17 Acknowledgement of Whether or Not Women Work is the Answer to Labor Shortages in Industries that Require Technology and Digitization Skills

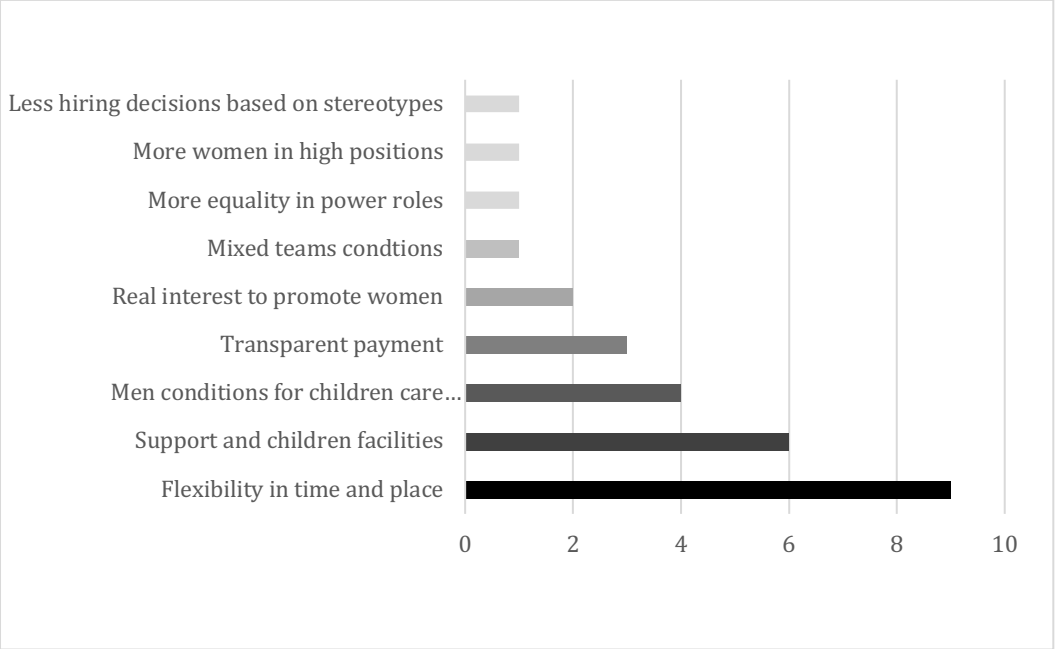


Note: Data collected by author in 2023.

Finally, to address the question of what companies should offer to address inequality in their industries, the experts identified 9 possible best practices that they believe could be key to addressing this issue. The most important, or at least the one most frequently mentioned by the experts interviewed, was flexible work schedules and the possibility of teleworking, for example, as expressed by expert E04, who believes that work flexibility or the option to work only four days a week without reducing salaries, or the possibility of booking nannies to continue working are essential. Similarly, expert E01 stated that more flexibility and a genuine interest in promoting women are required. Furthermore, the possibility of receiving financial or material support for childcare, such as kindergartens provided by the company, which illustrates the sensitivity of the issue of motherhood and its limitations as expressed by expert

E09, who highlighted various options, including transparent payment, assistance with childcare, and support from the company for both fathers and mothers to care for their children. The third most frequently cited good practice was employer enhancement of parental responsibilities, where women do not have to work less but both parents have equal responsibilities and can take parental leave to care for their children. The fourth best practice cited by the experts was transparency in pay and equal pay. Among the many reasons given, it was noted that women tend to underestimate their abilities and often demand lower salaries than men, even when both have the same skills. This was followed by a genuine interest on the part of companies to promote women. The nine best practices cited in the interviews are shown in Figure 18.

Figure 18 Best Practices to Address the Disparity Between Female and Male Employees



Note: Data collected by author in 2023.

Finally, in the additional comments section, the women interviewed expressed their great interest in the research topic. For example, they recommended that the real problem is the perception of nursing professions, which are often undervalued compared to fields such as

engineering. In addition, they emphasized the need to recognize the significant accomplishments of women to date and stressed that technology education should transform learning not only for girls, but also for boys. Here it was possible to gain a deeper understanding of the perceptions of the women interviewed regarding the relationship of women to learning new technologies. In an exploratory way, it is clear that this area is attractive and positive not only for working-age women, but also for those who are still in school. One of the conclusions of this chapter is the urgent need to improve the education system in general so that both girls and boys benefit in learning these innovations. Another issue that came up frequently in the interviews is gender segregation in society, which interviewees believe is a major cause of gender inequality in the labor market.

6.3 Main Highlights of Document Analysis

This final section of the chapter presents the analysis of documents aimed at establishing a solid conceptual foundation based on evidence from various publicly available official sources and studies by related organizations. The goal of this analysis was to gain a comprehensive understanding of the key findings from each document. The information was then carefully reviewed, categorized, and used as a valuable point of comparison between the findings of experts and professionals and the research presented in this study. This process facilitated the synthesis of meaningful relationships within the information. The analysis is carefully presented, and the various clusters of information are clarified by thematic tables in this section. This approach contributes to a more structured presentation of the data. It is worth noting that all the documents analyzed to derive these findings are located in the final section of the appendix.

6.3.1 Digitalization Approach

As for the findings derived from the document analysis on the topics of digitization and technological innovation in the German market, eleven overarching themes were identified. These themes are readily identifiable in Table 11 and underscore the increasing demand for

workers with the necessary skills to manage these technological changes. It is clear from the documents that this unmet need is hindering the overall economic growth of the country. It is noteworthy that several documents agree that there is a gap between the skills required by the workforce and the curricula offered by universities. Moreover, there is a lack of enthusiasm for these subjects in educational institutions. Indirectly, the education system is blamed for the current challenges in this area.

Table 11 Key Findings of the Document Analysis in Relation to Digitization in Germany

Key Findings
• High demand for digitalization-related professionals, but a shortage of skilled labor hampers employment growth.
• There is a persistent shortage of skilled workers in the digitalization professions.
• Germany lags behind in teaching digital skills in schools.
• Companies need to invest more in the skills of their employees.
• Women are underestimated and their skills are not sufficiently appreciated when it comes to working in jobs related to digitization.
• Insufficient digital skills hinder the development and use of innovations.
• The digital gender gap not only impacts the German economy, but also limits women's opportunities to work in the field.
• Digitalization is transforming office work.
• Automation is impacting routine tasks and affecting career advancement.
• There is a need for early introduction of digital concepts in education.

Note: Data collected by author in 2023.

In analyzing the primary findings of these documents, a consistent theme emerges that underscores the significant gender knowledge gap in the areas of digitalization and technology. These documents emphasize the important role of female role models in inspiring girls and women to pursue careers in technical and knowledge-intensive fields. Furthermore, they advocate for an inclusive approach to digitalization, free from gender segregation or dominance, given its far-reaching impact on the economy. The predominant focus in these documents is the pursuit of knowledge equality to ensure that both men and women can take full advantage of the opportunities of digitalization. Table 12 showcases a specific subcategory

that emerged during the coding process which relates to the link between digitalization and gender. This subcategory is referred to as Gender Role Variation in Digital Industries (GDI).

Table 12 Key Findings of the Document Analysis in Relation to Digitization and Gender in Germany

Key Findings
• While men and women seem to have the same chances to access to the digital industries, they often hold different job roles within these sectors. • Women express a similar need for training, but are less probable to participate in digital-related training. • Women lack confidence in the IT environment. • Encouraging women to develop digital skills benefits both women and companies. • Women are underrepresented in IT-related fields. • There is a need for female role models in the digital landscape. • There is a lack ofeducation in the field of digitalization, especially for girls.

Note: Data collected by author in 2023.

6.3.2 Labor Shortage Approach

While the previous section clearly illustrates how digitalization is changing the way of work and creating challenges and opportunities for businesses in Germany, as previously discussed in this document, there is a shortage of skilled labor to meet the market demand for jobs. This, in turn, hinders the country's economic growth and prevents it from evolving at the pace it should. Regarding the labor shortage, the analyzed documents drew similar conclusions, forming the category "Labor Shortage" (LS) with 10 key statements that can be highly beneficial when examining these documents. Table 13 display the perceived main findings related to this topic uncovered during the document analysis.

Table 13 Key Findings of the Document Analysis With Regard to the Labor Shortage in Germany

Key Findings
• There is a persistent shortage of skilled workers, especially in digitalization occupations. • In Germany, there is a need to encourage women to seek for opportunities in industries with labor shortages. • The labor shortage is more pronounced in occupations dominated by one gender, and two-thirds of all shortage occupations are male-dominated. • Recruitment of workers from third countries remains insufficient. • Addressing the skilled labor shortage requires a multifaceted approach. • Companies are focusing on improving hiring practices, salaries, and working conditions to attract skilled workers. • Companies responding to the skills shortage in male-dominated fields have hired more women and increased the proportion of women in recent years. • Improved childcare and eldercare infrastructures, as well as efforts by many companies to balance work and family life, have encouraged many women to return to the labor market. • The shortage of skilled workers is perceived as a key risk both to the economy and to the survival of many companies.

Note: Data collected by author in 2023.

While this study serves primarily as an exploratory analysis of these phenomena, it is becoming increasingly clear through document analysis that Germany is experiencing not only a shortage of skilled workers, but also the complexity of the problem. Several of the documents analyzed make it clear that this is not a challenge for which there is a single solution and the fact that a consensus was found on this statement primarily means that the studies have apparently all come to this understanding. Thus, a multi-faceted approach with different strategies is required. Moreover, it is remarkable to see the efforts companies have made in recent years to attract more talent. These efforts underscore companies' commitment to creating optimal conditions for women's reintegration into the labor market, as shown in the results presented in Table 13.

6.3.3 Women Segregation Approach

While companies have made significant efforts to improve working conditions for women, there are still many obstacles that hinder the genuine integration of women into the labor market. If the goal is to motivate more women to increase their paid working hours, especially mothers, it is essential to consider the different obstacles that prevent this from happening. In analyzing the documents, one category was identified in this context. The category Gender Segregation (GS) served to summarize the results and highlight the main ideas on this topic. The most important results on this topic are listed in Table 14.

Table 14 Key Findings of the Document Analysis With Regard to the Segregation of Women in Germany

Key Findings
• Women are underrepresented in leadership positions, despite having equivalent qualifications.
• Women often face the challenge of caring for children while seeking employment.
• Women in part-time employment face challenges in bridging the digital divide.
• Mini jobs are predominantly held by women.
• Sensitivity to gender issues is often insufficient among those involved.
• Women with a migration background have problems finding jobs.
• Gender-specific language in job advertisements has a significant impact on women's career aspirations.
• Simply increasing the number of women in tech jobs is not enough.
• There is a need to eliminate stereotypes related to technology and "female jobs”.
• The success of the women's movement has led to a misperception among younger generations.
• The growth in the proportion of women in the labor market seems to be continuing, and with it the gender imbalance in housework and childcare.
• Trends such as remote work, flexible arrangements, and the impact of digitization on work and skills seem to be helpful for women.

Note: Data collected by author in 2023.

Insights into the current status of female regarding labor market participation and recognition of the limitations women face in realizing their potential seems to be a promising step not only to address the problem of labor shortage, but also to promote economic growth with greater social awareness. Women can represent significant potential in this regard. It is important to state that this is only a small sample and that further, more in-depth research would be

required to reach such a conclusion. Recognizing the barriers that emerged in the various studies included in the document analysis is a valuable first step. However, important findings can be seen in Table 14. For instance, it highlights that it is not just a matter of placing more women in areas affected by digital transformation, but that it is necessary to consider the entire context of women to maintain this inclusion in the long term. Another notable finding is the importance of eliminating stereotypes and the perception that certain professions are for men and others are for women. A key fact is that this was not only a recurring finding in the documents, but also because it limits not only female workers, but also young girls who may not feel motivated to pursue careers in such fields. Finally, another important finding concerns women's role in childcare, which is still perceived as primarily the responsibility of mothers rather than fathers. This underscores the need for men to be actively involved in taking on more responsibilities than fathers.

In conclusion, this chapter emphasizes the importance of the findings obtained from the analyzed documents and their informative nature. These findings are significant not only because of their relevance to society. However, they also underline a growing need to address these issues through a variety of research studies. In addition, it is important to emphasize the decisive role played by the companies in successfully integrating more women into the workforce. This importance stems not only from the perspective that companies face labor shortages and challenges, but also because they have the decision-making power when it comes to hiring women, whether they are college graduates, mothers, or women with immigrant backgrounds. Recognizing women's potential and their pursuit of personal development along their career paths is paramount. In addition, companies are praised for their efforts to promote work-life balance. This includes strategies such as flexible work arrangements, telecommuting, and other flexible policies that benefit both men and women. In the specific case of women, however, these measures can significantly improve their work lives. This is particularly important given the profound impact of digitization on the economy, where companies increasingly need highly skilled employees, especially in these dynamic and

evolving fields. Regrettably, the interviewees highlighted that not many women are motivated to pursue careers in these fields. The landscape is full of insights, and understanding how digitization, labor shortages and better participation of women in the labor market can be linked together can lead to significant improvements for the German economy.

Chapter 7: Discussion and Analysis

This chapter serves to synthesize the extensively analyzed findings from the previous section. Its specific purpose is to address each of the previously posed sub-questions, which together contribute to answering the central research question that forms the basis of this entire master's thesis. Given the descriptive and exploratory nature of this study, it must be recognized that the findings and analysis provide an overview of the situation in Germany rather than a promising sample and further analysis is required to reach a conclusion. To better organize the complexity of the topic, this chapter is divided into three different sections.

7.1 How Do Companies Perceive the Role of Women in Addressing Their Labor Shortages?

This subsection leverages the findings from the three research methods employed in the previous chapter to gain insight into how companies perceive the role of women in addressing labor shortages. The initial analysis of this question is grounded in the responses obtained from interviews with HR managers. The data implies that most companies represented by the interviewed experts do not explicitly target women as a solution to their labor shortages, as illustrated in Figure 10. Respondents conveyed that their organizations do not have job openings or strategies that exclusively target a specific gender. In an ideal scenario of gender equity, such an approach could be effective, if both men and women encounter similar constraints, thus ensuring equitable hiring practices. However, as the information gleaned in this study underscores, this is not the prevailing situation in practice. This is attributed to the

fact that women encounter distinct circumstances and constraints as mentioned before by both the women advocates and the interview experts who participated in this study.

Shifting the focus to the perspective of the interviewed experts hailing from feminist and women's support groups, it is essential to scrutinize whether there exists a shared desire among women to augment their labor force participation. It is indeed crucial that companies express genuine interest in increasing the hiring of women, but this initiative can only yield success if women themselves harbor this ambition. Examining the responses of female experts in women's support groups, as depicted in Figure 13, it becomes evident that women in Germany do aspire to enhance their labor force participation. In other words, there exists a strong motivation among women to become more actively engaged in the labor force. Nevertheless, a comprehensive assessment of Table 10 reveals that various factors persistently contribute to gender disparities in employment opportunities. The practice of formulating job offers without accounting for the prevailing inequalities in opportunities and constraints perpetuates the status quo and reinforces existing inequality. Consequently, if companies persist in creating job openings characterized by fixed working hours, it is highly probable that mothers could refrain from expressing show motivation for these roles and will seek positions that align better with their constraints. For instance, as pointed out in the study "Part-Time Employment as a Means to Increase Women’s Employment: (Where) Does It Work?" part-time jobs are often seen as the only viable alternative. Part-time employment may seem better than not working at all. However, it perpetuates existing power structures in which women are restricted to certain occupational groups (Barbieri et al., 2019). Perpetuating these structures and expecting women to overcome their obstacles on their own may discourage many women from participating in the workforce.

On the other hand, offering incentives and programs that help women in their situation would motivate them to realize their desire for more professional engagement. This consideration is especially true for mothers. The study also highlights that single women or women without

children face different, more socially oriented constraints that are, in quotes, somewhat easier to overcome. Thus, although this study is exploratory, it is evident that companies do not appear to have gender policies that actively encourage women to work full time or to enter other fields of employment. Instead, the document analysis, interviews, and literature review suggest that companies simply assume that these changes will occur on their own, or at least that they are not proactively addressing these issues. For example, many of the studies in the document analysis concluded that more women are needed but did not address how companies can actively encourage women's participation. Moreover, considering the experts who claim to have strategies that are directly aimed at women, such as offering jobs with more flexible hours or, for instance, making positions more attractive for women without children who have reservations about applying for male-dominated fields. This is done by featuring images of women and emphasizing that even if all requirements aren't met, women should still apply. It's based on the understanding that women tend to underestimate themselves when they don't meet all the requirements. This represents a significant first step, although not all companies in this study subscribe to this approach. However, it's worth noting that awareness of these factors can encourage women, even in small ways, to feel motivated to apply for these roles. This might encourage more companies to adopt similar strategies, especially considering the current labor market situation and the labor shortage. These considerations impact women life’s and their careers.

Another important aspect to analyze from a company's perspective is how they deal with challenges in finding candidates. While these strategies are not explicitly targeted at women, women can benefit from them. In Table 06 from the previous chapter, strategies mentioned by the experts such as mobile working, good social benefits and additional training are cited as beneficial for women, even if they are not explicitly tailored to them. Overall, the attractiveness of job descriptions plays an important role for applicants, according to the experts. Thus, any improvements in this regard may influence women's decision to apply for a job, especially in areas that are strongly influenced by digital transformation and are the

most attractive sectors for this study. This is because the promotion of engineering, high-tech industries, and innovation in general makes women feel empowered and influences their career choices (Bannikova et al., 2018). However, the findings suggest that companies need to take a real interest in promoting these types of careers with programs that are more focused on women.

Current policies to attract more women to fields such as engineering, high-tech industries, and innovation is positively influencing women's career choice. This impact can be seen in the increasing number of women interested in these fields that have traditionally been associated with men. Particularly in the fields of engineering, technology, IT and management positions, the HR experts interviewed from various companies emphasize the need for more personnel, thus confirming a labor shortage, as shown in Table 4. Furthermore, when looking at the results of the document analysis, this shortage is reinforced, especially when examining the main highlights related to dealing with digitalization, as shown in Table 11, where a persistent shortage of digitalization-related job openings is evident, reflecting a lack of digital skills. This aligns with the demand of role models for females in different areas and highlights the importance of engaging girls in these areas from an early age. In addition, the documents consistently point out that women remain undervalued in these areas, which contributes to their lack of confidence in their knowledge of digital transformation. As a result, many women opt for alternative careers in these fields, as can be seen in Table 12.

Social perceptions can have a great impact on women's development in the labor market, with constraints being social and cultural rather than cognitive. The importance of overcoming these social barriers and integrating more women into fields that require expertise in digital transformation is evident in the results of literature reviews. For instance, the study "Digital Gender Parity? Gender-Specific Attitudes and Competencies of Young Professionals in Germany," highlighted those male respondents held stereotypes that said women had lower IT and media skills and less interest in technology compared to men. Such stereotypes may

perpetuate gender inequalities in technology-related fields (Franken & Wattenberg, 2019). Similarly, the study "Labor Market Opportunities for Women in the Digital Age" emphasizes that programs to promote digital literacy and interest in STEM subjects among girls and women should be expanded and include women of all ages (Krieger-Boden & Sorgner, 2018). These initiatives should target women of all ages. This essentially suggests that engaging women in these areas of knowledge from a young age is critical to changing the prevailing societal perspective. This is particularly relevant because, as the study "The Paradox Evaluation of IT Stereotypes - A Post-hoc Analysis of Women's Missing Interest in IT Study Programs" shows, negative stereotypes contribute to women shying away from IT careers (Oehlhorn, 2018). In this regard, it is highlighted that while underestimating women is a social construct, interviews with HR professionals did not question women's cognitive abilities. In general, companies focused on finding the most qualified candidates, regardless of gender. As shown in Figure 11, many interviewees had positive experiences with mixed-gender groups, citing benefits such as versatility and different problem-solving perspectives. However, a minority mentioned challenges in get an strong insight in regard of the topic because of the low percentage of women working in their companies, making it difficult to identify the benefits of mixed-gender groups.

Based on the various analyzes presented in this section, it is possible to state that while this study is exploratory in nature, there is a notable lack of recruitment strategies that specifically target women. Most experts interviewed support gender equality and do not believe that strategies targeting women exclusively are the solution to their labor shortage problems. A quick answer to the study's sub-question would therefore be that the companies participating in this study do not consider the integration of more women as an explicit goal. From the perspective of these experts, the role of women in finding solutions to the labor shortage is not exceptional. They emphasize that their focus is not on integrating more women, but on finding the perfect candidate. Moreover, experts say, companies have their policies in place to prevent gender bias. This means that, from the companies' perspective, women must have

a strong professional profile in order to gain access to jobs with such requirements. Making sure there is no gender segregation is at least a good start. It is important to analyze how women can fulfill these professional profiles and what challenges they face in their professional lives. This is explored in the following section of this chapter to understand the relationships identified in the analysis.

7.2 What Are the Key Challenges and Barriers That Women Encounter in the German Labor Market When They Are Seeking Employment or Career Advancement in Industries Facing Labor Shortage? And What Strategies Have the Companies Implemented to Encourage Greater Women Participation in the Work Force?

Delving into the topic of how women can be instrumental in addressing the labor shortage necessitates a comprehensive comprehension of the prevailing context and the real-life experiences of women. It is imperative to consider the myriad circumstances that influence women's professional lives before proposing viable solutions. This section undertakes an analysis of the impediments identified by experts from the interviewed companies, the document analysis, and experts from feminist groups. The aim is to establish connections between these findings and discern whether specific constraints are consistently observed across these distinct sources. Additionally, a comparison is drawn with the document analysis to pinpoint the principal barriers that must be tackled to enhance women's involvement in the labor market. As elucidated in the preceding chapter, this study acknowledges the existence of varying constraints affecting women with and without children, as well as those juggling unpaid work and caregiving responsibilities. In accordance with the insights gleaned from the experts interviewed, feminist experts, and the outcomes of the document analysis, the primary reasons, and barriers that women encounter in their professional lives encompass the following:

- Male dominance in high-paying jobs: men continue to dominate higher-paying positions.

- Societal Perception of Women as Providers: The prevailing societal perception of women as primary caregivers has a significant impact.

- Reconciliation of work and domestic responsibilities: The difficulty of balancing work and domestic responsibilities is a major challenge for women.

- Low representation of women in public decision-making entities: The underrepresentation of women in public decision-making positions affects their opportunities.

- Segregation in career choices: Women's career choices are often influenced by gender segregation in occupations, especially those related to social work, which tend to have lower incomes.

- Limited childcare facilities: Inadequate kindergarten capacity and limited hours of operation pose challenges for working mothers.

- Lack of flexibility in working conditions: Rigid working conditions hinder women's efforts to conciliate work and family.

Understanding and knowing these limitations is important because it helps to comprehend the reality of women, and also to evaluate possible solutions and better proposals for job opportunities that truly meet women's needs. For example, companies could open the

possibility of hiring more mothers with children under five by offering additional kindergarten places or special benefits tailored to their needs. This could motivate many more mothers to re-enter the workforce.

The constraints that women face in their professional lives are many and vary depending on their stage of life and the tasks they perform. This is so important to get a better understanding of the types of strategies that exactly this group is targeted for. And, to ensure that companies are aware of the situation of female employees. According to experts in the field of human resources and the research conducted, these limitations include several key areas:

- Availability of work time: women often have less time for their work due to caregiving responsibilities. This limited availability can affect their career advancement and opportunities, as they may not be able to keep regular work hours.

- Absenteeism due to childcare: women may take more sick days or absences to care for their children. Working and caring for children can be a challenge and can lead to more frequent absences.

- Reduced work hours: Many women choose to work reduced hours, especially after becoming a mother. This reduction can lead to lower earning potential and slower career advancement.

- Performance changes after motherhood: Some experts have noted that women's job performance may change after motherhood. This perception can lead to bias and affect their career advancement.

- Perception as caregivers: society often views women as caregivers, which can lead to the expectation that they should take on the bulk of family responsibilities. This perception can impact their career choices and opportunities.

- Stigma: Women, especially mothers, can be stigmatized in the workplace. Sometimes they are expected to fulfill multiple roles, but they are not always recognized or rewarded for their efforts.

- Lack of understanding by managers: some male managers may lack understanding of the challenges women face both as mothers and as workers. This lack of understanding can affect how women are treated in the workplace.

The limitations women face in the workplace are not only a result of sexism but are also deeply rooted in historical and cultural contexts. To overcome these limitations, involves addressing societal expectations, promote work-life balance, and create inclusive and supportive work environments. When companies recognize and address these challenges, they can better support their female employees and realize the full potential of the workforce. In addition, promoting a more equitable sharing of caregiving responsibilities between partners can help women maintain their careers while balancing family life. However, expecting women to focus on other types of jobs and improve their working conditions cannot rely solely on their desires and expressed intentions. The different external factors that influence women's choices must also be considered. These include girls in their career choices, women with part-time or 'mini jobs' and mothers who must juggle the delicate balance between personal and professional lives. This section addresses a comprehensive set of constraints identified through various analyses, with the aim of gaining a deeper understanding of how women's starting points differ not because of sexism, but rather because of historical and cultural contexts (Teixeira et al., 2021).

Furthermore, A scrutiny of the document analysis, particularly regarding the segregation of women, reinforces the constraints outlined in Table 11. This accentuates the fact that, despite their motivation to work, women encounter obstacles. These barriers, notably in career advancement, parallel those identified by industry experts and feminist groups. Issues such as the underrepresentation of women in leadership roles, societal perceptions of women as primary caregivers, the prevalence of women in part-time or 'mini jobs,' and stereotypes surrounding women's proficiency in technology and innovation, are among the limitations underscored in the studies. It is noteworthy that immigrant women may also grapple with these restrictions, particularly in terms of their familiarity with the technology landscape. In addition, mothers are limited in time and opportunities due to their role as caregivers. For instance, the study "Job access after leaving education: a comparative analysis of young women and men in rural Germany" found that marriage has a negative impact on women's job prospects but a positive impact on men's (Unay Gailhard, 2016). This makes sense if women are primarily responsible for unpaid housework while men focus exclusively on their careers.

This situation is further illustrated by the findings of the study "Combining employment and Caregiving: How Different Care Intensities Affect the Employment Behavior of Middle-Aged Women in Germany," which state that women with high care work responsibilities are more likely to drop out of the labor market altogether. In contrast, women with less intensive care responsibilities can reconcile work and care responsibilities easier (Kelle, 2018). The situation could potentially improve if men were more involved in parenting. According to the "Fathers' Parental Leave-Taking, Childcare Involvement and Mothers' Labor Market Participation study," policies that allow successive paid leaves or require mothers to work during fathers' leaves could have even more positive effects on the division of housework and overall labor supply among couples (Tamm, 2018). A common barrier highlighted in the three research instruments used in this study is the lack of female role models pursuing careers in male-dominated fields. Studies show that regions with traditionally greater participation of women

in the workforce tends to have more socially accepting attitudes toward women in the workforce (Wyrwich, 2018). Although these limitations depend on various other factors, they do exist, and through the combined efforts of businesses, women's groups, and academics, some similarities in outcomes can be seen.

Moreover, it is important to understand how companies address the aforementioned constraints, an examination of the best practices outlined in Table 8 reveals the strategies these companies employ to alleviate the impact of these challenges on their female employees. Considering the varied responses, three distinct phases emerge in which these companies strive to assist women in overcoming these obstacles.

The first phase occurs during the application process. Companies commit to transparent selection procedures, including practices like "blind recruiting" and ensuring diversity in interview panels. The second set of best practices is centered on accommodating the specific needs of female employees. These encompass flexible work shifts, personalized arrangements tailored to women's requirements, overall flexibility in working conditions, opportunities for remote work, and trust-based work schedules. These best practices are noteworthy because, although the previous section noted that companies aren't creating roles exclusively for women, a closer examination of the benefits offered to female applicants and employees demonstrates significant potential for women to thrive in these industries. These benefits, especially those catering to mothers, may be the deciding factor for individuals seeking to increase their work hours. For instance, the option to work remotely or enjoy flexible hours can be highly appealing. The third phase includes practices explicitly designed to support mothers, which may entail reduced working hours, the provision of daycare centers and kindergartens, and the provision of maternity and paternity leave. It's important to emphasize that the mere recognition by companies that women require assistance at these three points in their professional lives is a positive sign of the working conditions they are providing for women.

According to the findings presented in this section, the acknowledgment of the limitations that women must overcome to develop their careers is evident. This recognition is shared not only by most HR experts working within companies but also by female experts in feminist groups and academics who have conducted studies in this field. Another significant aspect of the findings in this chapter is the best practices that HR experts have identified. It's clear that the labor market is evolving and adapting to the changing requirements for quality of life. The practices mentioned show that both single women and mothers have opportunities, and leveraging these opportunities is crucial. This is important not only for current female employees but also for the younger generation. If the upcoming generations are more engaged in careers related to digital transformation, these best practices have the potential to eliminate limitations. However, a more in-depth study would be needed to thoroughly explore and demonstrate this potential.

7.3 How Does the Participation of Women in the German Workforce Align With the Demand for Skilled Labor in Industries Undergoing Digital Transformation and How Do Companies Support It?

Finally, to address the last sub-question of this study, it is imperative to review the outcomes related to women's participation in sectors influenced by digital transformation in Germany. In line with the insights provided by experts interviewed across various companies, as illustrated in Table 9, HR recruiters do not perceive any disparities in technological skills between men and women. However, they also acknowledge that, despite possessing the necessary skills, women often grapple with a lack of self-confidence, which curtails their active engagement in domains significantly impacted by digitization and technology. Other experts posit that the primary barrier lies in a lack of motivation stemming from male predominance in these fields. Some suggest that a bit more training might suffice. In general, the companies partaking in this research do not discern cognitive discrepancies between men and women. Instead, they point to various constraints that impede a greater representation of women in these sectors.

In addition, most respondents confirm that companies generally offer training to their employees and that women can benefit from these programs to improve their skills. Given that women are perceived by recruiters as equal to men in terms of technological knowledge, it is possible to propose that as demand for workers in these fields increases, there should also be a greater supply of women with these skills. This is consistent with the opinion of the female experts interviewed from feminist groups, as shown in Figure 15. These experts also claim that there is no difference in technological knowledge between men and women. However, they mention differences in approach due to certain aspects of the education system, where men are more encouraged in these areas. In Figure 15, the majority of the women experts say that digital progress can help close the gender gap in employment, highlighting, for example, the great advantage of remote working. This represents an opportunity not only for companies to attract a diverse workforce, but also for women to improve their working conditions. For this to happen, change must start with young girls, considering the importance of the education system.

The experts recommend several best practices, including mentoring programs, making men aware of their dominance in these fields, the importance of role models, initiatives such as "Girls Days," eliminating gender stereotypes in occupations, and, of course, improving the education system. Once these best practices are implemented, the aim is not just to encourage more women and girls to enter these highly digitized fields, but as shown in Figure 17, women can represent a solution to the labor shortages. This underscores the need for men to become aware of the care work that women do at home. However, there is likewise a need to encourage womento pursue professional careers in these areas so that their inclusion can help alleviate the labor shortage. This is an important finding of this exploratory study. Despite its preliminary nature, it shows a good level of understanding of women's abilities to engage in these industries. This is evident from both the industry perspective and the perspective of women working to improve the quality of life for women. The idea that women

can be a valuable solution to the labor shortage is quite feasible, assuming a common convergence of ideas.

On the other hand, considering the document analysis conducted for this study, especially in the context of digitization, it is worth highlighting some important findings. A notable discovery in Table 11 is the societal underestimation of women and their skills in professions related to digitalization. This finding is at odds with the experts' opinions. Gender digital divide not only affects the country's economy, but also discourages women from working in these fields. In addition, it was noted that women need to be trained in these technological changes while still in school pointing to the importance of the education system.

Finally, the need for women as role models in the digital landscape, an observation also expressed by the female experts interviewed, is critical. From these findings, it appears that while some companies do not believe there is a skill gap between females and males, there is a need to incentivize women in these fields, reach out to schools and the education system to increase girls' interest in these fields, and create role models who can influence and show that women also have opportunities in these fields. In addition, the document analysis in Table 12 shows equity in terms of chances to enter industries affected by digital transformation, they often do so in different roles. This issue needs to be approached.

It was also noted that women express their need for more training but participate less in training related to digitalization. This could be since women often lack confidence, which can have a negative impact when applying for jobs in these areas. Considering the interaction and convergence of findings in this section, one can understand, for example, why one of the findings of the study "Digital Gender Parity? Gender-Specific Attitudes and Competencies of Young Professionals in Germany" was that men showed a higher interest in digital technologies than their female counterparts (Franken & Wattenberg, 2019). This can be attributed to the problem of promoting these areas, as highlighted by the experts. This

discrepancy in interest between men and women is consistent with research findings such as the study "Gender Inequality - Now Available on Digital Platform: An Interplay Between Gender Equality and the Gig Economy in the European Union," which indicates that the need for women is latent. In the gig economy (independent contractors), for example, female gig workers are affected by algorithmic bias, which can reinforce gender discrimination and inequalities (Vyas, 2020). This underscores the importance of addressing the issue of confidence, as according to the study, "The Paradox Evaluation of IT Stereotypes - A Post-hoc Analysis of Women's Missing Interest in IT Study Programs," participants expressed concerns about not having IT-related skills or knowledge and felt that negative stereotypes decreased their confidence in studying or pursuing an IT career (Oehlhorn, 2018)

Thus, based on the information gathered from various sources, it can be concluded that women seem to have opportunities in highly digitized industries, thanks to various changes in benefits and an initial assessment of equality. Given the findings of the studies that have addressed this issue, it is also essential to take immediate action. Postponing action can further exacerbate the gender divide due to a lack of knowledge or interest in the changes ahead. In addition, companies are increasingly willing to offer more flexible work arrangements, remote work options, and the necessary training that is essential for women to participate in and reap the benefits of digital transformation. Increased participation of women in these industries can promote gender parity in these sectors and mitigate labor shortages.

This chapter provides a thorough exploration of the numerous challenges and prospects associated with increasing women's participation in industries influenced by digital transformation in Germany. Drawing from an extensive analysis of expert interviews, academic research, and documented evidence, a nuanced comprehension of the dynamics within this context has emerged. One of the principal findings is that women encounter multiple constraints when it comes to accessing and excelling in industries affected by digital transformation. These constraints encompass societal perceptions, the distribution of unpaid

caregiving responsibilities, and stereotypes that restrict their career choices. These limitations are certainly not consistent, as there is a significant distinction between women without childcare obligations and mothers. These findings emphasize the imperative to address these constraints and formulate strategies to accommodate these distinct circumstances. The role of companies in mitigating these constraints is highlighted through a discussion of best practices. Although companies do not create specific positions exclusively for women, they offer several benefits that can be particularly attractive to female applicants and employees. These practices include flexible work arrangements, childcare facilities, and maternity and paternity leave. Encouragingly, these practices create a favorable environment for women, especially mothers, to expand their work hours, which align with the overall goal of increasing female labor force participation. The chapter also underscores the critical importance of raising awareness, not only among women but also among men. Gender-specific attitudes and competencies play a vital role in determining the level of interest and engagement of women in digital technologies. This issue is further compounded by a lack of confidence stemming from negative stereotypes. Thus, addressing these biases and enhancing self-confidence among women are vital steps to encourage their participation in digitally transformed fields. Crucially, the chapter also points to the potential of women to serve as a solution to the labor shortage in industries affected by digital transformation. Both expert opinions and academic research assert that there is no significant difference in knowledge and skills between men and women, suggesting that women can fill the talent gap in these fields. This perspective is mirrored by the awareness that companies are willing to provide training and flexible working conditions.

In conclusion, the chapter reveals a promising landscape for women's participation in industries impacted by digital transformation. As digital transformation continues to reshape the labor market. By removing restrictions, promoting inclusive business practices, increasing confidence, and encouraging women's participation, the path to gender parity in these industries is becoming more tangible. Moreover, this pursuit of gender equality not only

enriches women's lives, but also provides a valuable solution to the problem of labor shortages, ultimately benefiting the industry and society. The findings of this chapter serve as a solid foundation for subsequent chapters that delve deeper into the strategies and recommendations for promoting women's participation in these digitized sectors.

Chapter 8: Conclusion and Limitations

This chapter represents the culmination of an extensive process of research and analysis and serves the central purpose of addressing the research question that has guided all previous efforts. In the previous chapters, various aspects of the role of women in the labor market, especially within industries influenced by digital transformation, have been examined in depth. The research methods employed have made it possible to gain valuable insights. Nevertheless, like any other study, it is worth recognizing that this paper is subject to limitations that may have affected the conclusions. This concluding chapter briefly summarizes the key findings, addresses the inherent limitations of the study, and outlines the intended contribution to research on women's labor market participation, particularly its potential to alleviate labor shortages in digitally transforming industries. These conclusions not only summarize the insights gained through rigorous research, but also provide guidance on the way forward to advance gender equality in these sectors and promote a more inclusive and diverse labor market.

8.1 Key Findings

In this subsection, it should be noted that the key findings are closely linked to the research question addressed in this thesis. The analysis of whether "Female participation can contribute to mitigating Germany's labor shortage in digitally transforming industries" depends on the examination of the sub-questions discussed in the previous chapter. In this section, the key

findings have been summarized to provide a comprehensive response to the research question. The primary findings encompass:

- The data show that many companies have not explicitly targeted women as a solution to their labor shortages, as Figure 10 confirms. This approach, based on gender equity principles, assumes men and women encounter similar constraints and therefore have equal opportunities for employment. However, the study shows that this assumption does not match the reality that women face.

- Despite the absence of a specific focus on women by companies, it is apparent that women in Germany aspire to increase their labor force participation, as illustrated in Figure 10. Nevertheless, multiple factors contribute to gender disparities in employment opportunities, as elaborated in Table 10. The practice of creating job vacancies without considering existing inequalities only sustains the current situation.

- Many companies do not have specific gender policies aimed at encouraging women's full-time employment or facilitating their access to various job types. Nonetheless, exceptions exist, with some companies adopting approaches that directly focus on women, such as providing roles with flexible hours or enhancing the appeal of male-dominated sectors to women. These strategies are designed to tackle challenges like the confidence gap that women may encounter, a concept supported by studies like The Paradox Evaluation of IT Stereotypes.

- Several strategies used by companies to address labor shortages benefit women, even if they are not explicitly intended for them. The attractiveness of job descriptions significantly influences applicants' decisions, as recognized by experts. Therefore, any

improvements in this context can influence women's decision to apply for jobs, especially in fields influenced by the digital transformation.

- Women often face gender biases and negative stereotypes related to digital skills. These biases can perpetuate gender inequalities in technology-related fields. Initiatives to promote digital literacy and interest in STEM subjects among girls and women are seen as essential, especially if they start at a young age.

- Women face numerous limitations in their professional lives depending on various factors. The main constraints highlighted by experts include male dominance in better-paid positions, the perception of women as primary caregivers, the lack of available places in childcare facilities, rigid working conditions, and gender segregation in occupations.

- Companies promote several best practices that can be divided into three distinct phases. In the first phase, during the application process, companies emphasize transparent selection procedures, including practices such as "blind recruitment" and ensuring diversity in interview rounds. The second phase is about customization, with companies offering flexible work shifts, arrangements tailored to women's needs, overall flexibility in working conditions, opportunities for remote work, and trust-based work schedules. Finally, the focus is on supporting mothers, with companies offering benefits such as reduced working hours, crèche and kindergarten facilities, and maternity and paternity leave specifically designed to support mothers.

- According to expert interviews at various companies, experts from HR departments generally do not notice any differences in the technical skills of men and women. However, women often lack confidence, which limits their active participation in

technology and digitally transformed fields. They also note a lack of motivation, possibly due to male dominance in these areas.

- Employees are offered training programs that give women the opportunity to improve their skills and confidence in these areas.

- Experts from feminist groups point to differences in approaches to technology areas in the education system. They recommend addressing this aspect to encourage more girls to pursue careers in technology.

- While men and women appear to have equal opportunities to enter industries affected by digital transformation, they often fill different roles. Women express the need for more training but tend to participate less in training related to digitalization, partly due to self-confidence issues.

- To increase women's participation in industries affected by digital transformation and labor shortages, a change in social perspectives is needed to include men in caregiving roles. Men should be made aware of the caregiving work that women perform at home.

In light of these key findings, it can be concluded that, according to the findings of this study, the participation of women can indeed make a valuable contribution to mitigating the labor shortage in industries in Germany that are impacted by the digital transformation. The results obtained in this study support this conclusion from various perspectives. The first perspective centers around the perception of knowledge. In interviews conducted with HR experts and female experts affiliated with feminist groups in this study, it was consistently emphasized that there is no discernible cognitive disparity in technological skills between men and women. This implicitly suggests that cognitive factors do not constitute a hindrance preventing women from active engagement in these domains. While issues related to self-confidence and motivation

have been identified as potential barriers for women, they are not insurmountable and can be effectively addressed, for instance, through training and fostering a supportive work environment.

Furthermore, it is essential to recognize that motivation to work in these industries not only contributes to increased opportunities but also creates influential role models, rendering these sectors more appealing to women. This leads to the next crucial aspect, which pertains to the education system and early intervention. Simply waiting for more women to enter these fields without proactively addressing potential issues at an early stage is not a viable approach. Consequently, addressing gender disparities in technology-related fields should commence at the educational level by promoting impartial access to knowledge. Encouraging young girls to pursue careers in technology, implementing mentorship programs, and raising awareness through educational initiatives can collectively foster a more balanced talent pool in these industries, thus narrowing the digital gender gap. While the document analysis highlights the disconcerting underestimation of women's digital skills, expert insights indicate that such underestimation is not rooted in actual disparities in skill levels. If women focus on training and boosting their confidence, they can effectively reduce the digital gender gap.

It is also worth noting that corporate recruitment programs, although they are not explicitly for women, are attractive. Better working conditions, with perks such as remote work or flexible working hours, or the possibility of using childcare provided by companies, give women better access to jobs that were not possible before. Here it is important to emphasize that these benefits are crucial for mothers. These benefits can motivate women to extend their work hours and more actively engage in technology-related industries. In addition, the need for society's participation and the awareness of men to make it possible must be exalted. When men take on more childcare responsibilities, women can also more easily pursue their career dreams. Promoting women in technology fields means not only providing them with training and opportunities, but also eliminating stereotypes and involving men in caregiving

responsibilities. The study's key findings suggest that with the right support, a shift in societal perceptions and interventions in the education system, women can play a critical role in addressing the labor shortage in Germany's digital transformation industries. Their participation not only helps bridge the gender gap, but also helps meet the growing demand for skilled workers in these industries, which can translate into the country's economy. With a larger workforce, the economy experiences more dynamism.

8.2 Limitations of the Research

The above results, while potentially valuable to the academic community and anyone interested in this topic, have been affected by several limitations that significantly affect the results. It is therefore necessary to consider the various limitations that must be considered when accepting the results of the study.

8.2.1 The Scope of the study

One of the most important limitations lies in the scope of the study. Since this is an exploratory study with a very small sample, it was difficult to draw firm conclusions or conduct a deeper analysis that would provide a detailed picture of labor shortages, digital transformation, and the integration of women into the labor market in Germany. The small sample size limits the generalizability of the results.

8.2.2 Time Constraints of the Participants

Another limitation of this study was the time constraints to which the experts interviewed were subject. Due to their busy schedules, questions had to be kept short in order to obtain their valuable input. A more detailed interview format might have provided more in-depth information. Nevertheless, it is worth noting that many experts kindly took time out of their busy schedules to participate in the interviews, even during their lunch break.

8.2.3 Subjectivity

Because two of the methods used involved interviews with experts, the study and its conclusions are based on their opinions. Although the study attempted to draw conclusions from the experts' opinions and the documents analyzed, it is important to recognize that the small sample of experts may not fully represent the views of the majority, including businesses and women's support groups.

8.2.4 Limitations of the Data

Despite a growing consensus in Germanyabout the role of women in the labor market and the promising benefits of increase in the labor participation of women, there is still limited documented literature addressing women's participation in fields permeated by innovation and digital transformation. Therefore, the study was constrained by the lack of a substantial bibliography on these topics.

8.2.5 Possible Gender Bias

Despite efforts to be impartial in considering participants' opinions, most of the human resource experts interviewed were women. This gender imbalance may have led to subjectivity in their responses. The fact that they belong to the same gender as the subject under study could lead to a different perspective than their male counterparts in the same field.

8.3 Recommendations

Based on the various findings of this study, several recommendations have emerged to empower women as a genuine force in mitigating labor shortages in industries heavily impacted by digital transformation. By examining the literature and the voices of interviewees, it is clear that digital transformation is permeating various sectors of the German economy. Therefore, the recommendations presented here recognize digital transformation and innovation as key variables in the labor market. In this context and from a gender perspective,

they assume a crucial role for women. Furthermore, these recommendations are derived from the findings presented in this study and are in no way intends to go further than the scope of this research. Rather, they serve as preliminary guidelines and initial findings based on the findings of this study.

8.3 1 Raising Awareness and Cultural Sensitivity

One of the most important recommendations that emerge from this study is the urgent need to raise awareness and cultural sensitivity. It is a matter of making these problems more visible and ensuring that the individuals and organizations involved truly understand that the situation of women is profoundly affected by cultural and societal limitations. It is quite intriguing that gender roles continue to be deeply ingrained, which can influence the collective consciousness and perceptions of women's abilities in the realm of digital transformation. Despite the increasing involvement of women in sectors as technology and science, in comparison to some years ago, it is undeniable that fostering women's interest in these domains begins with the fundamental question of whether women can assume roles that demand these skills.

8.3.2 Educational Reforms

A critical step in enabling women to play a more significant role in bridging the labor shortage in digitally transforming industries is the implementation of education reforms. The education system, both formal and informal, should integrate more knowledge related to the digital revolution and changing work methods. This is not limited to women, but should be designed to get young people, regardless of gender, excited about these topics. Sparking interest in these areas at a young age, without gender bias, is essential for a diverse and competent future workforce.

8.3.3 Realistic Support for Working Mothers

A crucial aspect of a labor market with segregation, particularly regarding women who are mothers, revolves around the practical support that can be offered to them. Fostering an interest in digital innovation and facilitating the learning or enhancement of skills for mothers can only be realized if their motherhood situation is thoroughly understood. Formulating programs that fail to take this into account are fundamentally flawed. It is vital to ease their integration by ensuring the availability of more childcare facilities and adapting childcare hours to the needs of working mothers. This enables them to invest time in building these technological skills and encourages their return to work. Consequently, the concept of mothers continuing their professional careers can become more concrete, rather than remaining a mere theoretical proposition.

8.3.4 Comprehensive Research Initiatives

Further studies addressing this issue are highly recommended. Academic interest in exploring gender perspectives and economic issues as the labor shortage and women participation in particular with the changes that technologies are bringing to the life of people, especially as digital transformations speed up in many industries and create a landscape of opportunities. These studies, with different focuses, can provide invaluable insights to help raise awareness and provide a broader perspective on how to achieve equality of gender within those industries by guaranteeing benefits of digital transformation may be studied from various perspectives and by identifying niches where improvements can best be applied.

8.3.5 Tailored Strategies in Corporations

Companies are encouraged to implement strategies that target the female workforce. While many companies already offer a broad portfolio of benefits, making them more visible and tailoring some of them specifically to women can be a motivating factor for women to actively engage in these areas. This includes developing mentoring programs, creating a gender-

sensitive work environment, and organizing initiatives to encourage women's participation, especially in technology-based careers.

8.3.6 Government Involvement

Public authorities have a pivotal role to play in addressing these issues, recognizing the significant economic benefits they bring. The digital transformation, with its acceleration of production processes and market expansion, as well as the transformation of work paradigms, represents a great opportunity. This is particularly true for a country as industrially robust as Germany. The government's active engagement in promoting these areas to women, including funding specialized training, and supporting technology development programs tailored to their interests and skills, can be a catalyst for the country's economic growth. Government-led initiatives are instrumental in advancing these areas of knowledge and stimulating their growth.

8.4 Contributions and Further Research

The contributions of this paper, while preliminary, have the potential to span multiple dimensions. This study can serve as a source of inspiration for scholars who wish to explore this topic in more depth, as the results obtained provide a solid starting point. Moreover, it could serve as a fundamental basis for future research, both to substantiate current findings and to discover new perspectives and dimensions of the problem. In this sense, this study strives to enrich the academic knowledge dealing with the intersection of labor shortages, digital transformation, and women's participation in the labor market.

A critical aspect of these contributions is their relevance to companies interested in improving their hiring strategies, and especially to those with a genuine interest in bringing more women into their ranks. The study provides valuable ideas and insights that can be used by companies in their efforts to diversify their teams and provide more equitable access to high-tech

positions. In addition, these recommendations can be useful in creating a more inclusive and gender-equal work environment, encouraging greater participation in industries undergoing pronounced digital transformation. In short, this study aims to contribute to both the advancement of academic knowledge and best practices that promote gender equality in the workplace specially in industries high impacted by the digital transformation.

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APPENDIX

This section of the document provides an elaborate account of the diverse research methods employed in the study presented herein. The section is subdivided into three segments. First, it offers an insight into the tools and the framework of code guidelines applied during the two distinct expert interview rounds. Subsequently, given the comprehensive nature of the document analysis, it delves into a detailed description of the analytical process and its associated guidelines. Finally, it culminates with the presentation of the document analysis, conveniently organized within this section for easy reference.

A. Interviews

I Interview Protocol with Experts from HR

The interviews with people who were initially contacted via LinkedIn were conducted using a semi-structured guide. Transcription was performed using the dictation function of the Microsoft program, followed by a subsequent review to ensure accuracy. Others were transcribed manually. The document was then systematically organized by assigning a unique identifier to each interviewee and consolidating all information into a single document. This consolidated document was then used for subsequent analysis and categorization, as described in more detail later in the Appendix.

*The interviews were semi-structured to encompass a duration of approximately 13 minutes.

*Absolute anonymity was assured to the interviewees.

*Participants were comprehensively informed about the interviews' objectives, data protection terms and conditions, and the exclusive use of the gathered information for academic purposes within the scope of this thesis.

Explanation of the Purpose of This Interview

This interview is tool by which aim to find outthe point of view of the people working in the area of recruitment in the companies with regard to the role of the labor situation of women living in Germany and it is part of the data collection tools of the thesis " Women in The Labor Market: Contribution to The Mitigation of Labor Shortages in Industries Involved in The Digital

Transformation in Germany" that seeks to understand if it is possible to provide more opportunities for labor integration to women through digitalization and if this in turn contributes to reduce the labor shortage that exists in Germany.

Thank you in advance for your cooperation.

Agreement Terms and Conditions

Our General Terms and Conditions (GTC) explicitly state that your data belong to us exclusively. It is necessary to conclude a Data Processing Agreement (DPA) in accordance with European Privacy laws (GDPR). You can check the DPA documents online. The information provided will not be owned or sold to third parties and is collected exclusively for educational use. Please accept the terms and conditions.

Semi-Structured Interview Guide

a. **Company Profile**

   Q1. What industry does your company operate in?

   Q2. Can you provide an overview of your company's size?

b. **Labor Shortage Awareness**

   Q3. Is your company currently experiencing a labor shortage? Please explain it

   Q4. If yes, in which specific roles or departments is the shortage most pronounced?

   Q5. About how long does an open job offer last until you find someone qualified for the position? Why do you think it lasts that long?

c. **Recruitment Strategies**

   Q6. What strategies has your company employed to address labor shortages or to try to find the right person?

   Q7. Have you specifically targeted women as part of your recruitment strategy to address labor shortages or long opened positions?

d. Women Inclusion

Q8. How does your company promote diversity and inclusion in its workforce, particularly regarding Women employment?

Q9. Have you observed any specific benefits from having a diverse workforce?

Q10. How do you ensure that recruitment processes are free from gender bias?

e. Challenges for Women in Employment

Q11. What do you see as the key challenges that women face when seeking employment or career advancement within your industry or organization? please explain it

Q12. How does your company support women in overcoming these challenges?

Q13. Can you share any success stories or best practices related to recruiting and retaining women in roles traditionally affected by labor shortages or an success story of recruiting women in "man jobs"?

Q14. Based on your experience, what recommendations would you give to other companies looking to address labor shortages by increasing female workforce participation?

f. Digital Skills and Training

Q15. To what extent do you believe that women possess the necessary digital skills to succeed in roles that require technological proficiency? please explain it

Q16. Does your company offer training or upskilling programs to help women develop these skills?

Q17. Would you like to add something more to the discussion?

Transcription and Compilation of Interviews

In an effort to conduct a qualitative content analysis, all the interviews were consolidated into a single document. This consolidated document expedited the identification of categories through the use of color-coding, enhancing navigability within the software and streamlining the categorization process for each question. Consequently, this approach facilitated the construction of the guidelines presented earlier in this section. Lastly, in order to safeguard the anonymity of the respondents, each interviewee was assigned a unique identifier, which was derived from the interview number of the respective round and appended with the letter 'R' to signify 'respondent'.

Interview with Interview with human resources recruiters from companies operating in Germany.

1. ***What Industry does your company operate in?***

R01 Emergency Assistance

R02 Saas IT

R03 Tech

R04 Market Research

R05 Business management consulting

R06 Technic

R07 Tech

R08 Food and confectionery

R09 Automotive

R10 Science

R11 Insurance-Tech

R12 Glass and Packing

R13 Renewable Energy

R14 Tech

R15 Automotive

R16 Logistics

R17 Tech

R18 Gaming

2. ***Can you provide an overview of your company´s size?***

R01 75

R02 +100

R03 600

R04 70

R05 50

R06 230

R07 21500

R08 6100

R09 400

R10 2500

R11 180

R12 +10000

R13 2000

R14 42

R15 1695

R16 78000

R17 30

R18 280

3. Is your company currently experiencing a labor shortage? Please explain it

R01 From time to time.

R02 No, we have our recruiting well under control.

R03 Not exactly a shortage but sometimes it's hard to get the perfect candidate.

R04 Yes. Especially at one Department/Location.

R05 Currently we do not have that problem, in general the vacancies are attractive, and we have enough applicants.

R06 I wouldn't say labour-shortage, but rather that there are vacancies where it is very difficult to find the right person.

R07 Sometimes it is difficult to find people, but it is not a crisis. So no, besides, the company is very well known in engineering and we receive a lot of free applications.

R08 We don't have a labour shortage as such but let's say that the vacancies that take the longest to be filled are the operator and transport vacancies.

R09 No, our recruiting process is working pretty well.

R10 Yes, due to the rivalry with other companies we can not pay enough to have the best Scientists.

R11 Yes, in parts. there are mainly two fields of expertise that we experienceing labor shortage, tech/software-related (e.g. software engineers, technical product managers, etc) and any roles that require on-premise working (office management, IT support, accounting).

R12 Yes, it’s a country problem affecting all sectors including us.

R13 Yes, in recent years it has become more and more difficult to find the right people for certain positions.

R14 It is not only our company but the industry in general, it is becoming increasingly difficult to find the staff to fill vacancies.

R15 Yes, currently, we are experiencing a labor shortage. The automotive industry, is going through a significant transformation with the shift towards electric and autonomous vehicles.

This transition requires a different skill set than what was traditionally needed. As a result, getting applicants with expertise in these new areas can be challenging.

R16 Yes, our company is facing a labor shortage. The logistics industry has seen significant growth in recent years, driven by e-commerce and global supply chain demands. Finding skilled and experienced workers to meet this demand can be challenging.

R17 Yes, the tech industry is booming, and there's a huge demand for talented folks. Finding the right people with the right skills can be a bit of a challenge.

R18 Yes, It is becoming more and more difficult to find the right people, it is necessary to have clear strategies and to be alert.

4. ***If yes, in which specific roles or departments is the shortage most pronounced?***

R01 Employees on the phone (Customer service)

R02 No problems right now. We have very experienced HR people in the company who have built up the recruiting and branding to a high level.

R03 Its harder to find people for the management positions.

R04 Deputy Head of Departments.

R05 We don’t have a shortage problems, but in general the recruiting process is taking now more time, I do not know if it’s helpful.

R06 Engineering and technicians in general is where it is most difficult to find candidates.

R08 Operator and transport.

R11 (Answered before) there are mainly two fields of expertise that we experienceing labor shortage, tech/software-related (e.g., software engineers, technical product managers, etc) and any roles that require on-premises working (office management, IT support, accounting).

R12 IT is the critical one.

R13 IT.

R14 Vacancies are open at almost all levels of the company.

R15 The shortage is most pronounced in roles related to electric vehicle technology, software development, data analysis, and artificial intelligence. These are critical areas as we adapt to the changing automotive landscape.

R16 The shortage is most pronounced in positions as truck drivers, warehouse workers, and logistics coordinators. These are key positions in our operations, and the demand has outpaced the supply of qualified candidates.

R17 Devs, devs, devs! We're always on the lookout for skilled software developers. But we also need designers and data scientists who can make magic happen with our software.

R18 IT, mobile game development, unity.

5. ***About how long does an open job offer last until you find someone qualified for the position? Why do you think it lasts that long?***

R01 2-3 Months, the selection process is long and sometimes there is a long evaluation of the people who apply for the job positions.

R02 We have a hiring time round 15 days. This way we have the possibility to know the applicants and due to our process innovation, we can make decisions in that time frame.

R03 3 months the longer ones, it depends a lot on the time of the year, there are months when we receive many applications and there are others when we do not, unfortunately there is no concise way of knowing.

R04 2 to 4 months, due to Salary expectations.

R05 It is difficult to say how long vacancies last because it really depends a lot on the type of vacancies, for example vacancies we offer to students or recent graduates are filled quickly, vacancies at management level take longer but in general it depends on each vacancy, it can be between 15 days to 3 or 4 months in the worst case.

R06 Vacancies are open for 1 to 5 months depending on the job position. Sometimes it is because there is a need for someone with exact knowledge in something and there are not many people in that area and sometimes it is because the people who apply do not meet the expected requirements so it is normal that this time is given.

R07 can take between 1 month and 3 months, due to the recruitment process. The main reason is that, as in other industries, sometimes there is a need for people with knowledge in certain subjects and you cannot find the perfect candidate at once, but you have to leave the vacancy open to make sure you have the person who best meets your requirements.

R08 It depends very much on the type of vacancies, operative vacancies can take up to six months, managerial vacancies take 3 months at the most.

R09 60 Days, it's the normal process to check and be sure the best candidate is chosen.

R10 3-6 months, there is a lot of competition and applicants have many positions to apply for, it becomes a competition between companies to catch the perfect candidate.

R11 Anywhere from 2-12 months. depending on general labour market conditions with lack of specific talent, discrepancies between what company offers and what specific candidate wants (e.g. product to work on, company mission, salary, onsite vs remote working), insecurity of economical situation and resulting lack of willingness for people to switch jobs and re-start their probationary period.

R12 Depends on the area - in IT long up to 3 months, junior positions 2-3 weeks.

R13 3 months, reasons vary from job position to job position, but in general there is a lack of specific skills.

R14 From 2 to 12 months, there is competition in finding the ideal person for each job, sometimes the job offers are very similar to other companies, sometimes the candidates interviewed do not meet the expectations, sometimes there are too few applications for some positions.

R15 Job offers in these specialized fields tend to stay open for a longer duration, often several months. This is because the pool of qualified candidates with expertise in these emerging technologies is limited. We want to ensure we find the right fit for our organization, and that can take time.

R16 3 to 5 months on average, the reasons are not always the same, it probablyhas a lot to do with thelack of workers in this area.

R17 Job postings typically stick around for 1 month or 2. We want to give folks enough time to find us, and tech roles can be competitive.

R18 3 months, especially managers there is a long response time and happened that there are no fitting candidates.

6. ***What strategies has your company employed to address labor shortages or to try to find the right person?***

R01 The best solution is talking to my network.

R02 Employer branding, fully digital environment so that work can be done from anywhere in the world.

R03 We are present on employment platforms and usually through referrals from our current employees.

R04 More Benefits.

R05 As I said before we at 3DSE have the benefit of having attractive vacancies and therefore it is perhaps easier to attract staff. We also have professionals in recruitment who are responsible for being present in major web portals, we have good ranking in kununu for example and that makes people feel more confident and attracted to work with us.

R06 We offer additional courses so that the person meets the minimum requirements and we give the extra step of training them in the technical processes we need.

R07 We have good employee branding and the brand is well known in the industry which makes the process much easier and of course the people working in Talent Acquisition are trained for each vacancy.

R08 The company is generally active on all platforms where people are looking for jobs, we are present at job fairs and employer branding is very important to us.

R09 Diffrent recruiting channels, cooperations with new stalkholders, cooperation with the BA, networking in the area, new models for apprenticeship.

R10 Advertisement in Job websites, Employer Branding.

R11 Inhouse and external recruiting, changing EVP, offer more remote options, offer part-time options.

R12 Active Sourcing, Recruiting via social media.

R13 Benefits.

R14 We are always making direct contact with people who meet our profile, we are present at job fairs, and we have good networking to attract people interested in tech.

R15 We've adopted a multi-faceted approach. This includes collaborating with universities and technical schools to identify and nurture talent early on. We're also investing in internal training and development programs to upskill our existing workforce. Additionally, we've expanded our recruitment efforts internationally to tap into a more diverse talent pool.

R16 General benefits. We offer competitive compensation packages and advancement opportunities to attract and retain talent. Additionally, we're investing in technology to streamline logistics processes and reduce labor demands.

R17 We're big on networking, so we hit up tech events and conferences. We also use social media and job boards. But honestly, we find some of our best hires through employee referrals.

R18 Linked in active search, good benfits& conditions like mobile work.

7. ***Have you specifically targeted women as part of your recruitment strategy to address labor shortages or long opened positions?***

R01 No, Inchoose the best fitting person: can be a man or woman.

R02 Gender is not in any place. We focus on the skills and motivation that someone brings to the table. We have a balanced ratio and diverse nationalities on all continents.

R03 We do not have programmes based on gender, our decision is based on whether the person really has the profile we are looking for regardless of gender, for us it is of utmost importance that the person fits the company.

R04 No. Men alike Women.

R05 Not directly, that is, we do not formulate specific vacancies for women, but we try to describe in the vacancies that if they do not meet all the requirements we ask anyway apply,

we do this because we know that women tend to be harder on themselves and if they feel they do not have everything that is listed are intimidated to apply, we also try in the selection process to provide equal opportunities for women and men to make everything fairer.

R06 In the company this is an issue at the moment and a couple of actions have been taken to attract women to this area. Not because of the open vacancies but in general to attract more women to the engineering and technical field.

R07 No, we are an engineering company and still this is a mostly male dominant field.

R08 No, we do not have jobs for women or for men, we always treat all candidates equally.

R09 No specificly.

R10 Yes, we have a diversity management team now.

R11 Yes, in the form of jobsharing/part-time possibilities. but not through any channels that target women specifically, women-focused job boards etc.

R12 No, not specifically.

R13 Yes, we try to be more attractive for women with more flexible work offers.

R14 Officially we don't have in our company any policy for this topic, we believe to give the same opportunity to any candidate no matter gender, race, background, nationality. When we find the ideal candidate it does not matter if it is a male, female, or diverse for us.

R15 Absolutely, we recognize the importance of diversity in our workforce, including gender diversity. We have actively sought to attract women to roles in technology and engineering through targeted recruitment campaigns, mentorship programs, and networking events.

R16 Yes, we recognize the low representation of females in the logistics field and are actively working to change that. We've launched recruitment campaigns targeted at women, highlighting the opportunities for a rewarding career in logistics.

R17 Absolutely! Diversity matters, and we actively encourage women to apply. We've even got women in leadership roles to show that we walk the talk.

R18 No, but I would like to know how we can target just women.

8. ***How does your company promote diversity and inclusion in its workforce, particularly regarding Women employment?***

R01 We choose the best qualified person for full time. For part time we try to offer positions for woman that want to work part time in the mornings

R02 By focusing on having a balanced ratio of females and males in working teams. Likewise in the management board, where generally speaking there is the most shortage.

R03 We have a general rule of non-discrimination and thus try to achieve inclusion in all respects, although we do not have something to target women as such.

R04 Women with small children primarily work remotely. This is already taken into account in the hiring process.

R05 We try to adapt to their individual situations, f.e. remote work, stabile projects, known clients, more feedback sessions on work pressure.

R06 Events such as women's day are organised to attract young talent, but in general it is still an issue that we are trying to define.

R07 While vacancies have no gender and a woman is not expected to apply for a certain type of job, the truth is that for example in HR there are quite a few women, but in boardmanagement there is only one woman, in engineering vacancies we always try to put images where there are women with machines to make it attractive to women but it is still a male dominated field.

R08 We do not have a specific way of attracting diversity, however when candidates are of different races, cultures or genders, we fully respect that and it is not taken into account when choosing.

R09 DEI policies are in place.

R10 We just implemented a project for that.

R11 1/3 of the board is female, we keep track of % of females in departments and per job level, option to bring children to the office.

R12 website overview, and in interviews

R13 Comitee in place, work on getting better.

R14 As I said before for us it is not relevant the gender of the person and we always emphasize that we need someone with the characteristics for the job, although unfortunately it is almost always men who meet these characteristics, in the company there are almost no women, and it is very much due to the industry.

R15 Our company has established diversity and inclusion initiatives that include specific targets for gender diversity at all in the staff. We've also implemented inclusive hiring practices, offered flexible work arrangements, and created affinity groups to support women in their careers.

R16 We promote equal opportunities, offer flexible work arrangements, children care bonus and actively recruit from diverse talent pools.

R17 We're all about it. We offer flexible work hours and remote options to make work-life balance easier. Plus, we're creating mentorship programs and making sure everyone's voice is heard.

R18 Promote women to management positions.

9. Have you observed any specific benefits from having a diverse workforce?

R01 No, it's more tirong in general to work with so many different personalities as they all want their attention and have their needs.

R02 Yes, the colorful mix of employees and thus also talents give rise to many great ideas and opportunities for our scale up to equip our working environment for the future and to become one of the top showcase companies in the digital sector as a full remote company.

R03 Yes, Diverse groups are much more versatile, and the working environment is more creative, in our area for example it is very helpful to have people from different cultures for example.

R04 No. But we are Open Minded for diversity.

R05 Yes, especially in the consulting area is of great benefit to have diversity, this makes the groups have more ideas and respond better to customers and their needs, we think it is a great help to have different points of view in the teams.

R06 Yes, In terms of cultural diversity. yes, but we don't have so many women in the company to talk about gender diversity.

R07 In my area yes.

R08 I think that more than diversity, what benefits the company is to have good professionals and to keep people motivated, no matter if they are only men or if they are mixed groups or only women, the work environment is key. I would say that there are benefits in that problems are handled differently.

R09 Yes, of course.

R10 No, Is still too soon to say something about it, now diversity is more than women and men

R11 None that have been tracked.

R12 Yes, Better teamwork.

R13 Yes.

R14 No, but we would like to have more diverse staff.

R15 Yes, a diverse workforce brings a broader range of ideas to the table. This diversity fosters innovation and problem-solving. It also reflects the diversity of our customer base, which is essential in understanding and meeting their needs effectively.

R16 Yes, a diverse team brings different perspectives and problem-solving approaches, which is invaluable in the logistics industry, where adaptability is crucial.

R17 For sure! Different perspectives bring innovation, and that's gold in tech. Our diverse team has led to more creative problem-solving and better products.

R18 Yes, diffetent perspectives, better understanding and motivation of staff.

10. How do you ensure that recruitment processes are free from gender bias?

R01 The work counsil checks the decision HR has made.

R02 We do not specify gender in our job titles of job postings. The title will always be (human). Regardless of the role or department.

R03 We have a clear and transparent recruitment process.

R04 Our company does not judge. everyone's being treat equally.

R05 The overall hiring process is designed to avoid stigma or bias, candidates are evaluated fairly and the ideal candidate for the job is chosen.

R06 We have standardised recruitment processes and we do not give any gender bias in any position, in fact, as I said, we want to attract even more women.

R07 Recruitment processes are objective, and candidates are chosen on the basis of their skills and performance, not their gender.

R08 We have standardised and regulated processes that allow us to select candidates based on how well they fit the profile we are looking for.

R09 Revision of hired emplyoees and the other applicants.

R10 We use a web page to check our texts for that.

R11 We could do more. recruiteres are sensitive towards baises and experienced in methods to reduce them, hiring managers and management need better education and willingness to take risks.

R12 Invite all candidates.

R13 Neutral language, divers' recruitment team.

R14 The selection process is always done in a fair manner and as I have emphasized before, we would like to see more women applying.

R15 We've implemented blind recruitment practices where possible, removing gender and other identifying information from initial applicant screening. We also provide training to our hiring teams on unconscious bias and the importance of diversity in the workplace.

R16 We provide training to the acquisition and hiring teams on recognizing and eliminating bias. Additionally, we maintain diverse interview panels to ensure fairness.

R17 We're training our hiring teams to recognize bias and keep it out of interviews. And, we've got a diverse interview panel to make sure everyone feels comfortable.

R18 Neutral CVs, training our HR overview/participation.

11. What do you see as the key challenges that women face when seeking employment or career advancement within your industry or organization? please explain it

R01 Work time availability, flexibility to do over time, sick days because of children.

R02 I think there generally needs to be a mix and balance of genders in the company. Likewise, voting rights and management roles must be assigned equally. In most companies there is an imbalance and therefore also the problem in general in a more male dominated world to integrate a woman.

R03 I would say that the positions you can apply for if you are a mother, most women are looking for part-time jobs and that makes it harder for them to find the right job. Also life with children for example, when women go to maternaty leave In general women reduce their working hours after their rejoin but more and more women come back with nearly 100% of their working hours.

R04 There are no Challenges.

R05 Job as consultant, mobility, flexibility, work intense.

R06 There is still a lot to be said here, a lot of extra help is still needed, women are still the ones taking care of children and I think that sometimes this discourages them from choosing technical careers that they may have to give up.

R07 The balance between personal life with children and career, I myself am an example of this, at the moment I am on my second parental leave but I work part time since my first child, even if I want to work more it is not possible for me.

R08 I would say that there is still a lot of problem with women mothers, once you are a mother it is more complicated to continue having the same performance and sometimes the managers notice it.

R09 Care working (mother), attracting women for shift work in the automotive enviorment.

R10 Women, who are planning on having a family need a good background, so they can do science.

R11 Not specific to our company but in general. (goes for both tech and insurances industries) women are judged harsher and given less credit, partly due to their own communication style. harder to advance career ladder with male-dominated management& supervisors taking the hiring and promotion decisions. specific example men 50+ making decisions on staff/women 20-40 who have children at home - if men used to have support from their wifes to raise their children they don't make the mental connection between own experience to that of their employees, own wife at home, looking after children 24/7 vs a female employee who wants 50/50 with her husband for their children thus needs 2.5 days/week to drop-off/pick-up children from kindergarden/school and is not available to work these times.

R12 Depends on the role. in our industry there are only few women educated for the blue collar area

R13 None, same position, same conditions, same challenges.

R14 There should be more promotion and opportunities for young women to get better access to information and existing options when taking a role in tech. I believe thatthe educational system and the society in general still makes a clear distinction between profession for males and for women, this stereotype should seize to exist.

R15 In the automotive industry, as in many STEM fields, women often face challenges related to stereotypes and biases. There may be a perception that certain roles are traditionally male-dominated, which can deter women from pursuing careers in these areas. Additionally, work-life balance concerns can be a challenge, especially in roles that require extensive travel or irregular hours.

R16 If the industry is dominated by men, the needs that women have will not be taken into account, there is a need for many women in management roles because they are the ones who understand for example the need to reduce working hours or to have a special 10 minutes leave to pick up their children from school, a man who's only obligation is to work will normally not pay attention to these kinds of needs.

R17 In tech, there's still a stereotype that it's a "guy thing." Some women might feel like they don't fit in or have to prove themselves more. Balancing family and demanding tech roles can also be tough.

R18 No female applications for some jobs, gaming very male dominated.

12. How does your company support women in overcoming these challenges?

R01 We are beeing flexible onntje working shifts, trying our best to arrange to the women's needs.

R02 By talking to them specifically and involving the management, which is generally very open-minded.

R03 We offer flexible working hours as well as part time jobs, Furthermore, in our job advertisements we intentionally put women in the pictures, to make the position more attractive to women.

R04 A lot, in general every case is different, but the company is flexible.

R05 As I said before, it is more about looking for a way for women to continue to have their work and if it is difficult for them to adapt to the rhythm due to for example children, then we look for a way to be more flexible, each case is different but so far we have not had to make any extreme adaptations, women work at the same rhythm as men.

R06 We have standard processes, the same support that is given to men is given to women, here I think the problem is more of an attitude problem, if a woman wants to continue working, maybe the man can also reduce his working hours so that they can both work and parent.

R07 Flexible working hours, remote work. But it always depends on the supervisor how well these instruments are used to meet the needs of parents.We have to daycare facilities, but the demand is much higher then the available spots.

R08 Always try to find a way for the mother returning from her mother leave time to adapt her job, most do not return to the same position, if the position requires a person to be there all the time, then look for similar positionswhere they canwork and also be with their children, mothersare much more likely to reportsick and working time is variable.

R09 Diferent models in shift models and working hours or home office policies, girl’s days.

R10 Own kita and kindergarten, mobile work, support by family bureau

R11 Flexible working times, trust-based work time, option to do part-time, option to take unpaid vacation if needed.

R12 There is not a program or something to support specificity women.

R13 None, the company does not have any program or initiative regarding women.

R14 We don't have many women, the company really offers many benefits that I think are optimal for women. Our work style is 100% digital and hybrid, it can be done from anywhere in the world or at our office. We offer flexible hours and special leaves for any colleague that needs this within our team no matter the gender.

R15 We provide mentoring and coaching programs to help women navigate their careers within the organization. Flexible work arrangements, including remote work options, are available to promote work-life balance. We also actively promote a culture of inclusion and respect.

R16 Flexible work arrangements, including remote options where feasible, are available. We actively promote a culture of inclusion and respect to create a supportive work environment.

R17 We're all about flexibility. We've got maternity and paternity leave, and we're exploring on-site childcare. Plus, our leadership is committed to creating an inclusive culture.

R18 Promote/pay for training.

13. Can you share any success stories or best practices related to recruiting and retaining women in roles traditionally affected by labor shortages or an success story of recruiting women in "man jobs"?

R01 No, not really. My ex-boss as a CEO has to work double hard to proove how good she is. On the management level it is still a men's world that do not want any women on their level. I have been watching this last 15 years.

R02 Initially, there was a strong male presence in the management area in the current company. This changed immediately due to my presence and Head of HR in that we now have a balanced ratio.

R03 There is no specific case but in general in recent years more and more women are returning to work 100% after becoming mothers, for us it may be because we offer additional payment for childcare and perhaps this gives them more freedom to return full time.

R04 No Not Yet.

R05 I would say that in the top positions, I have seen that women who get promoted within the company have much more pressure to be always demonstrating their knowledge and skills and that they deserve the position, there I think there is much more problematic and I have seen it several times, however I see them and I am proud that they make their place in the management board.

R06 I think that the women who are currently working with us are each a success story, it is very good that they are not intimidated by the number of men and do their job very well.

R07 No really.

R08 Nowadays you see a lot more applications of women in technical jobs for example, which used to be more of a male thing, but I don't have a story worth telling at the moment.

R09 Dual students were hired with focus on women and getting girls into tech jobs.

R10 No.

R11 Females in management roles in the tech department - they refer other women to work with them from former jobs, thus creating a trajectory.

R12 Yes, the few women in the area and their promotion into leading positions.

R13 We have saveral woman in these jobs common known as “male jobs”

R14 It seems to me that there is still a lot to do in this I think that women are inspired byother women andif there were more women in tech surely it would stop being so stereotypical, but unfortunately I don't have a story to share on that.

R15 There really are many cases of success, there are more and more women in these fields, and they are always giving the best of themselves in their jobs.

R16 In the directive board we have some women who have worked hard to be at this level, although it is always more difficult for them because they must always prove that they have the knowledge to be part of it.

R17 Yes, the main idea of our company is coming from a Women, she is inspiring us and doing her best all the time.

R18 Yes, the women in IT, Mobile gamed.

14. Based on your experience, what recommendations would you give to other companies looking to address labor shortages by increasing female workforce participation?

R01 None, choose the best qualified is still my mantra: woman or men.

R02 In general, to ensure that roles are assigned equally and that all genders are involved in important decisions and that one gender never has more voting rights than the other.

R03 It is always good to have women and men working in the different areas, when the selection process is done in a transparent way it is as likely to happen as possible, so I would say don't be prejudiced and rely on the capabilities of the candidates.

R04 Who run the world? GIRLS! Equal Pay, assistance to women and better conditions for women.

R05 We must understand that positions are becoming more and more dynamic, and we need to attract young talent and that these positions must be formulated to be attractive.

R06 If the idea is to attract more women, the ideal would be to look for places where women go, such as women's fairs and so on.

R07 Trying to make jobs offers more responsive to women's needs, it is really difficult to cope with the stress of work and children when you are expected to work full time with fixed hours.

R08 I think that more than attracting women, companies should be in constant evaluation of processes, if a company is good for the women it already has, this will surely make more women voluntarily apply.

R09 look outside the normal paths and add more value to the whole life of every employee.

R10 Give women a chance, though they are the ones, carrying babies. They are capable of so much more than we think.

R11 Start with the internal work, not external. don't promote anything externally you don't already do/have committed to doing internally. don't make false promises. make examples public.

R12 Invite all candidates to interview, dont hesitate in hiring women and promoting them.

R13 Directly address women in direct search.

R14 Simply put stereotypes aside and if there are women who come forward, truly believe in them.

R15 There is a need to re-evaluate the way of making contact with candidates and understand that the necessary requirements can also be learned in the position.

R16 Actually we are also in the problem, but I can say that we have to re-evaluate the working conditions and rely for example on hybrid models of work.

R17 Innovation is the key to everything, not only in products but also in processes, it is necessary to constantly review and change.

R18 Family friendly conditions, flexibility, other women in management.

15. To what extent do you believe that women possess the necessary digital skills to succeed in roles that require technological proficiency? please explain it

R01 Everybody is responsible for his career and interests. So women are also responsible to acquirr the digital skills they think they need and also they must be passionated about this field and understand the advantage in their work organisation.

R02 So far, I have not had the experience that women have less knowledge than men.

R03 I have seen in selection processes with women with digital skills exactly the same as men, especially in our industry, I don't think there is any difference between the skills of one gender or the other.

R04 If women want to have the skills in digitization they have to learn, it is the individual responsibility of each worker to have the skills that their job requires.

R05 I believe that women professionals especially entering our industry possess the same technological capabilities as men.

R06 I believe that if a woman wants to perform in any profession she needs to believe in herself and learnthe skills that are needed inthat profession, I believe that women have all the potential but they lack motivation especially in fields like ours.

R07 Women can do all men can do, there is not a difference.

R08 As I said before, women today are more aware that they can also do things that were once thought to be done only by men, and that includes all technological and digital jobs.

R09 no gap between genders, it´s an individual gap.

R10 Skills have nothing to do with gender.

R11 I don't see a reason why women shouldn't have the same digital skills as men for any roles.

R12 Sometimes they need more capacitation but is nothing critical.

R13 They have the needed skill set

R14 Women can do the same things that men do, I think there is a lack of information but in fact there are studies that show that in the school age women are more skilled than men in technology, so it is really a social thing and not a skill thing.

R15 Women absolutely possess the necessary digital skills. However, there may be historical disparities in access to STEM education and opportunities. Encouraging more womento pursue STEMfields from an early age and providingequal access to education and training iscrucial.

R16 I think it depends a lot on the job especially in our industry, in terms of skills and knowledge I don't see any difference, but for example in strength roles and jobs with trucks and heavy machinery I really do think there is a difference.

R17 Women absolutely have the skills! Sometimes it's about confidence. We're working on mentoring and training programs to boost that confidence.

R18 They own them just as much or not like the male colleagues. They often just miss confidence.

16. Does your company offer training or upskilling programs to help women develop these skills?

R01 If necessary for this specific work role, yes.

R02 We offer training and e-learnings for all who want to improve their skills or compensate for deficits, regardless of whether they are a man or a woman.

R03 Continuing education is part of our benefits, not just for women but for our employees as a whole.

R04 Yes, we have special training programs that are more accepted by women.

R05 We offer all kinds of courses, not only on work issues but also on stress management and other important topics. If the candidate wishes to learn more, he/she will always have the support of the company.

R06 Yes, there are programs.

R07 Yes, not just for women in general.

R08 The company offers benefits to its employees and among them is the education and courses they desire.

R09 Yes, We have training for every gender

R10 Yes, it's part of the benefits

R11 No, no specifically targeted upskilling programs in place.

R12 Yes we have general programs for our employees to develop skills in tech areas and in general courses.

R13 Yes, training is for everybody

R14 No, there are programs for every employee but not addressing women

R15 Yes, we offer training and upskilling programs for all employees, including women, to develop the digital skills required for their roles. We are committed to providing ongoing learning and development opportunities to support career growth.

R16 Yes, we offer training and upskilling programs for all employees, including women, to develop the digital skills required for their roles.

R17 Yes, we offer training for everyone, and we're developing specific programs to help women level up their tech skills. We want everyone on our team to thrive!.

R18 Yes, there are special programs for women

17. Would you like to add something more to the discussion?

R01 Every employee, encouraged or not encouraged from their work, is responsible to develop further skills if he wants to push his career. If not then do not complain, you do not move forward.

Modern organisations need to be agile, we do not have time to wait till somebody will do an qualification, rather we identify the employees that have done their homework and are passionated about digitalization.

R02 No.

R03 No.

R04 No.

R05 is a very good subject.

R06 No.

R07 In my perception, it is a trust issue why our company is so hesitant with remote work.

R08 I don't knowif this is useful for your research but from what I have seen in these years working in this company, there is still a lot of discrimination against women, recently an agreement was made with one of the women who works in finance who is now a mother, and she asked her boss to take 15 minutes off her breakfast break to take it at 3pm to pick up her daughter from kindergarten, but the boss didn't like it and they reached an agreement for her to resign.

R09 No.

R10 No.

R11 No.

R12 No.

R13 No.

R14 No.

R15 I would like to know more about the results.

R16 I find the topic very interesting but I think you should also consider that there are women who do not want to work in this industry or do not have the awareness that there are opportunities here, we must pay attention not only to those who apply but also to those who do not.

R17 No

R18 No

Coding Agenda

The following tables illustrate the coding agenda employed for the inductive qualitative content analysis. In this approach, codes were developed directly from the data, utilizing the terminology and concepts provided by the participants, rather than relying on predefined ideas or theories imposed by the researcher (Linneberg & Korsgaard, 2019). In other words, for this study, the categories emerged during the analysis of the data, incorporating responses from all participants, which were then organized using the Qcamap software. Prior to coding, participants' responses were amalgamated into a single document. This consolidation facilitated navigation within the software and the execution of the initial coding phase. This phase involved a straightforward assignment of primary codes derived from the ideas present in the document. Subsequently, the in vivo coding technique was implemented. In vivo coding is a qualitative data analysis method that underscores participants' verbatim expressions, aiming to emphasize their voices (Manning, 2017).

The assignment of categories presented for each question analyzed during the research was based on the coding rules presented below:

Q3. Is your company currently experiencing a labor shortage? Please explain it.

Coding Guidelines				
Category	Variable (sub-categories)	Definition	Anchor Examples	Coding Rules
Awareness of Shortage.	Yes	Respondents state that they are experiencing labor shortages.	"Yes…" "Actually yes, we are"	Confirmation of explicitly experiencing labor shortages
	No	Respondents deny that there is a labor shortage in their companies.	"No, we don't" "I would no say…"	Explicit denial or doubt that their situation is considered a labor shortage.

Note: Guideline by author in 2023.

Q4. If yes, in which specific roles or departments is the shortage most pronounced?

Coding Guidelines				
Category	Variable (sub-categories)	Definition	Anchor Examples	Coding Rules
Fields where is perceived labor shortage	Management Positions	Management jobs and have employees under them.	"For use management positions", "General board positions"	Respondents directly mentioned the name of the subcategory or targeted positions.
	Engineers	Jobs that have engineering focus in their title.	"Engineers" , " Civil Engineers"	Respondents directly mentioned the name of the subcategory or targeted positions.
	Technicians	Technical jobs.	"Technicians" , "Support technic"	Respondents directly mentioned the name of the subcategory or targeted positions.
	IT	Jobs that involve knowledge and skill with technology.	"IT" , "Developers"	Respondents directly mentioned the name of the subcategory or targeted positions.
	Unity developers	Jobs with focus in unity.	"Unity Developers" , "Seniors in unity"	Respondents directly mentioned the name of the

				subcategory or targeted positions.
	Transport and logistics positions	Jobs in the logistics area.	“Transport and logistic”, “Load Planner ”	Respondents directly mentioned the name of the subcategory or targeted positions.
	Electric Vehicle Technology Positions	Jobs focused on the elaboration of electric vehicles.	“Electric Vehicle Technology Positions” , “Electromobility Project Manager“	Respondents directly mentioned the name of the subcategory or targeted positions.
	Operators	Jobs that have in their title operative.	“Operators”, “Baubot Operator”	Respondents directly mentioned the name of the subcategory or targeted positions.
	Designers	Creativity and design work.	“Designers”, “Graphic Designers”	Respondents directly mentioned the name of the subcategory or targeted positions

Note: Guideline by author in 2023.

Q5. About how long does an open job offer last until you find someone qualified for the position? Why do you think it lasts that long?

Coding Guidelines

Category	Variable (sub-categories)	Definition	Anchor Examples	Coding Rules
Length of time an open vacancy lasts.	Minimum	Positions are open for 15 days.	“15 Days” “Two Weeks”	Explicitly mention the duration of the definition
	Average	Positions last from 3 months onwards open.	“From 2 to 5 months” “From 2 to 6 months”	Contestants mentioned a minimum of 2 months
	Maximum	Positions are open for 12 months.	“1 year” , “12 Months”	Respondents mentioned that the positions are open for one year

Note: Guideline by author in 2023.

Q6. What strategies has your company employed to address labor shortages or to try to find the right person?

Coding Guidelines				
Category	Variable (sub-categories)	Definition	Anchor Examples	Coding Rules
Main Strategies for finding the ideal candidate	Networking	Acquire new employees through personal relationships both internally and externally	"Recommended by our employees" "We have a network of talent pools"	If the interviewee mentioned the variable
	Employer branding	Improvements and efforts to improve the company's image as an employer	"We are continuously working on employer branding"	If the interviewee mentioned the variable
	Good Benefits	The benefits package is attractive and improved	"We offer outstanding benefits"	If the interviewee mentioned the variable
	Mobile Work	Possibility to work from anywhere.	"We offer remote work"	If the interviewee mentioned the variable
	Presence on job search platforms	Posting jobs on job search platforms	"We post positions on LinkedIn□□□	If the interviewee mentioned the variable
	Attractive vacancies	Continuous improvement in the job description of the positions	"Our vacancies are attractive"	If the interviewee mentioned the variable
	Job fairs	Presence at fairs	"Attending job fairs"	If the interviewee mentioned the variable
	Company Reputation	The company is well known	"We have been in the market for many years"	If the interviewee mentioned the variable
	Aditional Trainig	Possibility to receive training	"We offer the possibility of additional training"	If the interviewee mentioned the variable

	Well-Trained Recruitment Staff	Improvement work and training of staff.	“Our recruiting staff is well prepared”	If the interviewee mentioned the variable
	Cooperations with New Stalkholders and Cooperation with The BA (German labour agency)	Programs supported by stalkhordelrs and the employment agency	“We have a partnership with BA”	If the interviewee mentioned the variable
	New Models for Apprenticeship	Improved apprenticeship offers	“We offer new models of apprenticeship”	If the interviewee mentioned the variable
	Innovation in EVP (Employee Value Proposition)	Improved position offerings	“We have a good EVP”	If the interviewee mentioned the variable
	Collaboration with Universities and Technical Schools	Agreements with educational institutions	“We have agreements with universities”	If the interviewee mentioned the variable
	Active Sourcing	Actively seeking talent.	“We do Active sourcing”	If the interviewee mentioned the variable
	Internal Trainning for upskilling current workforce	Promotion of in-house training programs for employees to develop their careers.	“We focus on our current employees”	If the interviewee mentioned the variable
	Investing in technology to reduce the labour demand	Acquisition of technology to fill positions.	“We acquire technology for positions where not many people apply”	If the interviewee mentioned the variable

Note: Guideline by author in 2023.

Q7. Have you specifically targeted women as part of your recruitment strategy to address labor shortages or long opened positions?

Coding Guidelines				
Category	Variable (sub-categories)	Definition	Anchor Examples	Coding Rules
Targeting Women within the recruitment strategy	Yes	Respondents stated that they have programs that targetable woman	"Yes…" "Actually yes, we are"	Explicit affirmation of targeting women
	No	Respondents deny having programs that target women	"No, we don't" "I would no say…"	Explicit denial of programs targeting women

Note: Guideline by author in 2023.

Q9. Have you observed any specific benefits from having a diverse workforce?

Coding Guidelines				
Category	Variable (sub-categories)	Definition	Anchor Examples	Coding Rules
Observation of benefits in mixed working groups	Yes	Respondents report benefits	"Yes…" "Actually yes, we are"	Explicit statement of observer benefits
	No	Respondents deny that there are benefits of mixed working groups	"No, we don't" "I would no say…"	Explicit denial of benefits

Note: Guideline by author in 2023.

Q11. What do you see as the key challenges that women face when seeking employment or career advancement within your industry or organization? please explain it

Coding Guidelines

Category	Variable (sub-categories)	Definition	Anchor Examples	Coding Rules
Women's main challenges	Work Time Availability	It refersto the fact that women aremore limited in time	“Mothers have less time”	The interviewee mentioned that the reason is time constraints
	Voting Rights and Enqual Management Roles	Lack of women in management roles and, therefore in decision.	“Women have fewer voting rights”	The interviewee mentioned the variable
	More sick days because of children	Women take more sick days	“Women take more sick days”	The interviewee mentioned the variable
	Limitation of Positions to Apply for Mothers	Not many positions are attractive to women mothers	“Some positions are full time not flexible”	The interviewee mentioned that some positions are not for mothers.
	Reduction of Working Hours After Becoming a Mother	Inability to work at the same pace after motherhood.	“Women tent to work less due kids”	The interviewee mentioned the variable
	Women Are Still The Ones Taking Care of Children and That Conditions Their Choice of Profession	Social conditioning of caregivers	“Women still being the ones taking care of kids”	The interviewee mentioned the variable
	The Balance Between Personal Life With Children and Career	Career, personal life and children balance problems	“It’s hard for women to deal with job and kids”	The interviewee mentioned the variable
	Performance Changes After Becoming Mothers	Change in disposition after becoming a mother	“The performance of women...”	The interviewee mentioned the variable

and Bosses Notice It			
Women Are Judged Harsher and Given Less Credit	Gender stereotypes	“Women are underestimated”	The interviewee mentioned the variable
Lack of Awareness on The Part of Male Managers of The Responsibility for Children	Lack of knowledge of women's situation by male managers	“Managers don’t recognize...”	The interviewee mentioned the variable
Few Women Educated for The Blue Collar Area	Low presence of women in jobs include factory workers, miners, construction workers, welders, and electricians.	“Lack of women in the blue-collar area”	The interviewee mentioned the variable
Different Communication Style	Women have different way to communicate	“Women have different communication style”	The interviewee mentioned the variable
Gender Estigmatization of Jobs	Job Stigmas.	“Some jobs are considered more for men”	The interviewee mentioned the variable
More Women in Management are Needed	Lack of women in management jobs.	“There is not too many women in management positions”	The interviewee mentioned the variable

Note: Guideline by author in 2023.

Q12. How does your company support women in overcoming these challenges?

Coding Guidelines

Category	Sub-categories	Variable	Definition	Anchor Examples	Coding Rules
Best Practices from the companies	Support in the application process	Blind recruitment practices	Non-gender biased selection processes	“We do Blind recruitment practices”	Direct mention of the variable
		Diverse interview panels	Recruitment processes with women and men	“We do Diverse interview panels”	Direct mention of the variable
		Women pictures in the job vacancies	Using images that empower women	“We do use women pictures in the job vacancies”	Direct mention of the variable
	Support in the work conditions	Flexible working shifts	Possibility to adapt working time	“We do offer flexible working shift”	Direct mention of the variable
		Arrangements to the women's needs	Flexibility in arrangements.	“We offer Arrangements to the women's needs”	Direct mention of the variable
		Flexibility in general on the company side	Flexibility in general on the side of the company	“We try to be flexible...”	Direct mention of the variable
		Standar Processes	Guarantee of having similar processes between men and women	“We have Standard process”	Direct mention of the variable
		Remote Work	Option to work from anywhere	“We offer remote work”	Direct mention of the variable
		Trust-based work time	Companies trust employees and do not	“We offer trust-based work time”	Direct mention of the variable

		require fixed working hours		
	Promote/pay for training	Promotion of knowledge upskilling.	“We offer promote/pay for training”	Direct mention of the variable
	Promotion of A Culture of Inclusion and Respect	Internal company values	“We promote o Culture of Inclusion and Respect”	Direct mention of the variable
Support for mothers	Part Time Jobs	Jobs with different time frame.	“We offer part time jobs”	Direct mention of the variable
	Daycare and kindergarten facilities	Offering childcare services	“We offer Daycare and kindergarten facilities”	Direct mention of the variable
	Job Adaptability for Women Who Become Mothers	Being able to adapt job duties after maternity leave	“We adapt the task of mothers”	Direct mention of the variable
	Option to Take Unpaid Vacation If Needed	In case of need, possibility to take time off	“We offer possibility of unpaid vacation”	Direct mention of the variable
	Maternity and Paternity Leave	Equal right to take time off when becoming parents	“We offer paternity leave as maternity leave”	Direct mention of the variable

Note: Guideline by author in 2023.

Q15. To what extent do you believe that women possess the necessary digital skills to succeed in roles that require technological proficiency? please explain it

Coding Guidelines				
Category	Variable (sub-categories)	Definition	Anchor Examples	Coding Rules
Perception of Women knowledge by the HR Experts	Women have the same skills in technology usage as men	Knowledge is the same among men and women	"I don't see difference."	Direct mention of the variable
	Today's women are more aware that they can also do things that were once thought to be done only by men	Awareness of women about their capabilities	"Women are aware of their potential"	Direct mention of the variable
	They have the skills but lack confidence	Acceptance of skills but doubt of self-confidence	"Women possess the same skills but miss confidence"	Direct mention of the variable
	women have all the potential but they lack motivation	Females have potential but motivation is lacking	"Women possess the same skills but miss motivation"	Direct mention of the variable
	Sometimes a little training is needed, but it is not critical.	Recognition of skills even if some training is needed	"Women have the knowledge and if is needed is possible to offer them training"	Direct mention of the variable

Note: Guideline by author in 2023.

Q16. Does your company offer training or upskilling programs to help women develop these skills?

Coding Guidelines				
Category	Variable (sub-categories)	Definition	Anchor Examples	Coding Rules
Offer of ongoing education programs targeting women	Yes	Respondents stated that they have Ongoing programs targeting women.	"Yes…" "Actually yes, we offer"	Explicit affirmation of targeting women
	No	Respondents deny having Ongoing programs targeting women.	"No, we don't" "I would not say…"	Explicit denial of programs targeting women

Note: Guideline by author in 2023.

II Interview Protocol With Experts from Women Groups

The interviews with women who are active in feminist groups or women's rights organizations began by contacting them. A quick Google search for the respective organizations made it easier to identify the contact emails. A short email was sent to each organization explaining the purpose of the contact. The interview questions were then forwarded to the individuals who had agreed to participate in this research. The responses were then compiled into a single document for later analysis.

*The interviews were semi-structured to encompass a duration of approximately 7 minutes.

*Absolute anonymity was assured to the interviewees.

*Participants were comprehensively informed about the interviews' objectives, data protection terms and conditions, and the exclusive use of the gathered information for academic purposes within the scope of this thesis.

Explanation of the Purpose of This Interview

The Interview provides a tool by which we aim to find the point of view of the different organizations that advocate for the restitution and/or preservation of women's rights and in this specific case the labor equality between men and women living in Germany. This interview is part of the data collection tools of the thesis " Women in The Labor Market: Contribution to The Mitigation of Labor Shortages in Industries Involved in The Digital Transformation in Germany" that seeks to understand if it is possible to provide more opportunities for labor integration to women through digitalization and if this in turn contributes to reduce the labor gap that exists in Germany.

Thank you in advance for your cooperation.

Agreement Terms and Conditions

Our General Terms and Conditions (GTC) explicitly state that your data belong to us exclusively. It is necessary to conclude a Data Processing Agreement (DPA) in accordance with European Privacy laws (GDPR). You can check the DPA documents online. The information provided will not be owned or sold to third parties and is collected exclusively for educational use. Please accept the terms and conditions.

Semi-Structured Interview Guide

a. Company Profile

Q1. Organization Name

Q2. if you want you can share your name too

Q3. City

b. Specific Questions

Q4. What do you think is the main reasons for the employmentdisparity between men and women in Germany?

Q5. Do women in Germany want to work more? (increasing working hours, starting work or returning to work after maternity leave)

Q6. Do you believe that digital advances can help close the employment gap between men and women? Please explain your answer

Q7. What should companies offer to address the disparity between female and male employees?

Q8. Is there still gender segregation in certain industries? Which ones?

Q9. What are the points of improvement that can be identified in terms of maternity leave to ensure that women return to their jobs if they wish to do so?

Q10. Is there a disparity between women and men in technological know-how in Germany?

Q11. How can we encourage technological advances in girls and close the digital gender gap?

Q12. Can women be the answer to labor shortages in industries that require technology and digitization skills?

Q13.Would you like to add something more to the discussion?

Transcription and Compilation of Interviews

Similar to the previous round of expert interviews for the qualitative content analysis, all interviews were summarized in a standardized document. This consolidated document facilitated the identification of categories using color-coded markers, which improved navigation in the software and accelerated the categorization process for each question. As a result, this approach facilitated the formulation of the guidelines presented earlier in this section. Ultimately, to ensure the anonymity of respondents, each respondent was assigned a unique identifier derived from their interview number and suffixed with 'E'.

Interview with women from women organization and the perception of women status.

1. ***Organisation Name***

E01 Internationales Frauenzentrum Bonn e.V.

E02 Frauen aufs Podium e.V.

E03 Bischöfliches Hilfswerk Misereor e. V.

E04 Frauen aufs Podium e.V

E05 Webgrrls

E06 Webgrrls

E07 New Work Moms

E08 New Work Moms

E09 Webgrrls

E10 Gründerinnen Zentrale

E11 WeiberWirtschaft eG

E12 Pro Exzellenzia plus (Project of the European Social Fund) Social

E13 Deutscher Akademikerinnenbund e.V.

E14 Hans-Böckler-Stiftung

2. Name of person answering this questionnaire (Optional)

E01 Elke Apelt

E03 Barbara Schirmel

E04 Friederike Baer

E05 Anja

E06 Birgit Funk

E07 Eva Stiekema

E10 Rafa

E13 Dr. Sabine Hartel-Schenk

E14 Amanda Witkowski

3. City

E01 Bonn

E02 Potsdam

E03 Aachen

E04 Kronberg

E05 Berlin

E06 Oldenburg

E07 Köln

E08 Frankfurt am Main

E09 Frankfurt am Main

E10 Berlin

E11 Berlin

E12 Hamburg/ Germany

E13 Mainz

E14 Erkrath

4*. What do you think is the main reasons for the employment disparity between men and women in Germany?*

E01 Men continue to dominate the good jobs. Women are often better educated, but due to family and other burdens (e.g. caring for parents) they often have to accept part-time work and take time off.

E02 Cultural Habits, Historical development of German industry, Gender prejudices, Underrepresentation of women in all public decision making processes.

E03 Care work in the family (children, caring for relatives) restricts the possibility of working outside the home although girls and women receive the same education. More women are employed in social related employment (health, education) where wages are lower.

E04 The German history with the view on women.

E05 Bad frame conditions.

E06 historical behavior, less flexible Kindergarten places and schedules, behavior and less spirit of many woman.

E07 Children, women still need to be the ones who need to decide between job and take care of the kids.

E08 Traditional roles and expectations of women in German society.

E09 Structural and cultural.

E10 self believe, trust, and sexism at all level. don't make me start with the Kita thing.

E11 Unequal distribution of care work.

E12 No compatibility of work and care-work, No equal pay, no flexibility of work conditions.

E13 There are still many men in leading positions; men support men; furthermore, family work is still the job of women.

E14 Gender pay gap.

5. Do women in Germany want to work more? (increasing working hours, starting work or returning to work after maternity leave)

E01 Yes, they do and often the employer supports an increase in the number of hours if he can.

E02 Yes, but it needs a fair share of domestic & care work; a change in attitudes towards general evaluation of work (male/female) for equal payment.

E03 If care work was equally distributed between men and women, women would work more hours. Most of the time men are better paid as I answered before and therefore more often work full time. Childcare institutions mostly don't correspond to the needs of families (early closing hours of kindergarten)

E04 One of them yes, one of them no. In my point of view, to be honest, unfortunately only 50:50.

E05 Yes, totally.

E06 Yes but depending on Job sharing Models with husband or within the job and add, flexible Kindergarten places.

E07 No.

E08 Would say 50/50.

E09 I don't know.

E10 No, no one want to work more, also not women.

E11 Partly - partly. The younger generation (both men and women) are more likely to aim for a 4-day week.

E12 Yes, but only if the conditions are fitting for them.

E13 Yes.

E14 Yes.

6. Do you believe that digital advances can help close the employment gap between men and women? Please explain your answer

E01 Home Office makes it easier to participate in the working process. This depends of course on the spatial possibilities at home and on the provision of daycare places, for example, which is currently very difficult in Germany. One can be happy about every KITA place.

E02 Not sure. If digital advances help to change stereotypes, underestimations and distribution of power - yes. KI has been developed mostly by male staf, which is counterproductive to equality.

E03 The possibility of home office does open some possibilities, but as we could see during the pandemic, still mostly women had to balance their house/care and office working hours. They often work in professions where home work is not possible (care work, health and education sector).

E04 Yes, because parents can be more flexible work and educate their children, together!

E05 Yes.

E06 Yes.

1) being able to work remote.

2) being able to be more productive within same time.

3) Online self-trading can help to stay at actual level.

4) job sharing partly remote or share working time with partner.

E07 Working from home definitely helps.

E08 Yes, because for example working from home could be easier for women who have care responsibilities.

E09 Perhaps, but it's not the main thing. its not about technology its about structures and learned behaviors.

E10 yes but also is very important to keep the disparitiies at bay, cause the same unfair conditions can repeat from analog to digital.

E11 No, the professions that have to do with digitalisation are the most male-dominated.

E12 No, as far as I know we have to pay attention that AI is not making the gap worse.

E13 No, I do not think so; especially the use of aritificial intelligence will enhance disparity.

E14 Yes and no. Yes, because women with care responsibilities can organise their work more easily or work at low thresholds in the sense that commuting is no longer necessary.

7. What should companies offer to address the disparity between female and male employees?

E01 Flexibility and real interest to promote women.

E02 More diversity, different approaches, better results in mixed teams, more freedom for talents like home office, more equality in decision making is really more creativity the increase of success.

E03 Above all, companies should also encourage men to take on more housework and care work.Childcare subsidies or the possibility to bring children into the workplace also help. Likewise, flexibility by support when relatives need to be cared for.

E04 Flexibility of work, maybe 4 days work per week without less earn, Kindergarden places, offering to book an nanny (hey namnily).

E05 Top Job sharing possibility.

E06 Flexible working hours, internal work and improvement to look for female talents, each team should have a mandatory mix of 50: 50, equal pay.

E07 Allow home office.

E08 Equal pay and wage transparency in companies.

E09 Transparent payment, childcare, beeing supportive that men and women take caringtime for their children, more women in high positions.

E10 Companies should have transparent wages, from beggining on.. cause we know already in this moment when women get asked " how much u want to earn" basically women people always put themselves down.

E11 Fewer gender stereotypes in the recruitment and training system.

E12 Good conditions to combine work and care-work like flexibility.Obligations that fathers also have to take parental leave-times .

E13 Very helpful is the offer of work-life-balance for women AND men. Additionally we need role models of men, who do familiy care and still work in their job; also in a leading position. And we need day care for children.

E14 Possibilities to work more flexible, (financial) support for childcare facilities.

8. Is there still gender segregation in certain industries? Which ones?

E01 In some industrial branches it is difficult for women to work. especially in IT and technology in general, engineering, logistics, among others.

E02 A lot such as -IT, engineering, KI, garbage disposal - on the other hand women are in kindergarden, education, social work.

E03 Yes, Engineering, construction etc. are mostly male dominated, health, education and care institutions are mostly feminine.

E04 Yes, mainly in the production industries, in the hospitals (only the doctors)

E05 Yes, AI for example is being explored and formulated almost exclusively by men.

E06 Yes of course, traditional old structures and thinking, being afraid to be open for change, bad experiences of too many women working only part time after becoming a mo, there are a lot of industries that are affected by this.

E07 I am not sure.

E08 All of them

E09 Engineer, highschoolteachers, directors, artists, programmers, …could be continued because is in all industries

E10 TECH! unbelievably much

E11 In line with career choice behavior, less social and cultural economics for men and less STEM for women.

E12 Engineering, IT-Sector, lots of industries if you focus the leadership level

E13 yes, i.e. in male dominated fields, such as mechanical and building engineering; also in some medical fields, such as surgery, anesthesia, cardiology

E14 Women in helping, cleaning, caring industries and men in technical, building, construction industries.

9. What are the points of improvement that can be identified in terms of maternity leave to ensure that women return to their jobs if they wish to do so?

E01 There are already many flexible workplace models in Germany and the promotion of women in the workplace has already been written into the respective rules of procedure. Whether this is always practised is another matter. Often, small and medium-sized businesses also lack the finances to set up expensive part-time positions. STEM education for women must also continue to be strongly promoted.

E02 Improvement of availability of child care - also for children under 12 months, equal payment, 32h week for all employees, obligatory maternity leave for fathers and mothers on an equal time basis/duration.

E03 Flexibility concerning working hours, part time hours at the beginning with the possibility to increase working hours later on; childcare support/facilities; home office where possible.

E04 More places for Kindergarden, the same salary for both in the similiar jobs.

E05 Flexible working hours and home office.

E06 Flexible working hours, job sharing, equal pay , career development.

E07 Better integration after maternal leave.

E08 Better childcare, flexible working hours, change in traditional expectations/beliefs on women's role.

E09 Part time models, daycare concepts, understanding atmosphere, flexible working hours if possible, same support for fathers.

E10 women should get the same wage or even more, women produce the workers of the future (their kids are future professionals) what is this GAP in wages!! Incredible.

E11 Mandatory 50% parental leave for both parents.

E12 Return of the same or even better position; Home-Office-Possibilities, shared leadership.

E13 Women should have the opportunity to stay in touch with their company during maternity leave; the oppotunity to get a child-care option.

E14 Childcare facilities, flexible work possibilities.

10. Is there a disparity between women and men in technological know-how in Germany?

E01 If this question is related to the training place, then no. All are equally equipped.

E02 Yes, men still do more technical university programms/degrees.

E03 There is a lack of technology as a subject at school. Girls are not fundamentally worse at technological issues, but less is expected of them and they are not encouraged.

E04 -Not really during the study, in the job yes, because familiy time is still in the responsibility of women.

E05 Yes, men are more involved in technological jobs and study these careers, so there is an imbalance in knowledge, not in skills, women can also learn but they still have social barriers to do it.

E06 I don’t know in general but as within Microsoft and other Tech ITs no.

E07 No, women possess same skills.

E08 I Don't know.

E09 Yes, men are more motivated by teachers to learn about these topics at school, and women? great, in care work.

E10 No in skills, but because of patriachy, girls get offered different toys and hobbies.

E11 No, women have the same ability to find out about new technologies, and they should do the same, because that's where the jobs of the future lie.

E12 No, women can learn about everything.

E13 No, I don´t think so.

E14 No.

11. How can we encourage technological advances in girls and close the digital gender gap?

E01 Enforcing the MINT-classes and promoting technical advances for girls.

E02 More female role models, more awareness within male dominated industries for the need to get women in identical hierachical positions, just having Girls and Boys days is not enough.

E03 Technology as a school subject; Girls' Days in engineering companies, more encouragement.

E04 Start to engage girls in the school, stop the pink and blue thinking in the childhood.

E05 In school education.

E06 Learning, learning, learning, great female teachers at school.

E07 Girl's Days, Mentoring programs.

E08 More role models, better teaching in school.

E09 Showing and promoting role models in the school, using different approaches.

E10 Stop with the gender division of labour! men to social work and stay at home!

E11 There are enough studies on the subject that show that girls only leave the STEM field when they develop a gender identity. It would help to focus on the benefits of technology. I don't see a digital gender gap.

E12 We should better encourage the Universities and other educational organizations to develop more fitting curricular and didactics to empower women and girls.

E13 This is also a social problem; commercials alway adress certain charactersitics to be female! Girls should learn very early, that (digital) technology is fascinating.

E14 Educational system need a big transformation.

12. Can women be the answer to labor shortages in industries that require technology and digitization skills?

E01 Yes, but there is still much to be done.

E02 Yes, if the conditions of care and flexible work are met, women can enter into these branches.

E03 Yes, But many changes are required.

E04 Perhaps the new generations will be more involved in this.

E05 Maybe, If there are changes in the structures and men take more responsibility and awareness about their female colleges yes, but if not, no.

E06 yes, for sure.

E07 No, no with all the pression home and care responsibilities.

E08 if the way of working is improved to be more flexible yes

E09 Absolutely

E10 No, there are not many women studying technology related fields at the moment so there are no women to fill these jobs.

E11 It's difficult because it's not just whether women can, because of course they can, but there are many factors that must be taken into account.

E12 Yes but with better conditions.

E13 No really, many things still need to be solved for women to access better jobs.

E14 I don’t see why not.

13. Would you like to add something more to the discussion?

E01 No.

E02 We do not necessarily need more women in technic - but we need to evaluate job which women do equally with those which man mostly do - e.g. engineering should be just as valuable as caring for old people.

E03 It is above all a question of recognising what women achieve. There are still too few apps being developed that meet the needs of women in particular.

E04 We have to react and to do a lot in our minds to Change the gap between men and women.

E05 No.

E06 Most important is to start learning as early as possible, we need a streamline our school system , we have to offer this to our young fellows, this is the only chance.

E07 No.

E08 No.

E09 No.

E10 Germany is very backwards in term of gender and labour, this makes me really sad.

E11 No.

E12 No

E13 Digital technology should be adressed to all, male and female persons very early in their education. We need role models: Men taking care of their familiy and women in technological fields. We also need commercials, that do not use women or womens body to sell products to men!

E14 No.

Coding Agenda

As in the previous method, the following tables illustrate the coding guidelines implemented in this study, the coding technique and approach is the same.

Q4. What do you think is the main reasons for the employment disparity between men and women in Germany?

Coding Guidelines				
Category	Variable (sub-categories)	Definition	Anchor Examples	Coding Rules
Main Reasons for employment disparity	Men continue to dominate the good jobs	Labor segregation	“Men are always in good positions”	The expert explicitly mentioned the variable
	Perception of women as family caregivers	Social percepcion of women	“Perception of women as caregivers”	The expert explicitly mentioned the variable
	Women's acceptance of part-time jobs and take time off	Women do not demand that their work be adapted to their needs, but rather that they allow themselves to be taken off work hours	“Women don’t stand for their jobs and…”	The expert explicitly mentioned the variable
	Cultural and historical perception of women	Cultural and historical perception.	“It is a cultural problem”	The expert explicitly mentioned the variable
	Work/caregiving compatibility issue	Problems in handling all duties	“It is hard to balance life and work”	The expert explicitly mentioned the variable
	Underrepresentation of women in public decision making processes	Few women in decision-making positions	“There is not many women in power positions”	The expert explicitly mentioned the variable
	More women are employed in social related employment (health, education) where wages are lower	Decision of women to opt for social careers	“Women social decision in career”	The expert explicitly mentioned the variable

	Bad frame conditions of work	Bad working conditions	“Women accept bad frame conditions”	The expert explicitly mentioned the variable

Note: Guideline by author in 2023.

Q5. Do women in Germany want to work more? (increasing working hours, starting work or returning to work after maternity leave)

Coding Guidelines				
Category	Variable (sub-categories)	Definition	Anchor Examples	Coding Rules
Women's desire to work more	Yes	Respondents stated that Women want to work more.	“Yes…” “Actually yes”	Explicit affirmation
	No	Respondents deny that women want to work more.	“No…” “I would no say…”	Explicit denial
	Depends	Respondents conditioned their answer.	“50/50”, “Depends...”	Doubt in the answers

Note: Guideline by author in 2023.

Q6. Do you believe that digital advances can help close the employment gap between men and women?

Coding Guidelines				
Category	Variable (sub-categories)	Definition	Anchor Examples	Coding Rules
Belief that digitization can help women	Yes	Respondents stated that digitization can help women	"Yes…" "Actually yes…"	Explicit affirmation
	No	Respondents deny that digitization can help women	"No…" "Absolutely no…"	Explicit denial
	Maybe	Respondents conditioned their answer	"Yes, but", "If..."	Doubt in the answers

Note: Guideline by author in 2023.

Q7. What should companies offer to address the disparity between female and male employees?

Coding Guidelines				
Category	Variable (sub-categories)	Definition	Anchor Examples	Coding Rules
Best practices to address the disparity	Flexibility in Time and place	Experts state flexible work hours and remote work or similar.	"Flexibility…"	The expert explicitly mentioned the variable
	Support and Children Facilities	Experts state that companies offer help to mothers and childcare sites for their children.	"Children Daycare…"	The expert explicitly mentioned the variable
	Men conditions for children care responsability	Experts state that companies push men to take more	"Paternity leave…"	The expert explicitly mentioned the variable

	responsibility with their children.		
Transparent payment	Experts state that more openness about payments is needed so that women are not undervalued.	“Women always ask for less salary…”	The expert explicitly mentioned the variable
Real interest to promote women	Experts state that companies need to demonstrate their real interest in promoting parity.	“There is a need of real interest from companies…”	The expert explicitly mentioned the variable
Mixed teams condtions	Experts state that mixed groups should be established as a requirement in the companies.	“The mixed teams should be obligatory…”	The expert explicitly mentioned the variable
More equality in power roles	Experts state that more women are needed as decision-makers.	“More women making decisions…”	The expert explicitly mentioned the variable
More women in high positions	Expertsstate that there is a need forequity in managerial or senior management positions.	“Role models with more women in high positions…”	The expert explicitly mentioned the variable
Less hiring decisions based on stereotypes	Experts state that the problem is stereotypes in jobs	“Stereptype in general in jobs…”	The expert explicitly mentioned the variable

		and there should be the focus.		

Note: Guideline by author in 2023.

Q10. Is there a disparity between women and men in technological know-how in Germany?

Coding Guidelines				
Category	Variable (sub-categories)	Definition	Anchor Examples	Coding Rules
Perception of disparity between women and men in technological know-how	Yes	Respondents stated that there is disparity	"Yes…" "Actually yes…"	Explicit affirmation
	No	Respondents deny that there is not disparity	"No…" "Absolutely no…"	Explicit denial
	I don't know	Respondents stated they don't know	"I don't know"	Deny of knowing

Note: Guideline by author in 2023.

Q11. How can we encourage technological advances in girls and close the digital gender gap?

Coding Guidelines				
Category	Variable (sub-categories)	Definition	Anchor Examples	Coding Rules
Best practices to encourage technological advances in girls	Mentoring programs	Mention of support for girls to get into tech	"It is necessary to have mentoring programs."	The expert explicitly mentioned the variable
	Awareness within male dominated industries	Acknowledgmentof the lack of women inthese industries	"The industries should take action…"	The expert explicitly mentioned the variable
	Female role models	Women who serve as inspiration	"We need more success women"	The expert explicitly mentioned the variable

	Girls Days	Special days for girls to be motivated to learn from these fields	“More efforts in Girls Day”	The expert explicitly mentioned the variable
	Elimination of gender stereotypes	Awareness of stereotypes and the need to erase them	“Simply elimination of the stereotypes in jobs…”	The expert explicitly mentioned the variable
	Improvements in the education system	Need to make changes in the education system	“Schools should focus more on…”	The expert explicitly mentioned the variable

Note: Guideline by author in 2023.

Q12. Can women be the answer to labor shortages in industries that require technology and digitization skills?

Coding Guidelines				
Category	Variable (sub-categories)	Definition	Anchor Examples	Coding Rules
Belief that Women can be the answer to labor shortage	Yes	Respondents stated that Women can be the answer to labor shortage.	“Yes…” “Actually yes…”	Explicit affirmation
	No	Respondents deny that Women can be the answer to labor shortage.	“No…” “Absolutely no…”	Explicit denial
	Maybe	Respondents hesitate that Women can be the answer to labor shortage.	“Yes, but”, “If...”	Doubt in the answers

Note: Guideline by author in 2023.

B Main Highlights of Document Analysis

For the document analysis, the first step was to search for documents on Google Scholar. The selection process followed a purpose-driven approach considering the source of the document, the subject matter, and, of course, the year of publication, as the search criteria were limited to documents no older than 2018. Once the documents were selected, each document was briefly reviewed, with the main focus on the 'findings' section. In this process, the key ideas were filtered out to condense the information. A comprehensive document summarizing the information from each source was then created and is presented in the following section of the appendix. This unified document was used to conduct a qualitative content analysis using the MAXQDA tool. The first coding phase was carried out quickly, categorizing the content according to themes, which resulted in three different approaches. A more in-depth analysis was then conducted to identify key ideas and points of consensus, as described in the tables below.

I Coding Agenda

Digitalization Approach

a. Digitalization

Coding Guidelines				
Category	Variable (sub- categories)	Definition	Anchor Examples	Coding Rules
Digitalization	High demand for digitalization-related professionals, but a shortage of skilled labor hampers employment growth.	The variable encompasses all the findings about the demand for digitization and the shortage of labor supply.	“Employment growth…”	The findings have as their central theme the variable
	Persistent shortage of skilled workers in digitization occupations.	The variable encompasses all the findings about the labor shortage in Digitalization.	“Labor shortage in digital fields…”	The findings have as their central theme the variable

The country lags behind in teaching digital competencies in schools.	The variable encompasses all the findings about the digital competencies in schools.	“Digitalization in schools is precarious…”	The findings have as their central theme the variable
Companies must invest more in the competencies of their employees.	The variable encompasses all the findings about the company’s role in upskilling employees.	“Upskilling employees in digitalization”	The findings that had as their central theme the variable
Women are underestimated and their skills underappreciated when it comes to working in jobs involving digitization.	The variable encompasses all the findings about women and digitalization.	“Women perception in digital relate jobs…”	The findings have as their central theme the variable
Insufficient digital skills hinder innovation development and utilization.	The variable encompasses all the findings about the Insufficient digital skills and the Country affections.	“Innovation is hinder by insufficient of digital skills”	The findings have as their central theme the variable
The gender digital divide not only affects the country's economy but also lags behind and limits women to work in this field	The variable encompasses all the findings about The gender digital divide and its consequences.	“The gender digital divide is affecting the economy…”	The findings have as their central theme the variable
Digitalization is transforming office work.	The variable encompasses all the findings about Digitalization and the transformation of office work.	“Digitalization is transforming in general office jobs"	The findings have as their central theme the variable

	Automation affects routine tasks, impacting career advancement.	The variable encompasses all the findings about how automation affects general jobs.	“Automation affects no just IT jobs but in general tasks…”	The findings have as their central theme the variable
	Early introduction of digital concepts in education, particularly for girls, is needed.	The variable encompasses all the findings about the importance of introduce digital concepts in education.	“There is a need of educations in digital concepts especially for girls”	The findings have as their central theme the variable

Note: Guideline by author in 2023.

Digitalization and Gender Perspective Findings

Coding Guidelines				
Category	Variable (sub- categories)	Definition	Anchor Examples	Coding Rules
Digitalization and Gender in Germany	While men and women seem to have the same chances to access to the digital industries, they often hold different job roles within these sectors.	The variable encompasses all the findings aboutthe difference between women and men in the digital sector.	“Different job roles between women and men…”	The findings have as their central theme the variable
	Women express similar needs for further training but participate less in digital-related training.	The variable encompasses all the findings about the women and their training process in digital related topics.	“Women underestimated themselves about training in digitalization…”	The findings have as their central theme the variable
	Women lack self-confidence in the IT environment.	The variable encompasses all the findings about the confidence of	“Women lack self-confidence in IT …”	The findings have as their central theme the variable

		women in IT environment.		
	Encouraging women to develop digital competencies benefits both women and companies.	The variable encompasses all the findings about the develop of digital competences od women and it benefits.	“Benefits of encouraging women in digital topics…”	The findings have as their central theme the variable
	There is underrepresentation of women in IT-related fields.	The variable encompasses all the findingsabout the underrepresentation of women inIT.	“There is a need of more women in IT…”	The findings have as their central theme the variable

Note: Guideline by author in 2023.

II Labor Shortage Approach

Coding Guidelines				
Category	Variable (sub- categories)	Definition	Anchor Examples	Coding Rules
Labor Shortage	There is Persistent shortage of skilled workers specially in digitization jobs.	The variable encompasses all the findings about the shortage in digital jobs.	“Labor shortage in digitalization jobs…”	The findings have as their central theme the variable
	In Germany in the regions with skilled worker shortages is neccesary to encouraging women to enter these fields	The variable encompasses all the findings about how important is to encourage women to go in the digital fields due to the labor shortage.	“We need to encourage women to apply in the fields where more people are needed…”	The findings have as their central theme the variable
	Shortages of skilled labor are more pronounced in professions dominated by	The variable encompasses all the findings about	“Two-thirds of all shortage	The findings have as their central theme the variable

one gender, and two-thirds of all shortage occupations are male-dominated.	the shortage in one gender dominated fields.	jobs are male-dominated.…"	
Recruitment of labor from third countries remains insufficient.	The variable encompasses all the findings about the strategy of supplying labor with personnel from other countries.	"Foreign workers are not sufficient for the high demand for labor…"	The findings have as their central theme the variable
Addressing the skilled labor shortage requires a multifaceted approach.	The variable encompasses all the findings about the multifaceted approach to supply labor shortage.	"There is no one single solution to the labor shortage issue.…"	The findings have as their central theme the variable
Companies are focusing on improve recruitment processes, salaries and working conditions to attract skilled workers.	The variable encompasses all the findings about companies improve of job offers to attract skilled workers.	"There is a constant effort by companies to attract qualified employees…"	The findings have as their central theme the variable
Companies responding to skilled labor shortages in male-dominated fields have hired more women, increasing percentage of women in the last years	The variable encompasses all the findings about companies hiring women to supply the need of skilled workers.	"Male-dominated fields have hired more women…"	The findings have as their central theme the variable
Improved infrastructures for child and elderly care, as well as the efforts of many companies to reconcile work and family life, have encouraged many women to return to the labor market.	The variable encompasses all the findings about family balance improvement offers from companies to be more attractive.	"Many women have returned to the labor market due to improved work-family balance conditions…"	The findings have as their central theme the variable

	Skilled labor shortages are perceived as a central risk to both the economy and the survival of many companies	The variable encompasses all the findings about affection of companies due to skilled labor shortage.	"The central risk of labor shortages affecting the economy and business…"	The findings have as their central theme the variable

Note: Guideline by author in 2023.

III Women segregation Approach

Coding Guidelines				
Category	Variable (sub-categories)	Definition	Anchor Examples	Coding Rules
Women segregation	Women are underrepresented in managerial roles, despite having equivalent qualifications.	The variable encompasses all the findings about the representation of women in managerial jobs.	"Women are underrepresented in managerial roles…"	The findings have as their central theme the variable.
	Women often face the challenge of being primary caregivers for children while seeking employment.	The variable encompasses all the findings about women perceived as caregivers while seeking employment.	"Women perception of caregivers…"	The findings have as their central theme the variable.
	Women in part-time employment face challenges in bridging the digital divide.	The variable encompasses all the findings about the problem of part time jobs in bridging the digital divide.	"Part time jobs make harder women digital integration…"	The findings have as their central theme the variable.
	Mini jobs are predominantly held by women.	The variable encompasses all the findings about the dominance of	"Women dominated minijobs…"	The findings have as their central theme the variable.

	women in mini-jobs.		
Sensitivity to gender issues among stakeholders is often insufficient.	The variable encompasses all the findings about lack of awareness of gender issues from stakeholders.	“Sensitivity to gender issues among stakeholders is often insufficient…”	The findings have as their central theme the variable.
Women with a migration background encounter challenges in finding employment.	The variable encompasses all the findings about how the integration of women in the labor market is.	“Immigrant women find it more difficult to look for work”	The findings have as their central theme the variable.
Gendered language in job advertisements significantly impacts women's career aspirations.	The variable encompasses all the findings about how importance is the gendered language in job offers.	“Gender-sensitive job offers are important…”	The findings have as their central theme the variable.
Mere increases in the number of women in tech roles are insufficient.	The variable encompasses all the findings about how important is to attack the problem and not just put more women in tech roles.	“More women in tech jobs is not enough to achieve parity…”	The findings have as their central theme the variable.
Eliminating stereotypes related to technology and "female" qualities is necessary.	The variable encompasses all the findings about the need of eliminate it stereotypes.	“Gender stereotyping in technology positions must be eliminated…”	The findings have as their central theme the variable.
The success of the women's movement has led to a misperception	The variable encompasses all the findings about	“Many young women do not see the need to	The findings have as their central theme the variable.

	among younger generations.	the misperception among younger generations about gender problems.	seek gender parity…"	
	The increase of women in the labor market seems to continue and so will the gender imbalances in domestic work and childcare.	The variable encompasses all the findings about how the mere increase of women is not the complete solution because there is still imbalance in work-care life.	"As more women turn to tech jobs, the imbalance in the home will continue…"	The findings have as their central theme the variable.
	Trends like remote work, flexible arrangements, and the impact of digitalization on work and skills seems to be helpful for women	The variable encompasses all the findings about all the improvement impact the women decision about digitalization jobs.	"Remote work has been a game changer for women mothers returning to work…"	The findings have as their central theme the variable.

Note: Guideline by author in 2023.

C Document Analysis

In this section of the appendix, the document analysis conducted to address the research question is presented. For access to the documents, it is possible to use the provided URL in each document. Some are not freely accessible, so it is recommended to use databases access. The information found here is the transcription and synthesis of the central ideas or the main results of each document.

1. **Statistik der Bundesagentur für Arbeit Berichte: Blickpunkt Arbeitsmarkt – Die Arbeitsmarktsituation von Frauen und Männern 2022** (Statistics from the Federal Employment Agency Reports: Focus on the Labor Market -The Labor Market Situation of Women and Men in 2022)

Published by: Federal Employment Agency Statistics/Labor Market Reporting
Authors: Kirsten Singer, Nicole Fleischer
Publication Date: May 2023
Suggested citation: Singer, K, Fleischer, N. Statistik der Bundesagentur für Arbeit Berichte: Blickpunkt Arbeitsmarkt – Die Arbeitsmarktsituation von Frauen und Männern2022, Nürnberg, Mai 2023. Source: Bundesagentur für Arbeit

URL:
https://statistik.arbeitsagentur.de/DE/Statischer-Content/Statistiken/Themen-im-Fokus/Frauen-und-Maenner/generische-Publikationen/Frauen-Maenner-Arbeitsmarkt.pdf?__blob=publicationFile

Key Findings:

- Self-employed individuals are mostly men (Singer & Fleischer, 2023).
- Over half of social insurance-covered employees are male (Singer & Fleischer, 2023).
- Mini jobs are predominantly held by women (Singer & Fleischer, 2023)
- Part-time work is more common among women than men (Singer & Fleischer, 2023).
- Men earn higher incomes on average, but the income gap is decreasing due to various factors (Singer & Fleischer, 2023).
- Women are underrepresented in managerial roles, despite having equivalent qualifications ((Singer & Fleischer, 2023).
- Women often face the challenge of being primary caregivers for children while seeking employment (Singer & Fleischer, 2023).

Note: Highlights from Document Analysis by author in 2023.

2. Der Digitalisierung fehlen die Frauen. (Digitization Lacks Women)

Published by: German Economic Institute (IW), Cologne
Authors: Barbara Engels, Alexander Burstedde, Axel Plünnecke

Publication Date: May 2023
Suggested citation: Engels, B., Burstedde,A., Plünnecke, A., (2023). Der Digitalisierung fehlen die Frauen, IW-Kurzbericht, No. 17/2023, Institut der deutschen Wirtschaft (IW), Köln

URL:
https://www.econstor.eu/handle/10419/271141

Key Findings:

- High demand for digitalization-related professionals, but a shortage of skilled labor hampers employment growth (Engels et al., 2023).
- Significant underrepresentation of women in digitalization-related professions, with only 16.3% being women. Initiatives should begin at the educational level to address this gender gap (Engels et al., 2023).
- Minimal increase in the proportion of women in digitization occupations from 14.6% in 2013 to 16.3% in 2022 (Engels et al., 2023).
- There are 97 digitalization-related occupations out of 1,300 listed in the Occupational Classification, including software developers, mechatronics engineers, and computational linguists (Engels et al., 2023).
- Continued demand for digital skills in the economy, exceeding the current labor market's capacity (Engels et al., 2023).
- Insufficient digital skills hinder innovation development and utilization (Engels et al., 2023).
- The digital gender gap extends beyond digitization professions, impacting various activities requiring digital skills (Engels et al., 2023).
- Women in part-time employment face challenges in bridging the digital divide (Engels et al., 2023).
- Women perceive their career prospects in an increasingly digitized labor market as less favorable compared to men, with 34% feeling well-prepared for digital technologies, compared to 49% of men (Engels et al., 2023).

Note: Highlights from Document Analysis by author in 2023.

3. **Wie (Weibliche) Digital Natives auf Digitale Jobs Vorbereitet Werden und Was Dabei Noch zu Tun Ist** (How (Female) Digital Natives are Prepared for Digital jobs and What Still Needs to Be Done in the Process)

Published by: Springer Gabler, Wiesbaden **Author:** Katja Werner **Publication Date:** 2020 **Suggested citation:** Werner, K. (2020). Wie (weibliche) Digital Natives auf digitale Jobs vorbereitet werden und was dabei noch zu tun ist. In: Ternès von Hattburg, A. (eds) Digitalisierung als Chancengeber . Springer Gabler, Wiesbaden. https://doi-org.ezproxy.hnu.de/10.1007/978-3-658-26893-0_4 Source: Institut der deutschen Wirtschaft (IW), Köln **URL:** https://link-springer-com.ezproxy.hnu.de/chapter/10.1007/978-3-658-26893-0_4#citeas	**Key Findings:** • Digitization fields in Germany remain predominantly male-dominated (Werner, 2020). • Initiatives and organizations are working to encourage young women's interest in STEM fields and digital careers (Werner, 2020). • There's a gradual but modestincrease in the proportion of women in STEM professions (Werner, 2020). • Awareness about STEM professions still needs improvement (Werner, 2020). • Many initiatives now focus on equal opportunities and gender-neutral support for both boys and girls (Werner, 2020). • The IT sector offers attractive career conditions, including flexibility and work-life balance, for both women and men (Werner, 2020). • Some German schools lack updated curricula and infrastructure aligned with labor market demands, as noted by interviewed experts (Werner, 2020). • Initiatives advocate for gender-neutral professions and policies, emphasizing well-trained teaching staff and digital skills in school curricula (Werner, 2020).

Note: Highlights from Document Analysis by author in 2023.

4. Digitalisierung der Arbeit und Auswirkungen auf das Geschlechterverhältnis: Allgemeine Entwicklungsmuster am Beispiel der Büroarbeit - Eine Empirische Untersuchung (Digitization of Work and Effects on Gender Relations: General Development Patterns Using the Example of Office Work - An Empirical Study)

Published by: Hans-Böckler-Stiftung, Düsseldorf
Authors: Edelgard Kutzner, Melanie Roski, Lena Kaun, Ninja Ulland

Publication Date: July 2023
Suggested citation: Kutzner, E., Roski, M., Kaun, L., Ulland, N. (2023). Digitalisierung der Arbeit und Auswirkungen auf das Geschlechterverhältnis: Allgemeine Entwicklungsmuster am Beispiel der Büroarbeit - eine empirische Untersuchung, Study der Hans-Böckler-Stiftung, No. 484, ISBN 978-3-86593-401-7, Hans-Böckler-Stiftung, Düsseldorf

URL:
https://www.econstor.eu/handle/10419/273563

Key Findings:

- Digitalization is transforming office work, requiring a gender-sensitive approach to challenge entrenched gender-based patterns (Kutzner et al., 2023).
- Stereotypes influence perceptions of gender suitability for digitalized tasks(Kutzner et al., 2023).
- Automation affects routine tasks, impacting career advancement, especially for women (Kutzner et al., 2023).
- Digitalization creates opportunities for women in roles requiring tech proficiency (Kutzner et al., 2023).
- Women still face challenges reaching leadership positions due to traditional stereotypes (Kutzner et al., 2023).
- Outcomes of digitalization on gender relations depend on organizational culture and tech advancement (Kutzner et al., 2023).
- Sensitivity to gender issues among stakeholders is often insufficient (Kutzner et al., 2023).
- Eliminating stereotypes related to technology and "female" qualities is necessary (Kutzner et al., 2023).
- Decision-makers need improved sensitivity to gender issues (Kutzner et al., 2023).

Note: Highlights from Document Analysis by author in 2023.

5. **Gender Diversity in der Tech-Branche. Warum Frauen* nach Wie vor Unterrepräsentiert Sind** (Gender Diversity in the Tech Industry. Why Women* Are Still Underrepresented)

Published by: Verlag Barbara Budrich **Authors:** Franziska Beckert **Publication Date:** 2021 **Suggested citation:** Beckert. F.(2023) :Gender Diversity in der Tech-Branche. Warum Frauen* nach wie vor unterrepräsentiert sind. https://library.oapen.org/handle/20.500.12657/43312 **URL:** https://library.oapen.org/handle/20.500.12657/43312	**Key Findings:** • Significant regional disparities exist in female tech participation, highlighting the need for encouraging women to enter the field, especially in regions with skilled worker shortages like Germany (Beckert, 2020). • Women in tech face gender-specific challenges, including fewer identification opportunities and being perceived as less competent due to gender (Beckert, 2020). • Comprehensive education on programming and tech careers, starting with better information for school graduates, is essential (Beckert, 2020). • A lack of qualified teachers in Germany poses challenges to educational changes in tech (Beckert, 2020). • Tech companies must address human issues empathetically and have gender-competent leadership to drive change and enable gender-sensitive recruitment (Beckert, 2020). • Companies require political guidance, potentially through gender quotas and childcare support, to achieve gender diversity (Beckert, 2020). • Knowledge societies, including tech, should consider fostering gender balance for shaping the future world independent of gender identity, recognizing the ongoing gender imbalance in STEM fields (Beckert, 2020).

Note: Highlights from Document Analysis by author in 2023.

6. **Deutschland Sucht Arbeitskräfte: Wie die Arbeitskräfteanwerbung Entwicklungsorientiert, Nachhaltig und Fair Gestaltet Werden Kann** (Germany Seeks Workforce: How to Make Workforce Recruitment Development-Oriented, Sustainable and Fair)

Published by: Stiftung Wissenschaft und Politik (SWP), Berlin **Authors:** Steffen Angenendt, Nadine Knapp, David Kipp. **Publication Date:** 2023 **Suggested citation:** Angenendt, S., Knapp, N., Kipp, D. (2023) : Deutschland sucht Arbeitskräfte:Wie die Arbeitskräfteanwerbung entwicklungsorientiert, nachhaltig und fair gestaltet werden kann, SWP-Studie, No. 1/2023, Stiftung Wissenschaft und Politik (SWP), Berlin, https://doi.org/10.18449/2023S01 **URL:** https://www.econstor.eu/handle/10419/268653	**Key Findings:** • Germany is facing a considerable increase in the shortage of skilled workers, especially in social services, education, healthcare, construction, IT, and STEM-related professions (Angenendt et al., 2023). • While labor migration from EU countries has been a significant source, it's declining due to aging populations in those countries (Angenendt et al., 2023). • Recruitment of labor from third countries remains insufficient, and development policy considerations have not had a sustainable impact (Angenendt et al., 2023). • There's a severe shortage of skilled workers in fields like nursing, geriatric care, health care, and construction, leading to unfilled positions (Angenendt et al., 2023). • IT job openings, after dropping during the pandemic, have rebounded, with a significant skills gap, especially among academics (Angenendt et al., 2023). • The FederalMinistry of Labor and Social Affairspredicts a shortage of workers for 240,000 skilled jobs in Germany between 2022 and 2026, primarily in IT, pandemic-affected sectors, healthcare, and technical professions (Angenendt et al., 2023).

Note: Highlights from Document Analysis by author in 2023.

7. **Frauen als Nicht-(Mit-)Gestalterinnen der Digitalen Transformation** (Women as Non-(Co-) Designers of the Digital Transformation)

Published by: Springer Gabler, Wiesbaden **Authors:** Ursula Maier-Rabler **Publication Date:** 09 July 2022 **Suggested citation:** Maier-Rabler, U. (2022). Frauen als Nicht-(Mit-)Gestalterinnen der digitalen Transformation. In: Alm, N., Murschetz, P.C., Weder, F., Friedrichsen, M. (eds) Die digitale Transformation der Medien. Springer Gabler, Wiesbaden. https://doi-org.ezproxy.hnu.de/10.1007/978-3-658-36276-8_5 **URL:** https://doi-org.ezproxy.hnu.de/10.1007/978-3-658-36276-8_5	**Key Findings:** • Digital transformation emphasizes that tech development should not be dominated by a single demographic, namely white men from the Western world (Maier-Rabler, 2022). • The impact of digitalization depends on both technology and societal conditions, emphasizing their interconnectedness (Maier-Rabler, 2022). • Despite progress in gender equality, women remain underrepresented in tech fields, with lower enrollment in computer science and IT programs (Maier-Rabler, 2022). • The success of the women's movement has led to a misperception among younger generations, obscuring the need for gender-sensitive policies in tech education and employment (Maier-Rabler, 2022). • Initiatives to increase women's participation in IT should address both implicit and explicit gender biases in the field (Maier-Rabler, 2022). • Mere increases in the number of women in tech roles are insufficient; "de-gendering" tech processes is essential for genuine gender equality (Maier-Rabler, 2022).

Note: Highlights from Document Analysis by author in 2023.

8. **Frauen in Führungspositionen – Einige Fakten** (Women in Leadership Positions-Some Facts)

Published by: Springer Gabler, Wiesbaden **Authors:** Regina Anna-Maria Palmer **Publication Date:** 13 November 2019 **Suggested citation:** Palmer, R.AM. (2019). Frauen in Führungspositionen – Einige Fakten. In: Sackmann, S. (eds) Führung und ihre Herausforderungen. Springer Gabler, Wiesbaden. https://doi-org.ezproxy.hnu.de/10.1007/978-3-658-25278-6_12 **URL:** https://doi-org.ezproxy.hnu.de/10.1007/978-3-658-25278-6_12	**Key Findings:** • Women are underrepresented in leadership positions in Germany and globally, with a brief mention of the impact of quota regulations (Palmer, 2019). • In 2016, only 6.4% of leadership positions in 160 premium standard German companies were held by women, highlighting the gender disparity (Palmer, 2019). • Female leadership is associated with higher organizational innovation, particularly when three or more women hold top management positions (Palmer, 2019). • Female role models can inspire women to pursue leadership roles, but their impact varies, with some individuals experiencing a contrast effect (Palmer, 2019). • Gender stereotypes, especially those related to leadership traits, can create incongruity between societal perceptions of male and female leadership roles, affecting women's competence perceptions and workplace dynamics (Palmer, 2019).

Note: Highlights from Document Analysis by author in 2023.

9. **Talente Werden Knapp: Perspektiven für den Arbeitsmarkt** (Talent is in Short Supply: Prospects for the Labor Market)

Published by: Springer Gabler, Wiesbaden **Authors:** Martin Werding **Publication Date:** 2023 **Suggested citation:** Werding, M. (2019). Talente werden knapp: Perspektiven für den Arbeitsmarkt. In: Busold, M. (eds) War for Talents. Springer Gabler, Berlin, Heidelberg. https://doi-org.ezproxy.hnu.de/10.1007/978-3-662-57481-2_1 **URL:** https://doi-org.ezproxy.hnu.de/10.1007/978-3-662-57481-2_1	**Key Findings:** • Germany will experience prolonged demographic aging as the Baby Boomer generation retires after 2020, leading to a significant increase in the elderly population and a decline in the working-age population (Werding, 2019). • The current trend of increasing female labor force participation is expected to continue, with the employment rate of women aged 15 to 64 projected to reach 94% of the rate for men by 2030. However, some gender role imbalances in household labor and childcare may persist (Werding, 2019). • An alternative scenario is introduced, where women's labor force participation matches Scandinavian levels. In this scenario, the age-specific female labor force participation rate could reach 100% of the rate for men by 2030, with significant effects on the total labor force (Werding, 2019).

Note: Highlights from Document Analysis by author in 2023.

10. Frauen in MINT Wie Sprache und Gesellschaft den Karriereweg beeinflussen

(Women in STEM How Language and Society Influence Career Paths)

Published by: „Sprechen“ erscheint im Verlag für Sprechwissenschaft und Kommunikationspädagogik (VfSK) **Authors:** Sarah Heinemann **Publication Date:** 2023 **Suggested citation:** Heinemann, S. (2023). Frauen in MINT Wie Sprache und Gesellschaft den Karriereweg beeinflussen. Sprechen. Zeitschrift für Sprechwissenschaft Sprechpädagogik – Sprechtherapie – Sprechkunst. VfS. http://www.bvs-bw.de/SPRECHEN/sprechen_75_2023_1.pdf#page=36 **URL:** http://www.bvs-bw.de/SPRECHEN/sprechen_75_2023_1.pdf#page=36	**Key Findings:** • Gendered language in job advertisements significantly impacts women's career aspirations in male-dominated fields like STEM. Inclusive and gender-neutral language can boost women's confidenceand motivation to pursue STEM careers (Heinemann, 2023). • There is a lack of researchon gendered language in verbal communication, particularly in comparison to written communication (Heinemann, 2023). • The gender imbalance in STEM fields is a complex issue influenced by various factors. Addressing this gap requires include early education initiatives, providing role models, and promoting gender-inclusive language (Heinemann, 2023). • Mentoring programs and role models play a crucial role in supporting women's success in STEM. These programs offer guidance, support, and networking opportunities in male-dominated environments (Heinemann, 2023). • To address the gender gap in STEM, a multifaceted approach is necessary, encompassing early education, gender-inclusive language practices, and program evaluation (Heinemann, 2023).

Note: Highlights from Document Analysis by author in 2023.

11. Auswirkungen auf den Arbeitsmarkt (Effects on the Labor Market)

Published by: Springer Gabler, Wiesbaden **Authors:** Hermann Troger **Publication Date:** 17 January 2019 **Suggested citation:** Troger, H. (2019). Auswirkungen auf den Arbeitsmarkt. In: 7 Erfolgsfaktoren für wirksames Personalmanagement. Springer Gabler, Wiesbaden. https://doi-org.ezproxy.hnu.de/10.1007/978-3-658-24437-8_2 **URL:** https://doi-org.ezproxy.hnu.de/10.1007/978-3-658-24437-8_2	**Key Findings:** • Women with a migration background, particularly non-Europeans, encounter challenges in finding employment, with over 40% of them not employed compared to 27.9% of women without a migration background (Troger, 2019). • Digitalization is reshaping industries and job qualifications, with debates about its impact. It could lead to job polarization or result in a general upgrading of qualifications, with its consequences varying across industries and contexts (Troger, 2019). • The impact of digitalization on jobs is a subject of varying predictions, from mass job loss to more moderate assessments. Certain areas like finance, administration, logistics, and production may be particularly susceptible to automation (Troger, 2019). • Digitalization can blur the boundaries between work and personal life, potentially improving work-life balance. However, it can also pose challenges in balancing work and family obligations, with the impact depending on individual preferences and needs (Troger, 2019).

Note: Highlights from Document Analysis by author in 2023.

12. Mit Regionalen Potenzialen Gegen den Fachkräftemangel? (Using Regional Potential to Combat the Shortage of Skilled Workers?)

Published by: ifo Institut **Authors:** Ernst Glöckner **Publication Date:** March 2023 **Suggested citation:** Glöckner, E. (2023). Mit regionalen Potenzialen gegen denFachkräftemangel?. ifo Dresden berichtet. https://www.ifo.de/DocDL/ifoDD_23-03_03-09_Gloeckner.pdf **URL:** https://www.ifo.de/DocDL/ifoDD_23-03_03-09_Gloeckner.pdf	**Key Findings:** • In Thuringia, solutions to the labor shortage include reintegration of unemployed individuals, increasing overall workforce participation, and targeting specific groups like young people, seniors, and women (Glöckner, 2023). • Matching qualifications and requirements with the available workforce is also crucial (Glöckner, 2023). • Aligning education and vocational training with local industries facing labor shortages could be an effective strategy. Policymakers need to create an attractive environment to attract and retain potential workers (Glöckner, 2023). • Ongoing digitalization offers opportunities to increase productivity through technological advancements and efficient production technology, potentially helping bridge the labor supply-demand gap (Glöckner, 2023).

Note: Highlights from Document Analysis by author in 2023.

13. Wie Unternehmen Beschäftigungspotenziale von Frauen noch Besser Nutzen Können. Attraktivität, Flexible Arbeitszeitmodelle und Berufsorientierung (How Companies Can Make Better Use of Women Can Be Better Their Potencial Used. Attractiveness, Flexible Working Time Models and Career Orientation)

Published by: KOFA

Authors: Anika Jansen, Dr. Regina Flake, Dr. Lydia Malin

Publication Date: February 2019

Suggested citation: Jansen, A., Flake, R., Malin, L., (2019). Wie Unternehmen Beschäftigungspotenziale von Frauen noch besser nutzen können. Attraktivität, flexible Arbeitszeitmodelle und Berufsorientierung. KOFA. https://www.kofa.de/media/Publikationen/KOFA_Kompakt/Beschaeftigungspotenziale_von_Frauen.pdf

URL: https://www.kofa.de/media/Publikationen/KOFA_Kompakt/Beschaeftigungspotenziale_von_Frauen.pdf

Key Findings:

- Women's labor force participation in Germany has steadily increased, with three out of four women now employed. This includes a significant increase in highly qualified women with university or advanced degrees (Jansen et al., 2019).
- 8.6 million women are professionally qualified women without advanced degrees (Jansen et al., 2019).
- Shortages of skilled labor are more pronounced in professions dominated by one gender, and two-thirds of all shortage occupations are male-dominated (Jansen et al., 2019).
- Companies responding to skilled labor shortages in male-dominated fields have hired more women, leading to a 12.8% increase in the female workforce in these shortage occupations between 2013 and 2017 (Jansen et al., 2019).
- Theincrease in women's labor force participationcan be attributed to improved childcare and eldercare infrastructure, as well as better work-life balance efforts by many companies. Part-time work is essential for women, especially those responsible for childcare and caregiving (Jansen et al., 2019).
- Diversifying career options for girls is important. The number of women in dual vocational training has decreased in recent years, even though there is demand for skilled workers with formal vocational training in the job market (Jansen et al., 2019).

	• Addressing gender differences in interests and expectations regarding education and work is essential. For example, companies can benefit from directly addressing these differences in their apprenticeship programs for girls (Jansen et al., 2019).

Note: Highlights from Document Analysis by author in 2023.

14. Fachkräftemangel aus Unternehmenssicht: Auswirkungen und Lösungsansätze Jahres monitor der Stiftung Familienunternehmen (Shortage of Skilled Workers from the Company's Point of View: Effects and Approaches to Solutions Annual Monitor of the Family Business Foundation)

Published by: ifo Institut & Stiftung Familienunternehmen **Authors:** Stefan Sauer, Johanna Garnitz, Annette von Maltzan **Publication Date:** 2022 **Suggested citation:** Stiftung Familienunternehmen (Hrsg.): Fachkräftemangel aus Unternehmenssicht: Auswirkungen und Lösungsansätze – Jahresmonitor der Stiftung Familienunternehmen, erstellt vom ifoInstitut – Leibniz Institut für Wirtschaftsforschung an der Universität München e.V., München 2022, www.familienunternehmen.de **URL:** https://www.familienunternehmen.de/media/public/pdf/publikationen-studien/studien/Fachkraeftema	**Key Findings:** • The impact of skilled labor shortages is widespread, affecting almost all companies in Germany (87.2%). This issue is no longer limited to specific industries or regions; it now affects companies across all sectors and regions (Sauer et al., 2022). • Companies face challenges in recruiting skilled workers, leading to more complex and resource-intensive recruitment processes, increased personnel costs, and greater strain on the existing workforce (Sauer et al., 2022). • Addressing the skilled labor shortage requires a multifaceted approach, including targeted career orientation programs in schools, streamlined immigration of foreign skilled workers, and simplified recognition of foreign educational qualifications (Sauer et al., 2022). • Companies are focusing on recruitment processes and working conditions to attract skilled workers. Initiatives include ongoing staff training, flexible working hours, higher salaries, active sourcing, and headhunting to

ngel-aus-Unternehmenssicht-Jahresmonitor_Studie_Stiftung-Familienunternehmen.pdf	directly approach potential employees (Sauer et al., 2022). • Skilled labor shortages are perceived as a central risk to both the economy and the survival of many companies, including family-owned and non-family-owned businesses (Sauer et al., 2022).

Note: Highlights from Document Analysis by author in 2023.

15. Fachkräftestrategie der Bundesregierung. Herausforderungen und Chancen für die Fachkräftesicherung und den Arbeitsmarkt in Deutschland (The German Government's Skilled Labor Strategy Challenges and Opportunities for Securing Skilled Workers and the Labor Market in Germany)

Published by:	**Key Findings:**
(BMAS)Bundesministerium für Arbeit und Soziales **Authors:** (BMAS) Bundesministerium für Arbeit und Soziales **Publication Date:** September 2022 **Suggested citation:** Bundesministerium für Arbeit und Soziales (Hrsg.): Fachkräftestrategie der Bundesregierung. Herausforderungen und Chancen für die Fachkräftesicherung und den Arbeitsmarkt in Deutschland .2022, https://www.bmas.de/SharedDocs/Downloads/DE/Publikationen/fachkraeftestrategie-der-bundesregierung.pdf?__blob=publicationFile&v=8	• Collaboration among various stakeholders, including businesses, employees, government and educational institutions, is crucial to address these labor challenges (BMAS, 2022). • Five key areas for addressing skilled labor shortages: ensuring accessible apprenticeships for all young people, promoting lifelong learning, enhancing gender equality, improving work quality and flexible retirement transitions, and streamlining immigration for foreign skilled workers (BMAS, 2022). • Focus on the importance of early career orientation, improving the attractiveness of vocational training, increasing training and education opportunities, enhancing work-life balance to boost female workforce participation, and simplifying qualification recognition processes (BMAS, 2022).

URL: https://www.bmas.de/SharedDocs/Downloads/DE/Publikationen/fachkraeftestrategie-der-bundesregierung.pdf?__blob=publicationFile&v=8	• Maximizing the potential of the domestic workforce through better education and workforce planning is vital (BMAS, 2022).

Note: Highlights from Document Analysis by author in 2023.

16. **Chancengleichheit und Digitalisierung Frauen und Männer in der Digitalen Arbeitswelt** (Equal Opportunities and Digitalization Women and Men in the Digital World of Work)

Published by:	**Key Findings:**
Kompetenzzentrum Fachkräftesicherung (KOFA) **Authors:** Dr. Susanne Seyda, Dr. Regina Flake **Publication Date:** November 2019 **Suggested citation:** Seyda, S., Flake, R., (Hrsg.): Chancengleichheit und Digitalisierung Frauen und Männer in der digitalen Arbeitswelt. Kompetenzzentrum Fachkräftesicherung . 2019, https://www.kofa.de/media/Publikationen/Studien/Chancengleichheit_Digitalisierung_4_2019.pdf **URL:** https://www.kofa.de/media/Publikationen/Studien/Chancengleichheit_Digitalisierung_4_2019.pdf	• While men and women work in digital industries equally, they often hold different job roles within these sectors. For instance, women are less likely to be in IT roles but are more common in administrative and financial positions (Seyda & Flake, 2019) • Women use similar digital tools as men, such as computers, laptops, and tablets, but use industry-specific software and IT system development and maintenance less frequently (Seyda & Flake, 2019) • Women are more likely to rate their digital competencies as matching their tasks, while men often believe they could handle more advanced tasks (Seyda & Flake, 2019) • Both genders express similar needs for further training, but in practice, women participate less in digital-related training and use digital media less frequently (Seyda & Flake, 2019) • Companies should involve women more in technology selection processes, promoting their active participation in digitalization, this can boost women's confidence in their digital skills, motivate them to engage more with digital topics, and further enhance their digital competencies (Seyda & Flake, 2019).

- Encouraging women to develop digital competencies benefits both women and companies (Seyda & Flake, 2019).

Note: Highlights from Document Analysis by author in 2023.

17. Digitalisierung: Chance oder Risiko für Frauen in der Arbeitswelt? Welche Auswirkungen hat die Digitale Transformation auf Frauen in Administrativen Bürotätigkeiten in Deutschland im Hinblick auf die Geschlechtersegregation und die Arbeitszeitmodelle? (Digitization: Opportunity or Risk for Women in the World of Work? What Impact Does the Digital Transformation on Women in Administrative Office Jobs in Germany Regarding Gender Segregation and Working Time Models?)

Published by: ItF Institut Kassel

Authors: Marie-Kristin Resch

Publication Date: April 2019

Suggested citation: Resch, M., (Hrsg.). Digitalisierung: Chance oder Risiko für Frauen in der Arbeitswelt? Welche Auswirkungen hat die digitale Transformation auf Frauen in administrativen Bürotätigkeiten in Deutschland im Hinblick auf die Geschlechtersegregation und die Arbeitszeitmodelle?. 2019, https://www.itf-kassel.de/assets/Uploads/Studie-Climb-Up-Frauen-und-Digitalisierung.pdf

URL: https://www.itf-kassel.de/assets/Uploads/Studie-Climb-Up-Frauen-und-Digitalisierung.pdf

Key Findings:

- Small and medium-sized enterprises (SMEs) that are expanding their digitalization efforts often face difficulties in filling vacant specialist positions, this highlights that skill shortages and lack of competencies are significant obstacles to digitalization in the SME sector (Resch, 2019).
- This is not because these positions are unattractive in terms of reputation, working conditions, pay, or location. Instead, they arise due to specific competency requirements that applicants often fail to meet (Resch, 2019).
- The country lags behind in teaching digital competencies in schools compared to international standards (Resch, 2019).
- Companies must invest more in the competencies of their employees through training and development, informal knowledge exchange, and measures to retain key personnel (Resch, 2019).

Note: Highlights from Document Analysis by author in 2023.

18. Fehlende Digitalkompetenzen Erschweren die Besetzung Offener Stellen in Digital Aktiven Unternehmen (Lack of Digital Skills Makes It Difficult to Fill Vacancies in Digitally Active Companies)

Published by: kfw **Authors:** Volker Zimmermann **Publication Date:** 7. März 2023 **Suggested citation:** Zimmermann, V., (Hrsg.). Fehlende Digitalkompetenzen erschweren die Besetzung offener Stellen in digital aktiven Unternehmen. 2023, https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-Fokus-Volkswirtschaft/Fokus-2023/Fokus-Nr.-420-Maerz-2023-Digi-Fachkraefte.pdf **URL:** https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-Fokus-Volkswirtschaft/Fokus-2023/Fokus-Nr.-420-Maerz-2023-Digi-Fachkraefte.pdf	**Key Findings:** • Men and women tend to work in different occupations within digital industries. Men dominate IT professions, while women are more frequently found in administrative and clerical roles (Zimmermann, 2023). • The IT field exhibits a significant gender gap, with only 16.5% of IT professionals being women. This gap extends to software development and IT systems maintenance (Zimmermann, 2023). • Men tend to self-assess their digital competencies more favorably than women, which could reflect actual differences in digital skills or differences in self-perception (Zimmermann, 2023). • Women are less frequently involved in the selection of new technologies within companies compared to men and this can affect women's confidence in their digital abilities (Zimmermann, 2023). • Digital technologies can improve work-life balance, especially for parents, by enabling flexible working arrangements(Zimmermann, 2023). • Flexible work arrangements, while beneficial for both genders, raise questions about potential downsides, such as blurred boundaries between work and personal life (Zimmermann, 2023).

Note: Highlights from Document Analysis by author in 2023.

19. Digitalisierung Geschlechtergerecht Gestalten – Herausforderungen Jetzt Annehmen. (Shaping Digitalization in A Gender- Responsive Way- Accepting the Challenge Now)

Published by: Ministerium für Wirtschaft, Tourismus, Landwirtschaft und Forsten des Landes Sachsen-Anhalt
Authors: Prof. Dr. Aysel Yollu-Tok, Prof. Dr. Sanaz Mostaghim,
Helene von Schwichow, Sandra Fischer, Prof. Dr. Heike Mrech,
Dr.Sandra Scholz, Regina Schreiber, Dr. Arn Sauer
Publication Date: 2021

Suggested citation: Tok, A., Mostaghim, S., Schwichow, H., Fischer, S., Mrech, H., Scholz, S., Schreiber, R., Sauer, A., Hiller, N., Oelke, A., Nebe, K., Knaut, A. (Hrsg.). DIGITALISIERUNG GESCHLECHTERGERECHT GESTALTEN – HERAUSFORDERUNG JETZT ANNEHMEN. 2021, https://www.sachsen-anhalt.de/fileadmin/Bibliothek/Politik_und_Verwaltung/MW/Digitalportal/Artikel/2021/09/210917_Sachsen_Anhalt_Digitalisierung_geschlechtergerecht.pdf

URL: https://www.sachsen-anhalt.de/fileadmin/Bibliothek/Politik_und_Verwaltung/MW/Digitalportal/Artikel/2021/09/210

Key Findings:

- Discrimination by Algorithms: Examples of algorithmic discrimination, like the COMPAS algorithm and Tesla's autopilot, are provided (Yollu-Tok et al., 2021).
- Measures to integrate ethics into AI development are proposed, including education, research, diversity, and public awareness (Yollu-Tok et al., 2021).
- The underrepresentation of women in IT-related fields is discussed, emphasizing the importance of diversity (Yollu-Tok et al., 2021).
- Early introduction of digital concepts in education, particularly for girls, is highlighted to encourage interest in STEM (Yollu-Tok et al., 2021).
- Fostering diversity, digital education strategies, making the tech industry attractive to women, and promoting role models and networks (Yollu-Tok et al., 2021).
- Trends like remote work, flexible arrangements, and the impact of digitalization on work and skills (Yollu-Tok et al., 2021).

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Note: Highlights from Document Analysis by author in 2023.

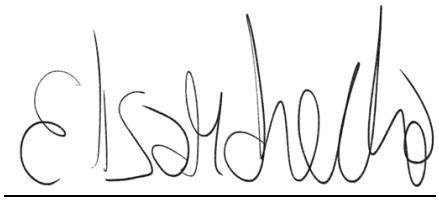
20. Erfolgskriterien Betrieblicher Digitalisierung (Success Criteria for Operational Digitization)

Published by: Bertelsmann Stiftung (Hrsg.) **Authors:** Dr. Josephine Hofmann, Claudia Ricci, Richard Schwarz, Valerie Wienken **Publication Date:** 2020 **Suggested citation:** Hofmann, J., Ricci, C., Schwarz, R., Wienken, V.(Hrsg.). Erfolgskriterien betrieblicher Digitalisierung. 2020, https://www.iao.fraunhofer.de/content/dam/iao/images/iao-news/studie-betriebliche-digitalisierung-iao-bertelsmann.pdf **URL:** https://www.iao.fraunhofer.de/content/dam/iao/images/iao-news/studie-betriebliche-digitalisierung-iao-bertelsmann.pdf	**Key Findings:** • Top management plays a crucial role in digital transformation by setting an example that encourages experimentation and innovation within the organization. They should actively embrace changes in digital work culture (Hofmann et al., 2020). • Digital transformation involves not only customer-facing aspects but also changing internal workflows and processes (Hofmann et al., 2020). • Creating Spaces for Innovation and Learning: Digital transformation is driven by a willingness to continuously learn at all levels of the organization (Hofmann et al., 2020).

Note: Highlights from Document Analysis by author in 2023.

Declaration of Academic Integrity

I hereby declare that I have independently authored this thesis and have not utilized any assistance beyond what has been specified. All passages borrowed from other sources, whether in terms of wording or meaning, have been properly cited with reference to the sources, in accordance with APA academic citation standards. This also applies to figures and tables. I am aware that any misleading representations will be treated as an attempt to deceive.



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