
Universidade Estadual de Feira de Santana

Programa de Pós-Graduação em Ciência da Computação

# Investigating Barriers Faced by Women in the Software Industry: A Gray Literature Study

Alêssa Soares de Oliveira Andrade

Feira de Santana

2025


Universidade Estadual de Feira de Santana

Programa de Pós-Graduação em Ciência da Computação

Alêssa Soares de Oliveira Andrade

# Investigating Barriers Faced by Women in the Software Industry: A Gray Literature Study

Dissertação apresentada à Universidade Estadual de Feira de Santana como parte dos requisitos para a obtenção do título de Mestre em Ciência da Computação.

Orientadora: Larissa Rocha Soares Bastos

Coorientador: Emmanuel Sávio Silva Freire

Feira de Santana

2025

**Ficha Catalográfica – Biblioteca Central Julieta Carteado**

Andrade, Alêssa Soares de Oliveira
S565i Investigating barriers faced by women in the software industry: a gray literature study./ Alêssa Soares de Oliveira Andrade. – 2025.
95 f.: il.

Orientadora: Larissa Rocha Soares Bastos
Coorientador: Emmanuel Savio Silva Freire
Dissertação (mestrado) – Universidade Estadual de Feira de Santana, Programa de Pós-Graduação em Ciência da Computação, 2025.

1.Mulheres na Tecnologia da Informação e Comunicação. 2.Questão de gênero. 3.Literatura cinzenta. I.Bastos, Larissa Rocha Soares, orient. II.Freire, Emmanuel Savio Silva, coorient. III.Universidade Estadual de Feira de Santana. IV.Titulo.

CDU : 004:055.2

Maria de Fátima de Jesus Moreira – Bibliotecária – CRB5/1120

Alessa Soares de Oliveira

# Investigating Barriers Faced by Women in the Software Industry: A Gray Literature Study

Dissertação apresentada à Universidade Estadual de Feira de Santana como parte dos requisitos para a obtenção do título de Mestre em Ciência da Computação.

Feira de Santana, 18 de março de 2025

## BANCA EXAMINADORA

gov.br Documento assinado digitalmente
LARISSA ROCHA SOARES BASTOS
Data: 18/03/2025 12:36:57-0300
Verifique em https://validar.iti.gov.br

Larissa Rocha Soares Bastos (Orientadora)
Universidade do Estado da Bahia

gov.br Documento assinado digitalmente
MARISTELA TERTO DE HOLANDA
Data: 19/03/2025 08:51:22-0300
Verifique em https://validar.iti.gov.br

Maristela Terto De Holanda
Universidade de Brasília

gov.br Documento assinado digitalmente
JOSE AMANCIO MACEDO SANTOS
Data: 19/03/2025 11:23:01-0300
Verifique em https://validar.iti.gov.br

José Amâncio Macedo Santos
Universidade Estadual de Feira de Santana

# Abstract

**Context.** In the fast-paced environment of the digital age, the software industry is fundamental in fostering innovation and progress. However, despite its relevance, the sector faces a constant challenge: gender inequality. Although women have historically contributed significantly, their presence in technology development environments remains disproportionately low, reflecting systemic barriers and biases that prevent their full participation. **Objective.** Aware of the urgent need to address the issue of gender diversity in the software industry, this study aims to identify and analyze, based on everyday descriptions found in the grey literature, the barriers faced by women in the ICT field. To achieve this objective, we intend to (i) analyze the gender barriers faced by women in software project work environments; (ii) reveal the effects that these barriers have on women; (iii) identify possible solutions suggested by women to make the software industry a more accessible environment for them; and (iv) organize the body of knowledge composed of barriers, effects, and solutions. **Method.** We chose gray literature because it provides a crucial, detailed, and current perspective on several research areas, bringing to light unique insights and viewpoints that are often missing from traditional sources. We considered the following online communities for software developers: DEV and InfoQ. The search strategy was divided into four steps: data extraction, coding, translation of codes into themes, and discussion. Our data extraction used search strings in English. Coding was done manually, identifying labels and then using the generated labels, defining specific themes for analysis and discussion. **Results.** Throughout the research, 44 articles from DEV and 18 from InfoQ were analyzed, revealing several barriers faced by women in the technology professional environment. Toxic male dominance, along with sexism, prejudice, stereotypes, pay gaps, and aggression, have serious and often irreversible consequences for these professionals. Many women in the industry feel powerless, undervalued, and exhausted, experiencing forced and disrespectful professional development that can radically change their career aspirations. We also identified that impostor syndrome, pain, the need to adopt a masculine posture to be accepted, and emotional exhaustion are effects that women face due to these barriers. To mitigate these obstacles, several strategies were recommended: ensuring the presence of mentors within the company, maintaining control over their skills and not allowing biases to influence their performance, ignoring threats, and negotiating salaries to obtain recognition and appreciation in the workplace. This study is a call to action to transcend complacency and address

the deeply rooted inequalities in the software industry. By fostering a culture of inclusion, respect, and empowerment, we can unlock the full potential of diverse talent, foster innovation, and propel the industry toward a brighter and more equitable future.

**Keywords:** Gray Literature, Women in TIC, Gender barriers

# Resumo

**Contexto.** No ambiente acelerado da era digital, a indústria de software é fundamental na promoção da inovação e do progresso. Contudo, apesar da sua relevância, o setor enfrenta um desafio constante: a desigualdade de gênero. Embora as mulheres tenham historicamente contribuído significativamente, a sua presença em ambientes de desenvolvimento tecnológico permanece desproporcionalmente baixa, reflectindo barreiras sistémicas e preconceitos que impedem a sua plena participação.**Objectivo.** Conscientes da necessidade urgente de abordar a questão da diversidade de género na indústria de software , este estudo tem como objetivo principal identificar e analisar, com base em descrições cotidianas encontradas na literatura cinzenta, as barreias enfrentados pelas mulheres na área de TIC. Para atingir este objetivo, pretendemos (i) analisar as barreias de gênero enfrentados pelas mulheres em ambientes de trabalho de projetos de software; (ii) revelar os efeitos que estas barreias têm sobre as mulheres; (iii) identificar possíveis soluções sugeridas pelas mulheres para tornar a indústria de software um ambiente mais acessível para elas; e (iv) organizar o corpo de conhecimento composto pelas barreiras, efeitos e soluções. **Método.** Escolhemos a literatura cinzenta porque ela fornece uma perspectiva crucial, detalhada e atual sobre diversas áreas de pesquisa, trazendo à luz percepções e pontos de vista únicos que muitas vezes faltam nas fontes tradicionais. Consideramos as seguintes comunidades online para desenvolvedores de software: DEV e InfoQ. A estratégia de pesquisa foi dividida em quatro etapas: extração dos dados, codificação, tradução dos códigos em temas e discussão. Nossa extração de dados usou strings de pesquisa em inglês. A codificação foi feita manualmente, identificando os rótulos e posteriormente utilizando os rótulos gerados, definindo temas específicos para análise e discussão. **Resultados.** Ao longo da pesquisa, foram analisados 44 artigos do DEV e 18 do InfoQ, revelando diversas barreiras enfrentadas pelas mulheres no ambiente profissional de tecnologia. A dominação masculina tóxica, juntamente com o sexismo, o preconceito, os estereótipos, as disparidades salariais e a agressão, tem consequências graves e muitas vezes irreversíveis para estes profissionais. Muitas mulheres na indústria sentem-se impotentes, desvalorizadas e exaustas, passando por um amadurecimento profissional forçado e desrespeitoso que pode mudar radicalmente as suas aspirações profissionais. Identificamos também que a síndrome do impostor, a dor, a necessidade de adotar uma postura masculina para serem aceitas e o esgotamento emocional são efeitos enfrentados pelas mulheres devido a essas barreias. Para mitigar esses obstáculos, foram recomendadas diversas estratégias:

garantir a presença de mentores dentro da empresa, manter o controle sobre suas competências e não permitir que preconceitos influenciem seu desempenho, ignorar ameaças e negociar salários para obter reconhecimento e valorização no ambiente de trabalho. Este estudo é um apelo à ação para transcender a complacência e abordar as desigualdades profundamente enraizadas na indústria de software. Ao promover uma cultura de inclusão, respeito e capacitação, podemos desbloquear todo o potencial de talentos diversos, promover a inovação e impulsionar a indústria em direção a um futuro mais brilhante e mais equitativo.

**Palavras-chave:** Literatura Cinza, Mulheres na Tecnologia da Informação e Comunicação, Questões de Gênero.

# Preface

This master's thesis was submitted to the State University of Feira de Santana (UEFS) as a partial requirement to obtain the Master's degree in Computer Science.

The dissertation was developed in the Postgraduate Program in Computer Science (PGCC), with Prof. Dr. **Larissa Rocha Soares Bastos**.

Prof. Dr. **Emmanuel Sávio Silva Freire** was the co-supervisor of this work.

# Contents

# Alignment with the Research Line

**Research Line: Software and Computing Systems**

This dissertation is part of the Software and Computing Systems line of research because it bases its conclusions on real data and evidence. By exploring women's experiences in the software industry, this study identified barriers and effects women face, providing an analysis based on empirical evidence. These data are essential to developing effective strategies to promote diversity and inclusion and improve policies and practices on the job, in addition to favoring the evolution of the results of technological innovation and creation, thus leaving the traditional standard of companies in this sector. In this way, this research contributes not only to academic advancement but also to the implementation of significant changes in the technology sector.

The objective of this research is to identify and analyze, based on everyday descriptions found in gray literature, the barriers that women face in the professional technology environment, what are the possible effects caused by these barriers, and suggestions for a possible improvement in the current situation.

# Bibliographic Productions, Technical Productions and Awards

## 0.1 Author Production: papers published

- Alêssa Soares de Oliveira, Sávio Freire, Manoel Mendonça, Edna Dias Canedo, and Larissa Rocha Soares Bastos. Investigating the Challenges Faced by Women on Software Engineering: A Grey Literature Study. Sixth Workshop on Gender Equality, Diversity, and Inclusion in Software Engineering (GE@ICSE 2025) - in press.

# List of Tables

# List of Figures

# List of Abbreviations

| Abbreviation | Description |
|---|---|
| IT | Information Technology |
| AI | Artificial Intelligence |
| RQ | Research Questions |
| SE | Software Engineering |
| ICT | Institute of Science and Technology |
| DEV | Refers to development |

# Chapter 1

# Introduction

Women have been involved in computing since the first technological inventions. The story of computer science and technology highlights notable female figures such as Ada Lovelace, Grace Hopper, and Sister Mary Kenneth Keller, who played a critical role in the development of programming languages (Demartini, 2019). Knowing the history of computing not only enriches the understanding of current technologies but also inspires and guides future innovations, providing an essential historical perspective for continued progress. Therefore, the lack of recognition of female merits in each contribution is not subject to acceptance (Swade, 2022). However, their contributions and achievements are often overshadowed by social prejudices (Oreskes, 1996).

The marginalization of women in the history of computing may have contributed to gender inequality in both academia and industry. Despite their significant contributions, women continue to face gender bias in various environments. This social polarization makes it difficult for them to be recognized and treated equally as qualified candidates (Pinto et al., 2015). This disparity is evident from university IT courses to professional careers, where women face problems of gender inequality, such as salary disparities, moral and sexual harassment, and lack of professional and intellectual recognition, despite occupying the same positions as their male counterparts (Rocha et al., 2023b; Canedo et al., 2023a, 2021b; Trinkenreich et al., 2022b; Kohl e Prikladnicki, 2021a). Furthermore, leadership roles in software project environments are predominantly occupied by men (Kovaleski et al., 2013; Canedo et al., 2021b).

Gender issues in software projects are a critical area of research in the contemporary digital era. Gender disparities in the technology sector are persistent barriers, and understanding these issues is essential to promoting diversity and equity. Studies indicate that multi-genre teams achieve highly satisfactory results in software production, interface development, and technological innovations, meeting the growing demands of society (Oliveira et al., 2023; Hoogendoorn et al., 2013; Blincoe et al., 2019; Kohl e Prikladnicki, 2022; Jung e Wang, 2023; Yong et al., 2021). Diversity is

the key to a successful ecosystem, allowing for multi categorized professional niches. Diverse work groups, including a significant representation of women, are more likely to generate innovative recommendations in software development projects (Soares, 2001; Yong et al., 2021).

Given this situation, it is crucial to identify and analyze the current barriers that women face in the field of software projects to transform the stigmas surrounding their computing competence. Previous studies have explored the barriers faced by women in academia and the software industry, primarily through interviews or surveys (Rocha et al., 2023b; Canedo et al., 2023a, 2021b; Oliveira et al., 2023), with limited exploration of other data sources such as gray literature (Schöpfel e Farace, 2010).

The gray literature provides an essential, comprehensive, and current understanding of various areas of research (Schöpfel e Farace, 2010). It covers significant information and unique perspectives often missing from conventional sources. This type of source includes technical reports, blogs, government documents, unpublished theses, and internal organizational communications, offering detailed analysis and practical insights crucial to professionals and decision-makers. By including them in research can enable a complete and accurate understanding of the topics, contributing to the advancement of knowledge and effective solutions to contemporary barriers (Chartier, 2002). The two literatures cited are study techniques that aim to disseminate scientific study and the major difference between them is related to the data source where the thematic aspects are analyzed.

This study innovates by conducting a thematic synthesis of the gray literature, providing current and contextualized views on issues that reflect the dynamic nature of the barriers faced by women in the professional technology sector. It identifies and analyzes these barriers based on everyday descriptions extracted from online communities, i.e., DEV Community and InfoQ. The specific objectives of this study include identifying the gender barriers women face in software project environments, analyzing which effects these barriers have on women, and exploring potential recommendations to mitigate gender-related adversities in software project environments.

Barriers are factors that obstruct or hinder progress, communication, or access to resources and opportunities. In the context of gender issues in the software industry, *barriers* refer to the obstacles that limit women's full participation, advancement, and success in the field. These barriers can be categorized as social, cultural, structural, educational, and personal. *Effects* are the consequences that the barriers cause in women's professional and personal lives, as well as in the technology sector itself. Meanwhile, *suggestions* encompass strategies and recommendations aimed at mitigating or eliminating these barriers and their impacts, ultimately fostering greater inclusion, retention, and success for women in software development.

Despite growing academic interest in gender inequality in computing, the understanding of barriers faced by women in the professional technology environment remains fragmented and often limited to formal institutional studies. These barriers

— including systemic discrimination, lack of recognition, and gendered expectations — not only restrict individual career development but also hinder innovation and organizational diversity. Investigating these barriers is essential because they are deeply embedded in organizational cultures and rarely reported in academic surveys alone.

Traditional research methods, while valuable, may overlook the richness and urgency of lived experiences. In this context, gray literature emerges as a powerful complementary source, offering authentic, timely, and uncensored narratives from women themselves. Blogs, forums, and developer communities provide first-hand accounts that bring to light subtle and complex forms of exclusion, often invisible to conventional academic frameworks. Therefore, incorporating gray literature into the study of gender barriers allows for a broader and more grounded understanding of the problem, enabling more effective and inclusive solutions

The communities selected for this study, DEV Community and InfoQ, are widely frequented by technology professionals and serve as dynamic spaces for open discussions on a range of technological topics. DEV Community is an interactive platform where developers share diverse content, spanning both technical and social issues. Posts on this platform are in-depth, averaging 710 words, which allows for a detailed exploration of gender issues (Papoutsoglou et al., 2021). Its engagement features, such as likes, comments, and shares, offer valuable insights into community attitudes and participation. Additionally, extensive user profiles and cross-platform links provide a broader perspective on social behaviors and professional networks. InfoQ, established in 2006, offers a rich repository of technical articles, interviews, conferences, webinars, and podcasts. It covers a broad spectrum of topics, including agile development, software architecture, artificial intelligence, machine learning, and DevOps. Both platforms are highly collaborative and rely on a reputation system that fosters quality contributions. They serve as essential resources for professionals looking to stay informed about the latest trends and practices in the software industry, ultimately contributing to knowledge dissemination and technological innovation.

Through a manual search, we identified and analyzed 44 articles from Dev and 18 from InfoQ, which consist of articles, interviews, and podcasts from InfoQ about barriers faced by women in the software industry. As main results, we found several barriers that women face in the professional technology environment, such as stereotypes, lack of recognition of women, dominance by men, and exclusion. These barriers generate significant effects on women's professional lives, such as impostor syndrome and the replication of masculine attitudes, which do not favor gender diversity in these environments. We also found suggestions to mitigate what happens to women in the software industry. For example, continuous learning, a good support system, and the self-recognition and appreciation of women's skills are recommendations to make the software engineering market diverse and safe for professionals.

The following sections present a detailed formulation of the problem statement, the research objectives, and the key contributions of this study. Additionally, an

overview of the document's structure is provided.

## 1.1 Problem Statement

Gender issues in software projects are a crucial area of research in the contemporary digital era. Gender disparities in the technology sector have been a persistent challenge, and an in-depth understanding of these issues is essential to promote diversity and equity. Studies indicate that multigenre teams achieve extremely satisfactory results in software production, in the development of common interfaces, and in technological innovations that serve a society that increasingly requires evolution. Manikas e Hansen (2013) stated that diversity is an important ingredient for the success of an ecosystem because the differentiation of actors allows for multi-categorized professional niches.

Soares (2001) indicated that, especially in the areas of Science and Technology, the participation of women causes transformations in the social and economic sphere and, as a result, generates a positive impact on society, thus, investigating gender issues in projects of software is not only an ethical approach but also a smart strategy to drive innovation and competitiveness in the technology sector. By integrating diverse gender perspectives, we can create more comprehensive technological solutions, benefiting society as a whole and eliminating problematic gender issues in an ever-evolving society. The inclusion of gender perspectives in software projects is fundamental to creating more equitable work environments, where men and women can contribute equally to technological innovation. Regarding socioeconomic aspects, the reduced number of women in scientific areas means the waste of highly qualified human resources that can contribute with scientifically creative solutions as well as different views of the situation in question (Soares, 2001).

In their research, Canedo et al. (2021a) found that barriers such as lack of leadership, sexist behavior, underestimation, and prejudice are still gender problems faced by female professionals in the software industries. Therefore, it is extremely important to verify and validate the real situation that women face in software project environments to list possible actions that modify this toxic environment and the technological advancement that a diverse team brings about can happen in a guaranteed way.

We intend to identify situations where women have faced barriers by collecting and analyzing data from the gray literature. This kind of literature has been used to demonstrate different topics in software engineering, such as technical debt (Santos et al., 2022; Gomes et al., 2022, 2023), requirements engineering (Freire et al., 2023a), empathy (Cerqueira et al., 2023, 2024), and psychological safety (Santana et al., 2023, 2024), providing a set of methodological steps to perform an empirical study considering gray literature sources.

## 1.2 Goal

The main goal of this research is **to identify and analyze, based on everyday descriptions found in gray literature, the barriers faced by women in the professional technology environment**. We derived the following specific goals (SGs).

- SG1: identifying reports in the gray literature that discuss gender issues faced by women in the software industry. The selection of gray literature was a strategic choice for this research. This type of literature plays a crucial role in knowledge dissemination, as the digital network enables rapid and widespread distribution. Through this dynamic process, knowledge reaches a vast audience almost instantaneously, facilitated by both content creators and those who further amplify its reach (Chartier, 2002).
- SG2: analyzing the gender barriers faced by women in software project work environments. In this study, we understand barriers as any impediment or hindrance to progress, communication, or women's access to a certain resource or location.
- SG3: identifying the effects felt by women professionals due to the barriers faced by them. The effects are consequences that barriers cause in women's professional and personal lives, as well as in the technology sector itself.
- SG4: checking possible solutions to mitigate adversities involving gender in work environments focused on computing and technology. In this study, solutions are proposed and recommendations are made to mitigate or eliminate the barriers that hinder women's participation and success in the software industry.
- SG5: organizing the body of knowledge composed of the barriers, effects, and solutions. We aim to establish a conceptual map of the body of knowledge that supports software practitioners in fostering a more inclusive work environment. Additionally, this map will assist researchers in understanding gender dynamics and exploring them in future studies.

## 1.3 Research Contributions

The contributions of this work are related to elucidations on the presence of women in software industry environments.

This study uses qualitative methods, including thematic synthesis, to extract and analyze data from gray literature, which allows for the identification of barriers faced by women in software development environments. This empirical focus is essential for obtaining an in-depth understanding of gender experiences in the technology sector.

The use of gray literature deviates from traditional research environments and lists real and dynamic data due to the great movement of digital platforms, their com-

ments, and article publications on the great World Wide Web. Schöpfel e Farace (2010) confirmed that due to its noncommercial nature, this kind of literature can provide unique and detailed insights that are crucial to a complete and comprehensive understanding of research topics, allowing researchers to access a wide range of materials that complement and enrich their investigations.

More specifically, this study provides:

- A comprehensive list of barriers faced by women in the software industry.
- A comprehensive list of effects felt by women due to facing these barriers.
- A comprehensive list of suggestions to mitigate these barriers.
- A conceptual map encompassing the barriers, effects, and suggestions to support software practitioners in knowing the gender disparities faced by women in software projects.

Ultimately, the research contributes to the body of knowledge in the area of Software Engineering by providing detailed insights into gender dynamics, using an empirical approach that is essential for the systematic and scientific exploration of the issues raised. This work not only expands theoretical understanding of the topic but also offers practical recommendations for the industry, based on real data and soundness analysis. In addition to providing valuable insights to other researchers on conducting studies in this area, highlighting the main aspects found in this area.

## 1.4 Work Structure

The chapters of this study are structured as follows:

- **Chapter 2** presents the background of the study, where the main concepts involved in this research are explained in detail.
- **Chapter 3** explains in detail the research method used in this study, including the steps of the thematic synthesis.
- **Chapter 4** shows the results by answering each research question.
- **Chapter 5** presents the contributions of this work organized into a body of knowledge and discusses threats to validity.
- **Chapter 6** presents the conclusion of this study and mentions future planning to complement this research.

# Chapter 2

# Background

This chapter explores the intersection between gender and computing, highlighting the history of women's contributions to the field, and analyzing how social constructs and gender stereotypes perpetuate inequalities, impacting the representation of women in technology and limiting innovation. This chapter consists of seven sections:

**Section 2.1** Women's History in Computing This section traces the historical trajectory of women in computing, highlighting pioneering figures such as Ada Lovelace and Grace Hopper. It shows how, despite their significant contributions, women have been systematically rendered invisible in the field due to deep-rooted cultural sexism. The text advocates valuing these legacies to inspire future generations.

**Section 2.2** Gender. It addresses the concept of gender as a social construct that goes beyond the male-female dichotomy, recognizing diverse identities. It explores how stereotypes and social pressures negatively impact the inclusion and permanence of women in computing. The section highlights the importance of a more inclusive and equitable environment in the technology sector.

**Section 2.3** Gray literature. It presents grey literature as a valuable source of up-to-date and practical information, including reports, blogs, theses and forum discussions. It defends its use because it allows access to insights and experiences that are not always present in traditional academic publications. It also highlights its rapid dissemination through digital means.

**Section 2.4** Barriers. This section addresses the concept of barriers as structural, social, and cultural obstacles that hinder women's full participation and advancement in the software industry.

**Section 2.5** Thematic synthesis. Explains thematic synthesis as a research method used to gather and interpret data from multiple sources. Details the steps in the process: data extraction, coding, translating codes into themes, and discussion. The section highlights the importance of synthesis in identifying patterns and deepening understanding of social phenomena.

**Section 2.6** Related work. This article presents the main academic studies related to gender barriers in software engineering. The literature review highlights gaps, such as the scarcity of research based on grey literature. The methodologies used, contexts studied and contributions to the understanding of gender inequality in the sector are mentioned.

**Section 2.7** Final remarks. The chapter concludes by recapitulating the central concepts addressed: female participation in computing, the role of gray literature, and the thematic synthesis method. It reinforces the relevance of analyzing everyday experiences to enrich the debate on gender equity in the technology field.

## 2.1 Women's History in Computing

Historically, the field of computing has been overwhelmingly dominated by men. This gender disparity is evident in statistics from Brazil's 2019 Census, which showed that only 13.3% of students enrolled in Computer Science courses were women (Brazilian Institute of Geography and Statistics (IBGE), 2020). These low participation rates are the result of long-standing cultural sexism in science and technology, which has restricted women's access and recognition in these fields.

Analyzed from a feminine perspective, many studies are being prepared to gather evidence that the importance of women in the history of computing has a much greater legacy compared to the value to which it is subjected. Female participation in the history of computing has its initial records around the 19th century, the first prominent woman was the English mathematician Countess of Lovelace, who became known as the first female programmer in history (Marçula e Benini Filho, 2010). Another important woman in the field of computing is the American Grace Hopper, who worked on programming the Mark I series of computers and was one of the creators of COBOL. Representing one of the first voices in the fight for acceptance and respect for women in the field of technology Sister Mary Kenneth was a doctor in Computer Science who already saw the potential of computers as a teaching tool and thus had a fundamental contribution to the programming language Basic. Carol Shaw was the first woman to enter the video game market, Frances Allen was the first woman to win the Turing award, and was responsible for some of the early security systems.

Over the years, women have made history in computing but have always sought recognition and gender equality in professional environments. We are in the 21st century and the list of female achievements in the computational era has continued to grow: Frances Allen has achieved recognition in the area of compiler research, in the creation of algorithms that determined evolution based on studies for the optimization technology used by them, Katie Bouman was responsible for leading a team that generated an algorithm for crossing and correcting data obtained by telescopes essential for building an image of a black hole located 55 million light-years from the Solar System.

These contributions highlight the importance of recognizing and celebrating the achievements of women in computing, not only to correct historical biases but also to inspire future generations. To foster a more inclusive and equitable future in technology, it is imperative to implement policies that address the systemic barriers women face, ensuring equal access, support, and recognition in the field. By promoting digital inclusion and gender equity, we can enrich the computing field with diverse perspectives and ideas, driving innovation and the success of technology companies.

## 2.2 Gender

It is understood as a social construct, traditionally viewed through a binary lens of male and female roles. However, modern perspectives recognize a spectrum of gender identities beyond this binary structure. Gender identity is a deeply personal sense of one's own gender, which may or may not align with social expectations or biological sex (Scott, 1988; Jensen, 2005).

Commonly, the concept of gender was defined based on a social construction attributed to the sex of a human being, as sociocultural determinations that occupy opposite places from an empirical view of society. Scott (1988) reflected on this same duality of extremes to define gender and uses two propositions that go together when he states that gender is an element constructed based on social relations, based on perceived divergences between the sexes, and is an initial way of assigning meaning to relations of dominance and power.

The term "gender" is multifaceted and can have different meanings, depending on the context in which it is used. Gender can refer to socially constructed categories that define roles, behaviors, expectations, and identities associated with the male and female sexes in a given culture. However, in recent years, the concept of gender has expanded beyond the traditional dichotomy, recognizing a wide range of gender identities that may not fit into binary categories. Thus, the definition of this term has been the focus of a process of conceptual reconstruction that goes beyond the traditional understanding of male and female. Gender identities are fluid and performative, challenging preconceived notions of roles and expectations associated with sexes (Jensen, 2005). This fact allows for a diversity of meanings for the conceptual prism that defines the meaningful interpretation of what constitutes gender. Still confirming the evolution of definitions for the concept of gender Machado (2013) states that currently, gender studies indicate that the social construction of gender occurs in an arbitrary way in relation to the differentiation between the sexes, indicating that there is no such thing as "woman" or "man" as universal and fixed categories, which allows for different manifestations of what could properly be gender.

**Female Gender Relations and Computing**

One can observe that gender constructions have historically influenced the underrepresentation of women individuals. Stereotypes and social pressures often dissuade women from pursuing and persisting in technology careers (Margolis e Fisher, 2002). The relationship between the field of study and work in the area of computing and women is a fact that has always sparked analysis and research, as it was necessary to verify the reason for the great difference between male presence and the notorious lack of female representation in computer science courses, science and technology, and in work environments that involve computing.

In the digital age, the intersection of gender and computing plays a fundamental role in shaping society and shaping the future of technology. As noted by Rosalind W. Picard, professor at the Media Lab (Cambridge, Massachusetts Research Institute), computing is too important to be left to men alone (Picard, 1997). This statement confirms a persistent concern regarding the underrepresentation of women in the technology industry.

Historically, computing has been perceived as male-dominated and with gender stereotypes that perpetuate the idea that technological skills are inherently masculine. As a result, women have faced significant barriers to entering and advancing careers in technology, such that many women are discouraged from entering computing because of ingrained labels and existing social pressures. Margolis e Fisher (2002) stated that gender bias in computing represses the potential for innovation and technological progress, by excluding valuable perspectives and diverse talents, when they limit female participation in research and computational work environments.

As society moves toward a broader, more inclusive understanding of gender, it is crucial to recognize the importance of incorporating diverse perspectives and unique experiences in the design and implementation of technologies. The inclusion of divergent gender perspectives in computing is essential in promoting innovation and excellence, causing significant advances in science and technology (Margolis e Fisher, 2002).

In short, the relationship between gender and computing is a dynamic and constantly evolving field that requires a holistic and inclusive approach to promoting gender equity and ensuring that technology benefits everyone in society. Addressing these gender biases is essential to promoting innovation and excellence in technology, as diverse perspectives improve problem-solving and creativity.

## 2.3 Gray Literature

Gray literature refers to a wide range of materials that are not formally published or peer-reviewed, such as reports, theses, conference proceedings, and online articles. These documents are valuable because they often contain timely and detailed

information that may not be available through traditional academic publishing channels (Campello et al., 2000; Dudziak, 2021). It provides a broader scope of knowledge and insights, especially about emerging trends and practical applications. The expression gray literature, which is a literal translation of the English term gray literature, is used to designate these unconventional and semi-published documents, produced in government, academic, commercial, and industrial spheres.

It is important to note that the communication methods available on the World Wide Web, such as blogs, email, chats, mailing lists, and discussion groups, are also considered gray literature and evolve with technological advances over time. This medium is crucial for the dissemination of knowledge because the digital network allows immediate distribution and amplifies the efforts of those who create and share content with a vast online audience (Chartier, 2002). One of the most significant advantages of gray literature is its accessibility and wide dissemination of knowledge on the Internet, as its reach is almost immeasurable. And when making a comparison with the official source, white literature, we identify that the research locations of gray literature are presented as the main differences between these two types of literature.

## 2.4 Barriers

The barriers faced by women in science are historical, social and institutional constructs that hinder their entry, permanence and progression in scientific and professional careers. These barriers are not limited to individual factors or academic performance, but concern systemic structures that perpetuate gender inequalities and that extend to the professional environment of ICTs, manifesting themselves through institutional norms, organizational practices and cultural expectations that perpetuate gender inequalities in the workplace. For Ely and Thomas (2003) and Ryan (2022), barriers are understood as any factors that obstruct or hinder progress, access to resources, communication or equal participation of certain groups in organizational and professional spaces. These authors also reflect that these barriers can manifest themselves explicitly — such as harassment or direct discrimination — or subtly, such as microaggressions, stereotypes and lack of recognition, and have the power to perpetuate unequal structures even in contexts that are intended to be neutral.

International studies reinforce these findings by demonstrating how the scientific environment continues to be structured by gender norms that favor men. For example, Van den Brink and Benschop (2012) show that criteria for scientific excellence are often subjective and operate to reinforce networks of male favoritism, which makes it difficult for female researchers to receive recognition for their work. Furthermore, Ceci and Williams (2011) point out that, although women's access to scientific training has increased, factors such as motherhood, gender stereotypes, and biased assessments still compromise their advancement to higher positions and visibility in their fields of activity.

The specialized literature confirms these findings by pointing out that the organizational culture of the software industry is still largely shaped by masculine norms that exclude or marginalize women. According to Happe and Buhnova (2021), female developers often face burnout due to work overload, microaggressions, and lack of institutional support. The study by Wang and Redmiles (2019) reinforces that unconscious biases are present in hiring and task delegation decisions, resulting in a concentration of women in support roles while more prestigious technical positions are occupied by men. Such practices crystallize a gender hierarchy that makes equity within development teams unfeasible.

In the Brazilian context, in addition to the institutional barriers common in other countries, there are social and economic specificities that aggravate gender inequalities in science. Research such as that by Oliveira et al. (2020) points to the unequal distribution of domestic and care responsibilities as a critical factor that limits the time and productivity of Brazilian female scientists, especially during the COVID-19 pandemic. Such obstacles align with the experiences reported by female software engineering professionals, who identify the overload of functions, lack of recognition, and institutional isolation as factors that discourage continuity in the academic and professional trajectory. The combination of local dynamics and global structures of exclusion makes it urgent to reformulate institutional policies that promote gender equity in science.

Catolino et al. (2019), more diverse teams tend to have fewer occurrences of organizational problems and better quality in development processes, which reinforces that eliminating these barriers is not only a matter of social justice, but also a smart strategy for innovation and professional performance.

Therefore, understanding these barriers empirically — through real experiences shared in the grey literature — allows us to reveal not only the objective dimensions of gender inequality in the software industry, but also its subjective and structural effects. These data provide a solid basis for the formulation of organizational policies and strategies that aim to build more equitable, diverse and sustainable environments for all people in the technology sector.

## 2.5 Thematic Synthesis

Thematic synthesis is a scientific research technique, through which researchers integrate evidence from individual studies and constitute a comprehensive understanding of a specific topic. As it is an intellectual process, it is composed of information from different sources that have been organized, analyzed, and integrated to unite paradigms, trends, and conceptions that are related to a given area. This is a type of approach used in academic studies, scientific works, and literature reviews.

The main objective of the thematic synthesis is to transcend the union of information, causing a comprehensive and relevant understanding of a topic to be researched.

According to the reflection of Papaioannou et al. (2016), thematic synthesis is a powerful tool for gathering and analyzing scattered data, allowing the identification of patterns, gaps, and trends in a specific area of study.

When conducting a thematic synthesis, researchers can explore a variety of sources of information, including empirical studies, systematic reviews, meta-analyses, and other types of publications. Thematic synthesis enables a critical and reflective investigation into a group of different studies, which provides a broad and deep understanding of a given phenomenon or research question, allowing useful conclusions to advance scientific knowledge (Green e Thorogood, 2018). One of the main advantages of thematic synthesis is its ability to find recurring patterns and themes in a body of literature.

However, it is important to recognize that thematic synthesis also presents barriers and limitations, including the heterogeneity of the studies analyzed and the subjectivity in interpreting the results. As highlighted by Thomas e Harden (2008), the transparency of the methods applied and the validity of the thematic synthesis are essential to enable that the results achieved demonstrate the reliability and credibility necessary for scientific research.

Thus, thematic synthesis is a procedure used for the consolidation and dissemination of scientific knowledge that directly contributes to the rise of science and the progress of society (Cooper, 2015), using the following fundamental steps:

- **Data extraction**: The first stage involves an activity to extract material relevant to the study. For example, excerpts of texts, quotations, transcribed speeches, and important information that address the objective of the research. This is a careful and systematic process that selects, organizes, and brings together essential elements for the synthesis (Thomas e Harden, 2008).
- **Coding**: This is the time to identify patterns, themes, and concepts resulting from data extraction, using codes or labels. Braun e Clarke (2006) defined the moment of coding as an inductive and iterative process, which involves identifying the patterns and meanings implicit in the information.
- **Translation of codes into themes**: It makes it possible to identify patterns and significant connections in the data (Nowell et al., 2017). Therefore, the organization and grouping into broader themes maintain the focus on the phenomenon under study, capturing their main aspects.
- **Discussion**: The last stage of the thematic synthesis is the discussion of the identified themes, where researchers explore and interpret the results of existing literature and the research context. This involves reflecting on the implications of the findings, gaps in the literature, and possible directions for future research. Braun e Clarke (2006) emphasized that this final discussion is a crucial part of the thematic synthesis, as it allows researchers to contextualize and make sense of the results achieved.

## 2.6 Related Work

To identify related works that align with the focus of this study, we employed the following search string:

*search string*:

*"software engineering and gender OR software engineering AND gender and gray literature".*

This search string was applied to the titles of papers from three major academic databases: ACM Digital Library, IEEE Xplore, and Google Scholar. Table 2.1 presents the number of papers retrieved from each database. These platforms were chosen due to their prominence and credibility in the academic community, particularly in the fields of research, science, and innovation.

To comprehensively explore the intersection of software engineering (SE), ICT professionals, and the gender challenges faced by women, we utilized the snowballing technique, both backward and forward. This approach resulted in the selection of 37 relevant papers. It is important to note here that in the Google Scholar platform, there was a detail to reach the 42 articles listed in Table 2.1. When applying the *search string* mentioned above, a total of 237 thousand publications were identified and of this amount, 10 pages with 10 publications each had their titles analyzed, thus obtaining a total of 42 papers that matched the thematic proposal of the current study.

Figure 2.1 shows the methodology used for the selection process, detailing each stage and the number of papers obtained at each step. The process began with an automatic search for paper (Stage 1), yielding 150 studies from the three databases: IEEE Explorer (86 articles), ACM (22 articles), and Google Scholar (42 articles). Following this initial search, the papers were screened based on their titles and abstracts (Stage 2), leading to the exclusion of 141 studies that did not meet the established criteria. This left 9 articles for further analysis.

In the quality analysis stage (Stage 3), the remaining 9 papers were thoroughly examined in their entirety to enable relevance and methodological rigor. All 9 papers passed this evaluation and were deemed suitable for inclusion in the study. Finally, the snowballing technique was applied (Stage 4), which involved identifying additional papers based on the references of the already selected studies. This process added 28 new papers, resulting in a total of 37 studies analyzed.

The figure demonstrates a rigorous method of refining and selecting scientific literature, ensuring that only relevant and high-quality publications were included in the study. This structured process reinforces the reliability of the results obtained, ensuring a careful approach in the analysis of barriers, effects, and solutions related to female participation in the software industry.

Additionally, Table 2.2 presents the 37 selected papers, along with their respective references. These studies offer a comprehensive overview of various perspectives and

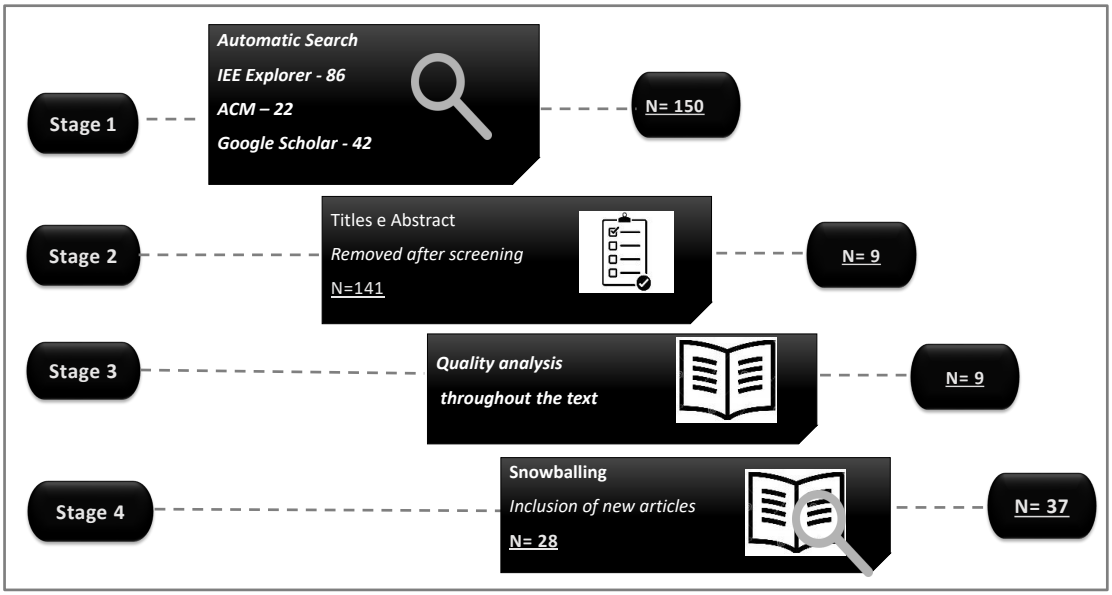


Figure 2.1: Selection process for related works.

Table 2.1: Digital Library

| Library | Link | Amount |
|---|---|---|
| IEEE Xplore | https://ieeexplore.ieee.org/Xplore/home.jsp / | 86 |
| ACM Digital Library | https://dl.acm.org/ | 22 |
| Google Scholar | https://scholar.google.com/ | 42 |

methodologies; however, none of them incorporated gray literature. Despite this limitation, they provide valuable insights into the experiences and barriers faced by women in higher education, as well as the benefits of gender diversity, which are further explored in the following discussion.

The selected literature covers a wide range of topics related to gender issues in software engineering (SE) and the technology sector in general. Several studies focus on the challenges faced by women in entering and maintaining careers in IT. For instance, Clerc e Kels (2013) examines the career trajectories of women in male-dominated industries highlighting systemic barriers. Similarly, Main e Schimpf (2017) provides a comprehensive overview of the systemic barriers that contribute to gender imbalances in computing fields. In the specific context of software engineering, Happe e Buhnova (2021) conducted a systematic mapping to identify the main causes of women's professional burnout, analyzing factors such as access to computers, stereotypes, confidence, sense of belonging, and feeling of being valued. The findings highlight significant barriers that impede gender equity in the industry, reinforcing the need for inclusion strategies.

Other studies explore gender biases in professional settings and their impact on workplace dynamics. Canedo et al. (2023a) investigated men's perceptions of gender inequality in their teams by interviewing 217 software developers. The study revealed that most men do not perceive sexist behavior in the workplace and attribute the lower female participation in the industry to a lack of interest and knowledge in coding. This finding reinforces the results of Wang e Redmiles (2019), which examines how unconscious biases influence hiring decisions and workplace dynamics. Complementarily, Wolff et al. (2020) analyzed the factors that discourage women from pursuing careers in SE, highlighting challenges such as lack of confidence and predominantly male environments.

In the context of collaboration in software engineering teams, Catolino et al. (2019) developed a statistical model to examine the relationship between gender balance and organizational problems. The study suggests that more diverse teams have better organizational quality and fewer structural problems, encouraging further research on the positive impact of diversity on organizational dynamics. Similarly, Dagan et al. (2023) analyzed gender and racial diversity within Google's software engineering teams. The qualitative study revealed that both top-down and bottom-up approaches are effective in building more inclusive environments, and highlighted the importance of developing technical allies to promote equity.

Motherhood is another critical factor in women's careers in software engineering. Rocha et al. (2023b) conducted a survey of 141 women, revealing significant socio-cultural barriers faced by mothers, including difficulties in balancing personal and professional life, bullying, and lack of organizational support. Many participants reported that the absence of a support network before and after maternity leave increased their workload. Suggested solutions include implementing codes of conduct for men and providing daycare centers within companies to foster a more welcoming environment for women balancing careers and motherhood. In another study, Colomo-Palacios e Casado-Lumbreras (2019) investigated how cultural factors affect female participation in the technology sector, finding that Hofstede's masculinity versus femininity dimension strongly predicts female underrepresentation in the field.

Table 2.2: Related work

| **Library** | **Article** | **Author** |
|---|---|---|
| Google Scholar | Gender in software engineering | Carver e Serebrenik (2019) |
| | What Are the Barriers Faced by Women in the Games Industry? | Drummond et al. (2022) |
| ACM | "We want to push the industry via communication"... Designing Communication Measures to Foster Gender Diversity in a Video Game Company. | Ahmadi et al. (2020) |
| | Gender diversity and women in software teams: how do they affect community smells? | Catolino et al. (2019) |
| | National cultures and gender balance in ICT: A preliminary study | Colomo-Palacios e Casado-Lumbreras (2019) |
| | Building and Sustaining Ethnically, Racially, and Gender Diverse Software Engineering Teams: A Study at Google | Dagan et al. (2023) |

Continued on next page

Table 2.2 – Continued from previous page

| Library | Article | Reference |
|---|---|---|
| | Do you see what happens around you? Men's Perceptions of Gender Inequality in Software Engineering | Canedo et al. (2023a) |
| | Breaking one barrier at a time: how women developers cope in a men-dominated industry | Canedo et al. (2021a) |
| IEEE | Women want to learn tech: Lessons from the Czechitas education project. | Buhnova e Prikrylova (2019) |
| | The Underrepresentation of Women in Computing Fields: A Synthesis of Literature Using a Life Course Perspective. | Main e Schimpf (2017) |
| | Frustrations steering women away from software engineering | Happe e Buhnova (2021) |
| | Investigating the Perceived Impact of Maternity on Software Engineering: a Women's Perspective | Rocha et al. (2023b) |
| | Work practices and perceptions from women core developers in OSS communities. | Canedo et al. (2020) |
| | Unveiling women's expectations as ICT professionals: A survey study. | Dias Canedo et al. (2024) |
| | An empirical investigation on the challenges faced by women in the software industry: A case study. | Trinkenreich et al. (2022a) |
| | Implicit gender biases in professional software development: An empirical study. | Wang e Redmiles (2019) |
| | "STILL AROUND": Experiences and Survival Strategies of Veteran Women Software Developers. | Van Breukelen et al. (2023) |
| | Never imagined I would work in the digital game industry. | Lima et al. (2021) |
| | What prevents Finnish women from applying to software engineering roles? A preliminary analysis of survey data. | Wolff et al. (2020) |
| Wiley Online Library | Now I know what ICT can do for me! | Clayton et al. (2012) |
| | Coping with career boundaries in masculine professions: Career politics of female professionals in the ICT and energy supplier industries in Switzerland. | Clerc e Kels (2013) |
| | The advancement and persistence of women in the information technology profession: An extension of Ahuja's gendered theory of IT career stages. | Armstrong et al. (2018) |
| Springer | Gender differences in early free and open source software joining process. | Kuechler et al. (2012) |
| | Owning your career paths: Storytelling to engage women in computer science. | Rubegni et al. (2023) |
| IGI Global | Perceived career success and career advancement of women: Challenges in the Indian IT industry. | Chauhan et al. (2022) |
| | Enablers for the advancement of women into leadership position: a study based on IT/ITES sector in India. | Bhattacharya et al. (2018) |
| SAGE Publications Sage UK: London, England | Speaking in public: What women say about working in the video game industry | de Castell e Skardzius (2019) |
| | Women's Professional Career and Culture: Software Organizations in India | Mishra et al. (2022) |
| | Puncturing the pipeline: Do technology companies alienate women in recruiting sessions? | Wynn e Correll (2018) |
| ArXiv | Navigating the Path of Women in Software Engineering: From Academia to Industry. | Oliveira et al. (2024) |
| | Challenges women in software engineering leadership roles face: A qualitative study. | Kohl e Prikladnicki (2021b) |
| Australian Computer Society | Social outcome expectations and women's intentions to return to IT employment. | Tretiakov et al. (2023) |
| Taylor & Francis | Women in IT management: Significant gains and continuing challenges. | Johnson et al. (2020) |
| | Perceptions of gender roles and attitudes toward work among male and female operatives in the Scottish construction industry. | Agapiou (2002) |
| SBC | Do you think there is no gender inequality in Software Engineering? Perhaps you should reconsider your opinion | Canedo et al. (2024) |

Continued on next page

Table 2.2 – Continued from previous page

| Library | Article | Reference |
|---|---|---|
| CLEI Electronic Journal | Engaging Women in Computer Science-Past, Present and Future. | Medeiros (2019) |
| Elsevier | Enhancing understanding and addressing gender bias in IT/SE job advertisements. | Kanij et al. (2024) |

In addition to identifying challenges, some studies propose strategies to improve gender diversity in technology. Buhnova e Prikrylova (2019) provides insights into educational initiatives aimed at increasing female participation in technology careers. Similarly, Rubegni et al. (2023) explores the impact of storytelling on motivating women to pursue and persist in computing careers. In the video game sector, de Castell e Skardzius (2019) and Lima et al. (2021) investigate the unique barriers and opportunities faced by women in the games industry. These studies align with the systematic review conducted by Drummond et al. (2022), which analyzed 108 articles from the last five years and concluded that gender stereotypes persist, resulting in professional segregation and forcing women to develop coping strategies to remain in the industry.

Finally, Canedo et al. (2021a) investigated the barriers faced by female developers in the software industry through interviews with 17 Brazilian women. The study revealed that, despite efforts to increase diversity, women still face gender bias, isolation, and lack of credibility. More complex technical tasks are often assigned to men, while women are relegated to support roles. In addition, the presence of women in leadership positions remains limited. This aligns with the findings of Canedo et al. (2020), which explored the experience of women in open-source software development and identified similar challenges of discrimination and exclusion.

Thus, the literature analyzed demonstrates that the barriers faced by women in technology range from unconscious biases and exclusion from challenging tasks to lack of organizational support and difficulties in career progression. In addition to identifying these barriers, several studies suggest strategies to mitigate such problems, such as implementing diversity policies, strengthening support networks, and promoting educational initiatives aimed at women. However, challenges still persist, indicating that deeper cultural and structural changes are needed to enable a truly inclusive and equitable environment in software engineering and technology in general.

Conventional research often relies on academic sources and formal publications, but including gray literature significantly broadens the scope and depth of analysis. To our knowledge, no gray literature studies have explored the intersection of gender and software engineering. Thus, by analyzing these works, this research aims to integrate gray literature with gender studies in software projects, capturing contextual and practical information often missed by traditional methods, contributing to ongoing discussions on fostering a more inclusive and equitable technology sector, and with the findings helping to inform future policies and initiatives aimed at improving gender diversity in ICT professions.

The related works that were identified using the methodology mentioned in this chapter provided a second data analysis. In chapter 5 of this dissertation, a comparative analysis is made between the barriers, effects and solutions identified in the papers of the white literature and in the articles of the gray literature. The process of identifying the three elements previously mentioned in the white literature was done by reading the results of each of the articles in the Table 2.2. A survey of barriers, effects and suggestions mentioned by the authors were listed and later compared using a Venn diagram.

## 2.7 Final Remarks

In this chapter, it was possible to understand the main theoretical foundations that support this research, focusing on gender issues in the context of computing. Section 2.1 recalled the historical contribution of women in the area, often neglected by social biases, despite names such as Ada Lovelace and Grace Hopper being important milestones. Then, section 2.2 discussed gender as a dynamic social construct, highlighting how stereotypes and cultural pressures negatively influence the participation of women and dissident identities in technology.

Section 2.3 introduced the concept of gray literature, highlighting its importance in capturing practical and current experiences, especially in professional contexts, such as software engineering. This methodological choice broadens the scope and depth of the data analyzed. Section 2.4 addressed the concept of barriers as systemic, social, and cultural factors that hinder women's advancement and inclusion in professional technology environments. Based on academic studies and empirical evidence from gray literature, this section revealed how such barriers—such as microaggressions, gender stereotypes, and lack of institutional support—materialize in the workplace, compromising equity, well-being, and innovation within the software industry.

Section 2.5 detailed the thematic synthesis as a method adopted in the research, structuring the analysis stages (extraction, coding, translation into themes and discussion) that allow an in-depth reading of the barriers faced by women in the area. Finally, section 2.6 presented related works, showing that, despite theoretical and empirical advances, there is still a gap in the exploration of unconventional sources, such as gray literature, in research on gender inequality in the technology sector.

Thus, this chapter substantiates the relevance and originality of the proposal of this study, providing the concepts and references that support the analysis of the barriers, effects and possible solutions aimed at the inclusion of women in the software engineering environment.

The next chapter presents the research method we applied to achieve the study's goal.

# Chapter 3

# Research Method

This research aims to validate insights derived from the study by conducting an in-depth investigation. Data is collected, coded, and categorized into themes, which are then synthesized using thematic analysis to conduct *exploratory* research. This approach systematically integrates findings from multiple primary studies. *Thematic synthesis* is employed as the primary method to achieve both the main and specific research objectives. This section presents the research questions (RQs) we posed in this work and the data collection and analysis procedures we carried out to answer the RQs.

Using thematic synthesis and exploring gray literature, the study identifies patterns, barriers, and trends related to gender inequality in the computing field. Adopting an inclusive and interdisciplinary approach seeks to broaden scientific understanding and promote equity and diversity. Figure 3.1 shows the methodology used in this study, which consists of a process based on the thematic synthesis technique, which was applied to transform reports and content extracted from online communities into structured knowledge. The process begins with a traditional literature review, which provides the necessary theoretical basis. Next, data are collected from the gray literature and go through four main steps: data extraction, coding, transformation of codes into themes, and discussion of results. These steps feed into the core of the process, the thematic synthesis, which organizes and critically interprets the information. The figure also shows that the gray literature directly dialogues with this core, contributing with narratives and practical experiences that often do not appear in the formal academic literature. In the end, the results of the thematic synthesis allow the construction of a conceptual map and a comparative analysis. The conceptual map organizes the body of knowledge formed by barriers, effects, and solutions identified in the study, while the comparative analysis allows the evaluation of these findings in light of existing scientific studies.

This research has a *basic* nature, due to its purpose of producing significant knowledge for the development of science without a practical application focused on a specific problem. Since this research has a linguistic-semiotic approach that aims

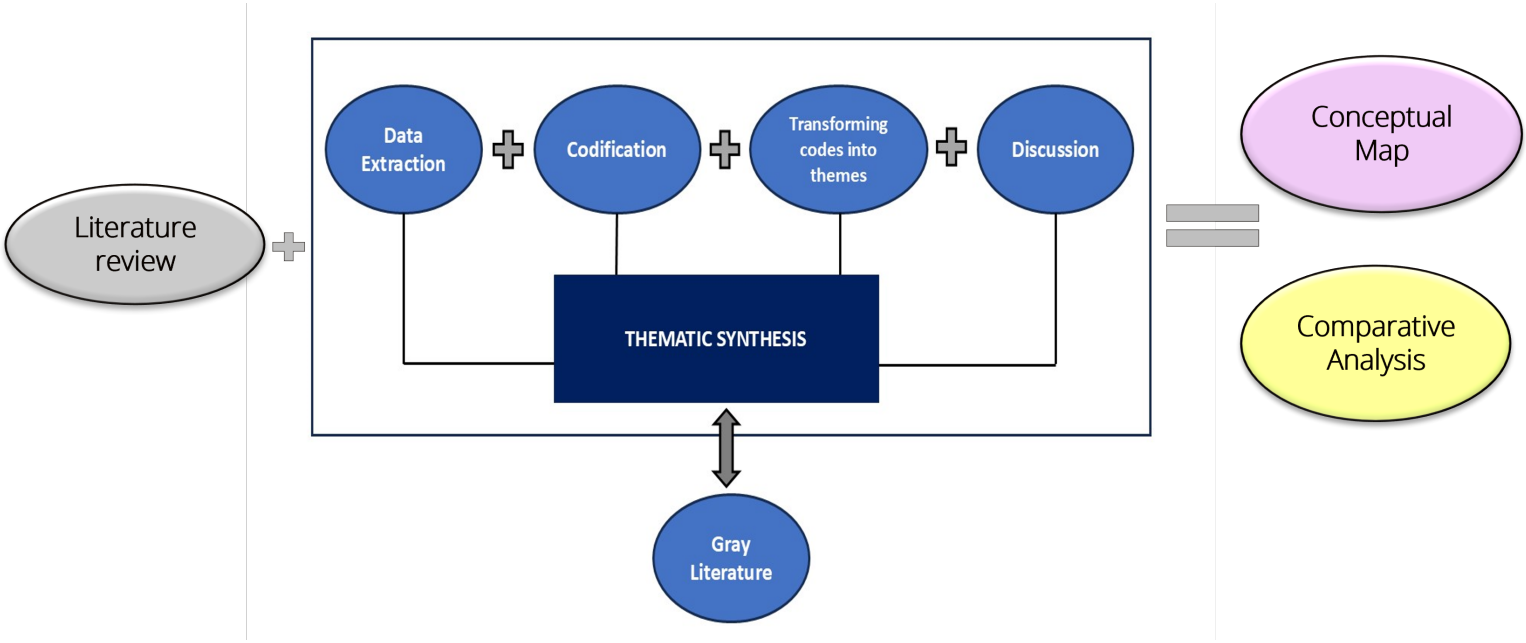


Figure 3.1: Methodological scheme

to study subjective aspects of social phenomena and behaviors, it is classified as *qualitative* Moresi et al. (2003).

This chapter consists of three sections:

**Section 3.1** Research questions. This section presents the four research questions that guide the study: identify the barriers faced by women in the software industry, understand the effects of these barriers, propose solutions for a more inclusive environment, and organize the body of knowledge on the topic. The questions guide the empirical analysis based on gray literature.

**Section 3.2** Thematic synthesis research strategy. Describes the methodology adopted based on thematic synthesis, structured in four stages: data extraction, coding, translation of codes into themes, and discussion. Data collection was performed manually on platforms such as DEV Community and InfoQ, using inclusion/exclusion criteria and open coding, with validation by multiple researchers.

**Section 3.3** Final remarks. This section concludes the chapter by reinforcing the importance of the method adopted to achieve the research objectives. It highlights that the qualitative approach through gray literature allows us to capture real and current experiences of women in technology, providing an in-depth and contextualized analysis of the problem studied.

## 3.1 Research Questions

Our goal is to *identify and analyze the barriers faced by women in the professional technology sector, based on everyday descriptions found in gray literature.* We refine this goal into the following RQs:

- **RQ1: What are the barriers women face in the software industry?** This question aims to identify the barriers women face when working on a software project. Knowing these barriers can help the software industry improve its working environment, making it more equal and open to women.
- **RQ2: What effects do barriers have on women in the software industry?** In this question, we seek to better understand barriers by revealing how women feel when they face them.
- **RQ3: How to build a more inclusive environment for female ICT professionals?** This question aims to identify possible solutions suggested by women so that the software industry is more accessible to them.
- **RQ4: How to organize the body of knowledge made up of barriers, effects, and solutions to support the reduction of gender disparities?** This question aims to investigate how the set of barriers, effects, and solutions can be organized to support software practitioners in knowing the gender disparities faced by women in software projects.

## 3.2 Thematic Synthesis Research Strategy

The research is based on the thematic synthesis method to find data in gray literature and unite thematic labels from articles, testimonials, and excerpts of texts that present gender issues faced by women in project and software engineering environments. It is a methodological approach used to integrate evidence from multiple studies to form a comprehensive understanding of a specific subject (Papaioannou et al., 2016; Green e Thorogood, 2018).

This process includes four fundamental steps (Cooper, 2015): i) Data extraction, collecting relevant data from various sources; ii) Coding, identifying and labeling key concepts and themes in the data; iii) Translating Codes into Themes, grouping related codes into overarching themes; and iv) Synthesizing Results, analyzing and discussing themes about existing literature. The following subsections explain each one of these steps.

### 3.2.1 Data extraction

To collect data, we used gray literature data sources. Table 3.1 presents the data source name and its link.

Table 3.1: Thematic Synthesis - Database

| Library | Link |
|---|---|
| Dev Community | https://dev.to/ |
| InfoQ | https://www.infoq.com/ |

We chose these data sources because, in addition to being collaborative editing platforms, they allow users to present their narratives anonymously and spontaneously. This likely results in articles and testimonials that are authentic. The presence of a large number of publications in English was a notable characteristic of choosing these databases.

On the *InfoQ* website, in addition to written publications, it is possible to have access to podcasts, maintaining the characteristics that are present in gray literature. Therefore, all podcasts with thematic characteristics of this study were translated into texts and will be analyzed, as well as the literary articles.

The *DEV Community* has a vast set of articles that deal with purely social aspects of software development (Papoutsoglou et al., 2021). It stands out for its inclusive and welcoming culture, where developers from different backgrounds and skill levels are encouraged to participate.

The search included data from a maximum of 10 years of publication. Data identification and collection took place from the end of October 2023. To retrieve the data, a manual search was performed using the following string that considered common terms used in studies on women in software projects (Canedo et al. (2023a), Rocha et al. (2023a)):

***Search string*:**

[Title:(Woman) **OR** Title:(Female) **OR** Title:(Mother) **OR** Title:(Gender) **OR** Title:(Dougther) **OR** Title:(Son) **OR** Title:(Maternity) **OR** Title:(Baby) **OR** Title:(Children)]

This string was designed to cover terms related to gender and female experience in the professional field of software engineering to recover relevant gray literature documents on Dev Community and Infoq platforms. It is important to mention here that female gender issues are related to some factors, one of which is age, but this was not detected with the words in the string used. The strategy of seeking exclusively in the "title" field has the advantage of focusing on texts whose main theme is directly related to women's experiences in the software industry. This increases the chance of finding relevant and explicit focus content in gender and female professionals, central topics for the analysis proposed in the dissertation.

Figure 3.2 represents the data extraction process conducted in the search and described in Chapter 3 of this dissertation. This process occurred as follows: In all,

they were found from the search *string* used, 1,085 publications divided between opinion articles, testimonials, excerpts of texts, comments, and podcasts, which were extracted from two gray literature platforms: Dev Community and Infoq.

A significant amount of search results were not relevant to the research topic. For better framing and filtering, the following inclusion (IC) and exclusion (EC) criteria were created to apply to this selection:

- IC1. Articles that discuss female barriers in the software development process.
- IC2. Publications made up to a maximum of 10 years
- IC3. Personal reports and professional experiences related to female gender.
- EC1. Unpaid articles in English.
- EC2. Duplicate articles.
- EC3. Publications with purely technical focus without mention of social or diversity aspects.
- EC4. Texts that treat gender only in a generic way, without linking the context of software engineering.

From the Dev Community, the author of this dissertation document found and revised 85 publications, and, after the application of the inclusion and exclusion criteria, 44 were considered relevant, all in the form of articles. In Infoq, 1,000 records were initially found, of which 18 were selected, including eleven articles, nine podcasts (transcribed), and nine interviews. This significant reduction in the amount of InfoQ platform records is justified by the application of the inclusion and exclusion criteria and the reading of the initial titles and sections of each of the 1,000 studies described above. The co-worker of this research revised these results independently, and there were no necessary adjustments, thus maintaining the same amount of articles as the initial proposition.

The combination of valid publications of the two tested platforms resulted in a total of 62 documents. A third researcher, the advisor of this study checked the data from the Platforms Dev and Infoq; And, not finding discrepancies, the subsequent coding steps, translation of codes into themes, and discussion of the results were conducted.

This image mentioned above visually synthesizes this flow, highlighting the amount of data in each step and the categorization of the sources used.

### 3.2.2 Coding

We used open coding (Hoda, 2021), conducted manually, without the aid of automated tools. To ensure consistency, we first conducted a pilot analysis, randomly selecting three articles to calibrate our approach. The author of this dissertation, Alêssa Soares de Oliveira Andrade, and the co-advisor, Emmanuel Sávio Silva Freire,

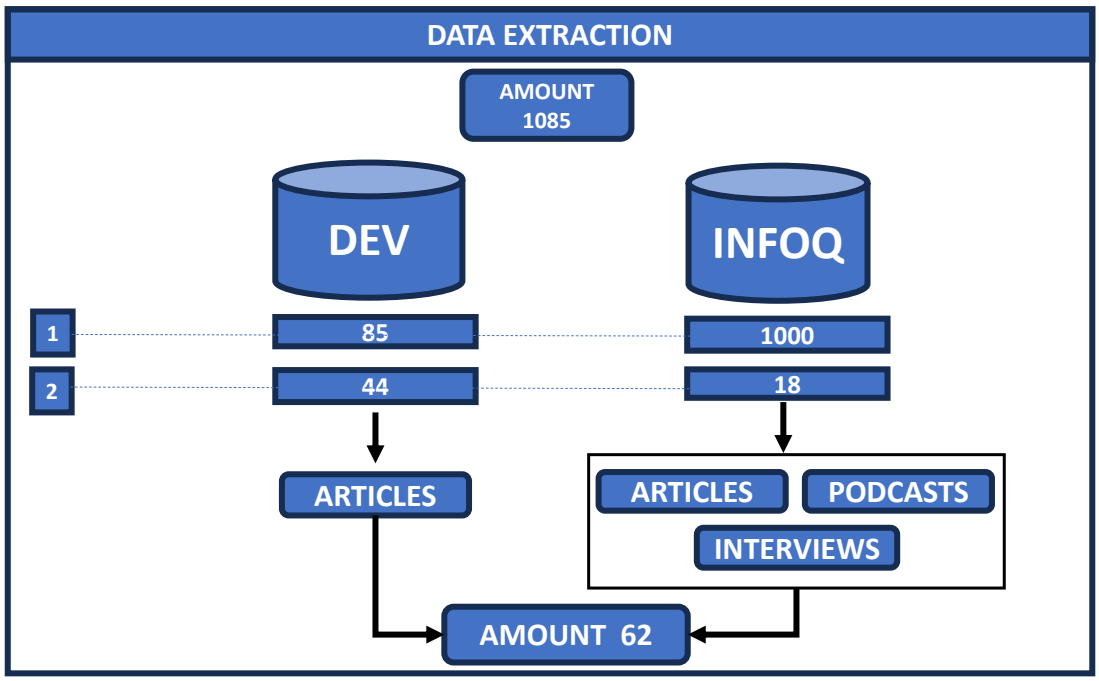


Figure 3.2: Data Extraction
[1] = Articles: found from search *strings* and *queries*, [2]Application of inclusion and exclusion criteria.

analyzed these articles independently and then met to discuss their findings. The extracted data were organized into a spreadsheet structured around three key questions: *"What are the barriers?"*, *"What are the effects?"* and *"What are the possible solutions?"*.

The aforementioned pairs then separately identified **recorded units**, which are text segments that answer the questions (Papaioannou et al., 2016; Green e Thorogood, 2018). The two researchers cited above also read all the articles independently and collected recorded units for each question. The researchers held a meeting to compare their results and reached a consensus, resulting in three subsets of recorded units, each related to a specific question.

Finally, the researchers carried out a **coding process** to identify the main idea in a recorded unit (Seaman, 1999; Strauss e Corbin, 1998). The same pair standardized the codes by searching for those with the same meaning. For example, the codes "male dominance", "most are men", and "few women in the area" in "male dominance". In the last stage of this joint coding of all registered units, the third researcher and advisor of this dissertation, Larissa Rocha Soares Bastos, reviewed the extracted codes. In the end, we obtained unified codes and their frequency of occurrence in each subset.

Figure 3.3 shows the thematic synthesis analysis performed, indicating how the extracted codes relate to each RQ. For example, RQ1 aims to verify possible barriers

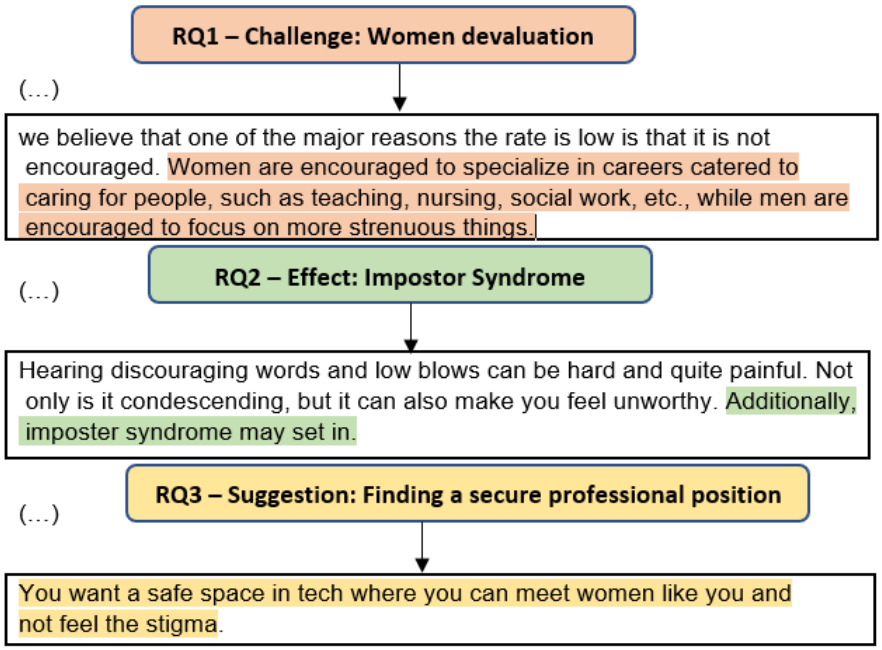


Figure 3.3: Example of an article analysis

that affect female access to the software work environment. The figure 3.3 shows an excerpt taken from (A1) that says the following: "*Women are encouraged to specialize in careers focused on caring for people, such as teaching, nursing, social work, etc., while men are encouraged to focus on more arduous things.*" In this case, the barrier identified in this excerpt was identified as *"Stereotype"*, as it brings a predetermined image that only men can perform more demanding roles.

### 3.2.3 Translation of codes into themes

Within the process of translating codes into themes in the thematic synthesis, Hoda (2021) clarifies that the use of Grounded Theory focuses on the application of this paradigm to understand socio-technical aspects in the field of software engineering. In this way, researchers identify significant patterns in the data collected, helping to formulate empirically based theories about the phenomena studied. Using the (Strauss et al., 1990) axial coding process, in which codes are then grouped and related to each other to identify broader connections, we can perform the initial categorization of codes into themes or sub-themes. In this study, we carry out this organization, classifying the units of analysis into themes that address similar aspects of the barriers, effects, and suggestions that involve women's presence in technology work sectors.

The standardization of codes into themes was done according to the example of Figure 3.4, which highlights the following example: "imposter syndrome," "shaken mental health," "anger," and "sadness" among other codes with the same meaning in

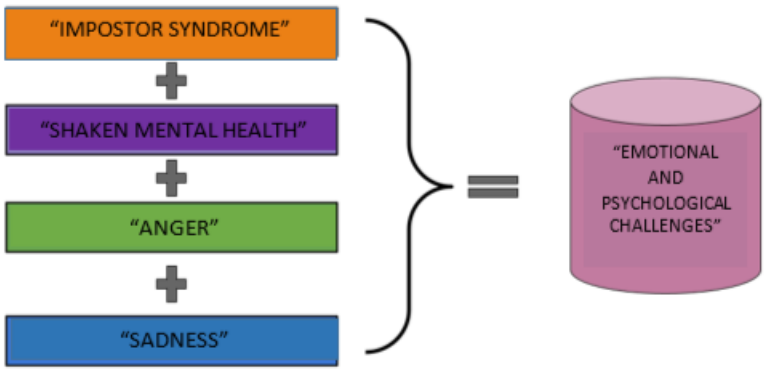


Figure 3.4: Example of translation of codes into themes

a theme defined as "Emotional and psychological barriers." One researcher clustered the themes, and another one reviewed each of the themes that were defined. Finally, themes and the number of codes that filled each of them were generated in this stage of the thematic synthesis.

### 3.2.4 Discussion

At this stage, we conducted a thematic synthesis, where researchers explored and interpreted the emerging themes from the collected data. This critical phase facilitated the integration of results into a coherent narrative, offering a deeper and more contextualized understanding of the studied phenomenon (Clarke e Braun, 2013).

Through this discussion, we not only described the identified themes but also examined their connections, variations, and exceptions, linking them to the existing theoretical framework and the initial research questions. Beyond validating the findings, this synthesis enabled a critical reflection on the theoretical and practical implications of the results, contributing to the advancement of knowledge in the field.

## 3.3 Final Remarks

This chapter presented the research method adopted to achieve the study's objectives, focusing on identifying and analyzing the barriers faced by women in the software industry. Initially, four research questions (RQs) were defined to guide the investigation: identify existing barriers, understand the effects caused by these barriers, raise suggestions to promote more inclusive environments, and organize the body of knowledge in a structured way.

To answer these questions, the thematic synthesis methodology was adopted, a qualitative approach that allows the integration and interpretation of data from different sources. The process was divided into four fundamental steps: data extraction, carried out manually from gray literature sources such as DEV Community and InfoQ; open coding, in which text segments were classified into meaningful units; translation of the codes into themes, through categorization and grouping of patterns; and, finally, the discussion of the themes, connecting them to the theoretical framework and the research questions.

The application of this method made it possible to construct a robust analysis that was sensitive to the social nuances present in the collected reports, offering a detailed overview of the challenges faced by women in the technology sector. The choice of grey literature, combined with the validation of data by multiple researchers, gave greater richness and authenticity to the results. Thus, the chapter establishes a solid basis for the presentation of the findings, discussed in the following chapter.

The next chapter presents the results obtained from the analysis of articles from DEV Community and InfoQ.

# Chapter 4

# Results from the analysis of the data collected

This chapter presents the results we obtained from the analysis of data collected from the DEV Community and InfoQ digital platforms. Initially, we found 1085 articles using the search string presented in Chapter 3. The author of this qualification document read all the articles and identified those that fit the acceptance criteria, resulting in 62 articles. Two experienced researchers reviewed the set of articles and the results obtained by the author of this qualification document. Since the results did not differ, we selected a set of 62 articles suitable for analysis.

This chapter consists of four sections:

**Section 4.1** Demographics data. It presents information on the 62 articles selected for analysis, published between 2014 and 2023 on the DEV Community and InfoQ platforms. Most of the publications are concentrated in the years 2019 and 2020, reflecting a recent increase in the debate on gender in technology.

**Section 4.2** RQ1: What are women's barriers in the software industry? Identifies several barriers faced by women in the software industry, such as gender stereotypes, exclusion, male domination, lack of recognition and toxic environments. These barriers make it difficult for women to enter, remain in and advance professionally in the sector.

**Section 4.3** RQ2: What effects do barriers have on women in the software industry? It highlights the emotional, psychological and professional effects caused by barriers, such as impostor syndrome, emotional exhaustion, low self-esteem, forced adoption of masculine behaviors and feelings of invisibility, directly affecting women's health and development.

**Section 4.4** RQ3: How to build a more inclusive environment for ICT professionals? It presents suggestions for making work environments more inclusive, such as promoting mentoring, developing recognition policies, encouraging women's self-

Table 4.1: Selected articles

| Title | ID |
|---|---|
| Programming as a Woman in Tech | A1 |
| What I wish, as a woman in tech, I knew early on? | A2 |
| Reflections on my career as a woman in tech. | A3 |
| Because You Are a Woman. | A4 |
| The Typecast Tango: Avoiding the Frontend Label as a Woman In Tech. | A5 |
| The incredible weight of being a trans woman in tech. | A6 |
| Sometimes I Feel Like I'm Invisible - Experiences of a Woman in Tech. | A7 |
| I am a Woman in Tech. | A8 |
| Being a Woman in Tech: My Journey. | A9 |
| Yes, I am a developer, and yes, I am a woman. | A10 |
| Be a yes-woman. | A11 |
| What it Means to be a Woman in Tech in 2019. | A12 |
| Nevertheless, It Still Sucks To Be A Woman In Tech. | A13 |
| So...this is what it's like being a woman in tech? | A14 |
| The first French computer science thesis author was... a woman, Marion Créhange(but nobody knows) | A15 |
| Developer world as a woman. | A16 |
| HerCode: Tips for negotiating compensation as a woman in tech. | A17 |
| Boosting Woman Participation in Open Source Projects: A Beginner's Guide to Contributing. | A18 |
| Career in Tech: Why Bother If You're Female? | A19 |
| On the role of female coders in software development. | A20 |
| How is it to be a female programmer in the tech world? | A21 |
| Could your recruitment process be discouraging female developers? | A22 |
| Persisting Past Dissonance: Adapting to the Identity of a Female Developer. | A23 |
| 4 annoyances of being a female developer (and how to help to make it better) | A24 |
| What it's like to be a technical female founder of a mobile app. | A25 |
| Taking the perspective of a female dev. | A26 |
| Why Are There So Few Female Software Developers? | A27 |
| Being a Female Programmer: How is it For You? | A28 |
| Why are there fewer female developers? | A29 |
| Why do we have more male applicants than female ones? | A30 |
| What must we do to encourage more female coders? | A31 |
| The Future (of AI) is Female: How Hiring Bias Mitigation in NLP Can Be Great for Women Now and in the Future. | A32 |
| 5 Things I've Learned as a Female Developer | A33 |
| Becoming a female software engineer (who studied Geography) | A34 |
| To The Young Female Software Engineer With Her First Job Offer | A35 |
| Things a female dev who has been in the industry for 16 years has to say | A36 |
| 6 tips: Finding your balance as a mother and software engineer | A37 |
| Promoting Gender Equity and Inclusion in the Tech Industry and Beyond | A38 |
| How Age, Race, and Gender Affect Software Engineering Pay | A39 |
| Gender Equality in Tech: Breaking Barriers and Building a Better Future | A40 |
| I am proud to be a transgender IT developer | A41 |
| Transgender Tech | A42 |
| Normalizing Maternity in Tech | A43 |
| Women in tech: Being a developer and a mom | A44 |
| Creating Tight Cohesive Tech Teams for Women to Thrive | A45 |
| Tackling the Lack of Women in Technology | A46 |
| Box, Facebook, and Pinterest Announced WEST Program for Women | A47 |
| ThoughtWorks Recognized as Most Women-Friendly Tech Company | A48 |
| QConSF: Is Managing Men and Women Really That Different? | A49 |
| Addressing Gender Imbalance in Software Engineering Through | A50 |
| Addressing Gender Imbalance in Software Engineering Through | A51 |
| Q and A on the Book Good Guys | A52 |
| The Future of Work Is Female | A53 |
| The Journey from Underrepresented IC to CTO: How Open Source Helped | A54 |
| I'd Hire More Women If They Would Apply! | A55 |
| Is Managing Men and Women Really That Different? | A56 |
| Women in AI and Blockchain | A57 |
| The Evolution of Engineering Culture: Oh, the Places We've Been | A58 |
| Women in Agile and the Confidence Code | A59 |
| Debunking the Steve Rule | A60 |
| Woman in Agile | A61 |
| Diversity and Inclusion in Tech: A Panel Discussion | A62 |

esteem, investing in support networks and combating biases and threats in everyday professional life.

**Section 4.5** RQ4: How to organize the body of knowledge made up of barriers, effects, and solutions to support the reduction of gender disparities? It proposes the creation of a conceptual map that integrates barriers, effects and solutions, facilitating the understanding of gender dynamics in the software industry. This resource can help professionals and researchers identify critical points and propose effective inclusion actions.

## 4.1 Demographics data

Table 4.1 presents the 62 articles used in the analysis, along with a unique identifier, formed by "A" and a sequential number. These articles were also published in Zenodo (de Oliveira Andradade, 2025) for the purpose of disseminating the analysis data. The publications of these articles occurred between June 2014 and the second half of 2023. The highest publication frequency was in 2019 and 2020, with thirteen articles per year, while the lowest was in 2014, with only one article. In 2015 and 2017, 2 articles were published each year, in 2016 and 2022 only 3, while in the years 2018, 2021, and 2023: five, six, and seven articles were found on the researched topic.

The authors of these articles were predominantly women from diverse locations, engaged in various roles within the software industry. Table B (Appendix B) provides a comprehensive overview of their demographic data, covering gender distribution, professional roles, geographic locations, and the timeline of their engagement on the digital platforms used in this study. Based on these characteristics, we observed the following key findings:

- **Gender Distribution:** In the chart of the Figure 4.1 we note that most articles were authored by women (42), although a smaller part was written by men (11), and some articles were published anonymously, being identified as: companies, groups of writers, or unidentified (9). It is important to highlight here that among the 42 authors one of them was identified as transsexual.
- **Professional Roles:** The dataset exhibits a broad range of professional functions, including front-end and full-stack developers, Android specialists, software engineers, technical leaders, information security specialists, and consultants. This diversity not only enriches the analysis but also highlights the varied perspectives and experiences that shape discussions and advancements in the field. Characteristics identified in the graph of the figure 4.2
- **Geographic Distribution:** In the chart of Figure 4.3 it is noted that the authors are based in multiple regions worldwide, including major technology hubs such as San Francisco, Seattle, Berlin, Helsinki, Paris, and Brazil. This international scope underscores the global nature of the articles analyzed and enables a more comprehensive examination of how knowledge dissemination

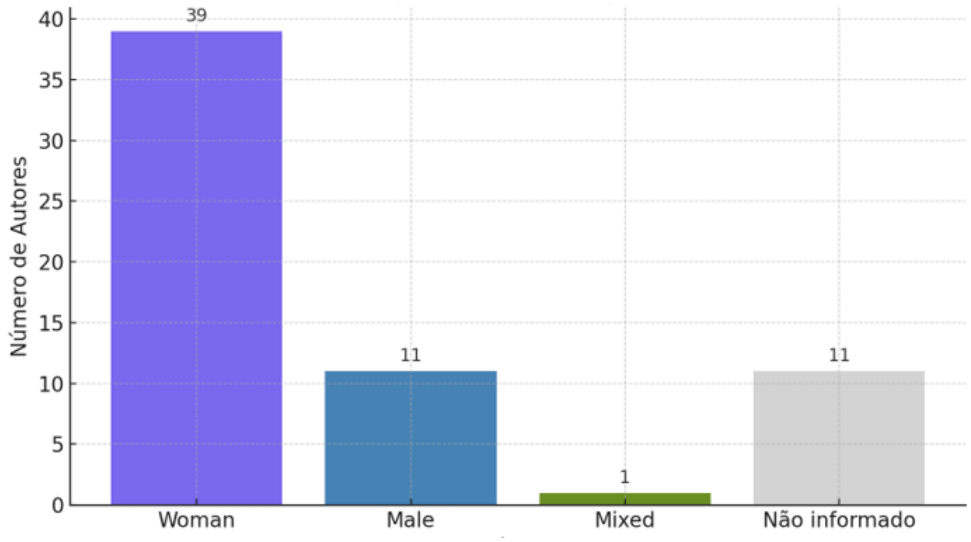


Figure 4.1: Number of authors identified by gender;

and technological practices vary across different cultural and economic contexts.

- **Platform Registration Timeline:** The "Year of Registration" field indicates the period in which authors joined the respective online platforms, ranging from early adopters in 2009 to more recent registrations in 2023. This temporal variation provides insights into trends related to professional entry and career consolidation in the technology sector, facilitating longitudinal analyses of evolving practices and professional profiles. As shown in the chart of the Figure 4.4

In summary, the demographic data presented in Table B offer valuable insights into the context in which these articles were produced. They provide a deeper understanding of gender diversity, the multiplicity of professional backgrounds, and the global reach of the authors. Such information is crucial for supporting subsequent analyses in this dissertation, enabling a critical reflection on the trends and dynamics shaping the contemporary technology sector.

## 4.2 RQ1: What are women's barriers in the software industry?

We identified 22 barriers that women face in the software industry. These barriers were organized into five categories: *Male-Dominated Culture, Stereotypes and Biases, Systemic Gender Inequality, Career Advancement Challenges, and Work-Life Balance Challenges*. Table 4.2 presents these categories, their respective barriers, and the number of occurrences. And Figure 4.5 shows the barriers organized in a word cloud, according to the number of occurrences in the code identification stage

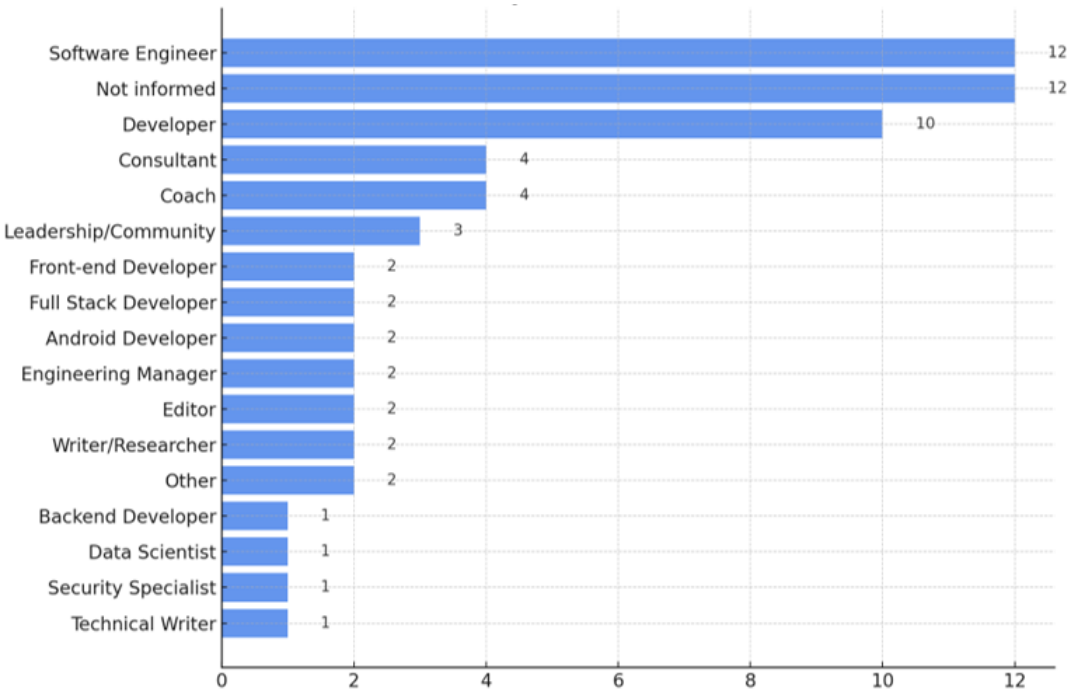


Figure 4.2: Number of authors identified by professional;

of the thematic synthesis. The greater the number of occurrences, the darker the tones of the colors of the words and the larger the font sizes.

**Male-Dominated Culture** is a category associated with the barrier that highlights the predominance of men in the software industry. Only the *"Male-Dominated Culture"* code, with the highest number of occurrences (34), was associated with this category. In this context, *"Male-Dominated Culture"* refers to the gender disparity where men significantly outnumber women in the software industry, as illustrated in (A2): "`As the overwhelming majority of my colleagues were men, acting as if I were just 'one of the guys' work in my favor.`"

**Stereotypes and Biases** is a category that encompasses three barriers: *gender stereotypes, microaggressions, and toxic workplace behavior*. These barriers reflect the challenges women face in the workplace due to societal and cultural biases. The *"gender stereotypes"* barrier highlights the labels often imposed on women, as seen in (A13): "`If I had a penny for every time someone assumed I was a web designer.`" *"Microaggressions"* reveal the hostile work environment and its impact on women, as described in (A23): "`If it were so egalitarian, we would have more women and diverse people in management positions, more women would not only enter technology but stay--you can see that due to the hostile work environment, women leave technology within 5 years.`" The "*toxic workplace behavior"* barrier reflects harmful expressions of masculinity in the workplace, as noted in (A6): "`Before making the transition, I was immersed in the toxic masculinity that characterizes the technology industry.`"

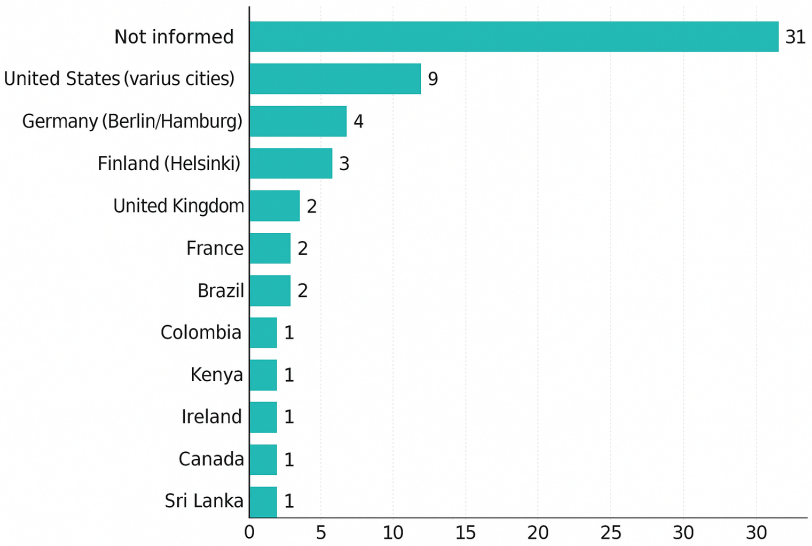


Figure 4.3: Number of authors identified by location;

Table 4.2: Barriers faced by women in the software industry.

| **Category** | **Barriers** | # |
|---|---|---|
| Male-Dominated Culture | Male-Dominated Culture | 34 |
| Stereotypes and Biases | Gender Stereotypes | 24 |
| | Microaggressions | 6 |
| | Toxic Workplace Behavior | 1 |
| Systemic Gender Inequality | Sexism | 15 |
| | Underestimation of Abilities | 14 |
| | Prejudice | 12 |
| | Lack of Recognition | 11 |
| | Devaluation of Women | 10 |
| | Exclusion from Decision-Making | 10 |
| | Gender Disparity | 7 |
| | Salary Gap | 6 |
| | Machismo in Workplace Culture | 3 |
| | Lack of Representation | 2 |
| | Blame Attribution | 1 |
| Career Advancement Challenges | Impostor Syndrome | 9 |
| | Difficulty in Career Progression | 5 |
| | Lack of Professional Support Network | 4 |
| | Ageism | 3 |
| | Perceived Complexity of the Field | 1 |
| Work-Life Balance Challenges | Parental Responsibilities | 5 |
| | Lack of Family Support | 2 |

The third category, **Systemic Gender Inequality**, encompasses eleven barriers that reflect the systemic biases and discrimination women face in the ICT sector. The most frequently cited barriers include: *"Prejudice," "Underestimation of*

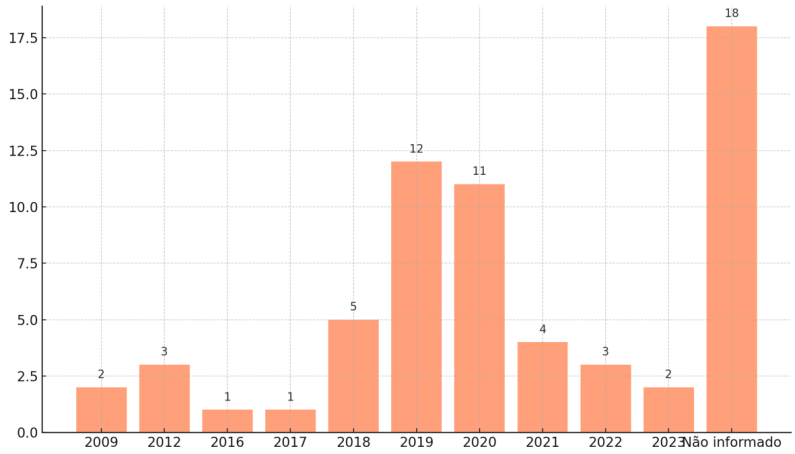


Figure 4.4: Number of authors identified per year of registration on the platform;

*Abilities," "Lack of Recognition," "Sexism," "Exclusion from Decision-Making," and "Salary Gap."* For example, *"Prejudice"* refers to preconceived and unfounded negative opinions about women, as highlighted in (A40): "`Hiring practices can also be a barrier to gender equality in technology. Unconscious bias can lead to men being hired over women, perpetuating a lack of diversity in the industry.`" *"Underestimation of Abilities"* reflects the tendency to undervalue women's skills and competencies, as seen in (A24): "`Why is it so hard to believe that I might know what I'm talking about? This need for proof also happens a lot on social media. I'm quite active on Instagram and my friends are constantly asked if we ever play the games we talk about and take photos of.`"

*"Lack of Recognition"* highlights the failure to acknowledge women's contributions and expertise, as noted in (A5): "`The leader insists that I should change my role as a software developer to a technical writing role because I was able to put two coherent sentences together.`" *"Sexism"* refers to discriminatory attitudes based on gender, as illustrated in (A4): "`He told me that I got my job as a software engineering intern because I am a woman, and that my colleague (who attended the same boot camp as me) got the job because he's smart.`" *"Exclusion from Decision-Making"* describes the marginalization of women from critical discussions and decisions, as stated in (A14): "`I don't receive calls for development meetings and I have to make an effort to follow what was discussed so that I don't appear incompetent when questioned.`"

Finally, *"Salary Gap"* highlights the disparity in pay between men and women performing the same roles, as evidenced in (A40): "`Pay and promotion can be significant obstacles to gender equality in technology, with women often paid less than men for doing the same work and having fewer opportunities for progress and promotion.`" The less frequently mentioned

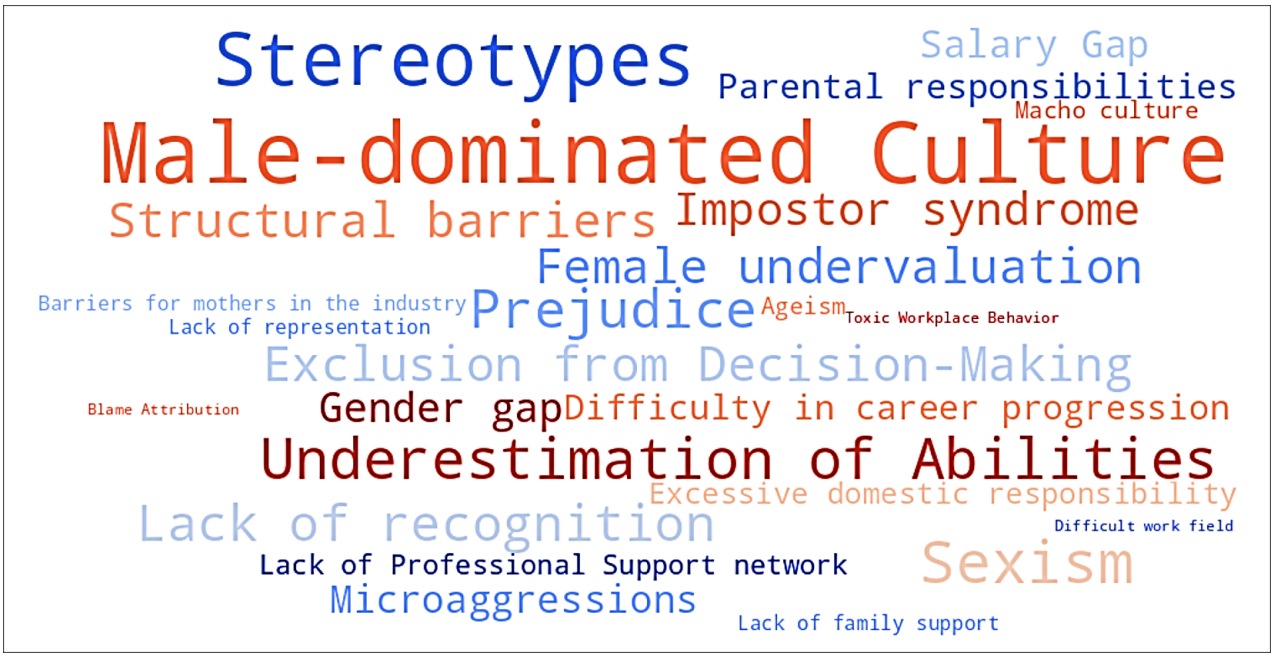


Figure 4.5: Word cloud containing barriers according to the quantity identified in code extraction.

barriers include *"Devaluation of Women", "Gender Disparity", "Machismo in Workplace Culture", "Lack of Representation", and "Blame Attribution,"* each with fewer than six mentions.

**Career Advancement Challenges** is a category that includes five barriers hindering women's professional growth: *"Difficulty in Career Progression", "Impostor Syndrome", "Lack of Professional Support Network", "Ageism", "and Perceived Complexity of the Field."* The most prominent barrier, *"Impostor Syndrome,"* reflects the lack of confidence women often feel in their professional roles, as described in (A12): "`A common challenge faced--which resonates not only among women developers but also among many developers who are just starting--is the dreaded imposter syndrome, when you feel like you don't deserve your role and have a general lack of confidence.`" *"Difficulty in Career Progression"* highlights the challenges women face in advancing their careers, as noted in (A40): "`Remuneration and promotion can be significant obstacles to gender equality in technology, with women often paid less than men for doing the same work and having fewer opportunities for progression and promotion.`" The less frequently cited barriers include *"Lack of Professional Support Network," "Ageism," and Perceived Complexity of the Field."*

Lastly, the **Work-Life Balance Challenges** category includes two barriers: *"Parental Responsibilities" and "Lack of Family Support."* These barriers reflect the challenges women face in balancing their professional and personal lives. *"Parental*

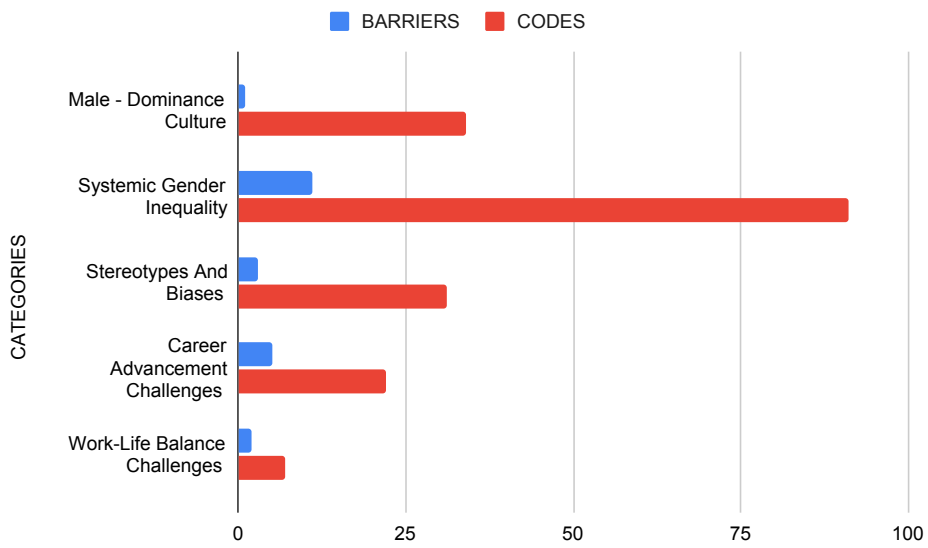


Figure 4.6: Frequency of barriers and codes.

*Responsibilities"* refers to the disproportionate burden of childcare and household duties often placed on women, as highlighted in (A44): "`I'm sure some people reading this will argue with me, but in my experience with all the mothers I know: we take on more parental responsibilities than fathers.`" *"Lack of Family Support"* describes the absence of emotional, practical, or financial support from family members, as noted in (A31): "`I can't speak for other programmers, but for myself, I don't receive much or any support from my family for being in the field of technology. My family particularly likes to downplay the achievements I've accomplished as a developer, as many of these achievements are unpaid and, in their eyes, don't count, other than saying negative things to make me give up.`"

Figure 4.6 shows the frequency of codes within each category. It is evident that *Systemic Gender Inequality* is the most prevalent category, reflecting the significant challenges women face in the ICT sector. Additionally, *Male-Dominated Culture, Stereotypes and Biases, and Career Advancement Challenges* also have a substantial impact on women's experiences in the software industry. In contrast, *Work-Life Balance Challenges* appears less frequently, suggesting that family-related issues, while present, are not the primary barrier for women in this field.

Table 4.3: Effects caused by barriers faced by women in the software industry

| **Category** | **Effect** | # |
|---|---|---|
| Emotional and Psychological Barriers | Impostor Syndrome | 14 |
| | Emotional exhaustion | 5 |
| | Pain | 3 |
| | Shaken mental health | 2 |
| | Fear of the absence of a support network | 2 |
| | Sadness | 1 |
| | Fear of becoming outdated | 1 |
| | Difficulty seeing yourself as a developer | 1 |
| | Anger | 1 |
| Behavior change | Personality change | 3 |
| | Replication of the male posture to be accepted | 2 |
| | Abandonment | 1 |
| | Defensive posture | 1 |
| Prejudice and devaluation | Prejudice | 11 |
| | Misogyny | 2 |
| | Being misunderstood | 2 |
| | Invisibility | 2 |
| | Being ridiculed | 1 |
| Representation and inclusion | Lack of female representation | 6 |
| Overcoming and positive change | Overcoming | 4 |
| | Acceptance | 2 |
| | Change in the perspective of the environment / the presence of women is always noticed | 3 |
| Experience of exclusion and abuse | Inhibits women from entering the area | 7 |
| | Abuse | 3 |

## 4.3 RQ2: What effects do barriers have on women in the software industry?

In total, we identified 24 effects resulting from the barriers mentioned in Section 4.2. The Table 4.3 presents these effects along with their number of occurrences and the categories in which these effects were organized. And the figure 4.7 presents a word cloud that visually organizes the effects faced by women in the software industry, as identified in the thematic synthesis coding stage; the words that represent the most recurring effects appear with larger font sizes and in darker tones, indicating a higher frequency of occurrence in the analyzed reports.

**Emotional and Psychological Barriers** is has nine effects that deal with the emotional and psychological adversities faced by software engineers. *"Imposter Syndrome"* is the most cited effect and was reported in the article (A1) as follows: "`Hearing discouraging words and low blows can be difficult and quite`

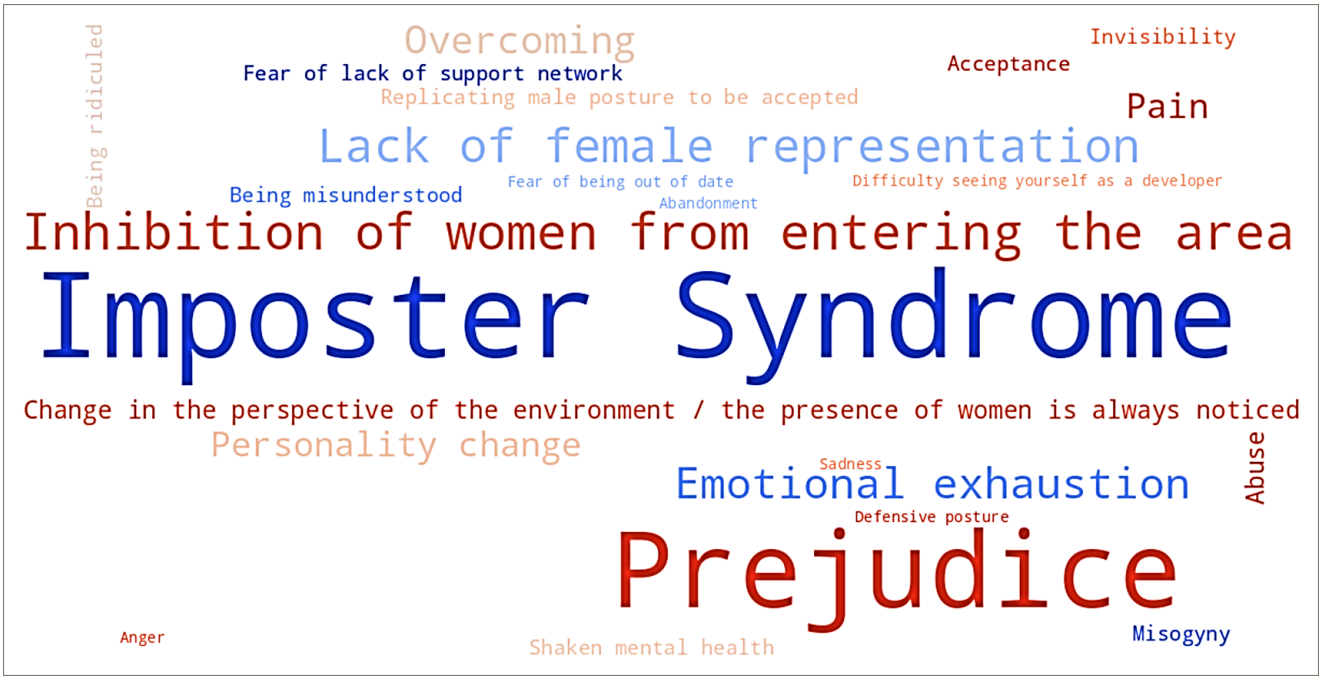


Figure 4.7: Word cloud containing the effects according to the quantity identified in the code extraction.

painful. Not only is it condescending, but it can also make you feel unworthy." Additionally, this effect was also highlighted as a challenge, showing that impostor syndrome can drive women away from the software industry and affect the performance of their professional activities due to psychological problems. Another effect is *"Emotional Exhaustion"* which is related to the tiredness that repetitive stress situations cause in women, a fact that causes a state of emotional and mental exhaustion. A professional in the field states the following (A7): "Sometimes, after a long week full of these occasions, which left me invisible, I can do nothing but cry because I'm exhausted." Other effects less mentioned were: *"Pain"* (3 occurrences), *"Shaken mental health"* (2), *"Fear of the absence of support"* (2), and *"Sadness"*, *"Fear of becoming outdated"*, *"Difficulty in seeing yourself as a developer"* and *"Anger"*, each one with only 1 occurrence.

The second category defined as **Behavior change** encompasses four effects: *"Personality Change"* with 3 occurrences, *"Replication of the masculine posture to be accepted"* with 2, *"Abandonment"* and *"Defensive posture"* with only 1. This category is associated with the different postures that women need to represent in an attempt to gain recognition in the technology sectors. For example, *"Personality Change"* deals with the modification in personal characteristics that female engineers accept to fit into work environments, article (A22) describes the following situation: "Women feel like they need to change their personalities to become more assertive, competitive and do not show emotions to be taken seriously.

`But in reality, emotional intelligence is an incredible additional skill for team and management.`"

The third category, **Prejudice and Devaluation**, refers to five effects related to the way women are treated in the workplace analyzed in this study. These effects are: *"Prejudice", "Misogeny", "Being misunderstood", "Invisibility", and "Being Ridiculed"*. Hence, *"Prejudice"* deals with the judgment made regarding the role, capabilities, and position of women within their work environment, which is generally related to some negative factors such as code rejections that occur on both GitHub and Facebook. Excerpts from the article (A22) illustrate this effect suffered by women: "`Regarding the GitHub problem, you are also speaking from experience, you say you don't judge, but you can't speak for everyone. What the statistics show is that when gender is revealed, female code is rejected at a higher rate`" and "`Female developers at Facebook have their code rejected 35% more often than their male counterparts. but with the code being accepted at a higher rate for women when their gender is hidden.`" The other effects had between 2 and only 1 occurrence.

The **Representation and Inclusion** category addresses the consequence *"Lack of female representation"* which had 6 occurrences and demonstrates the absence of women in the software industry. *"The lack of female representation"* is an effect resulting from the absence of women in leadership in digital environments, regarding this fact we find the following situation described in the article (A20): "`In small companies, limited opportunities due to their size may result in fewer available leadership positions overall, and because women are a minority in software development, there are fewer women in leadership positions.`"

The penultimate category brought aspects related to **Overcoming and Positive Change**. It includes three effects such as: *"Overcoming"*, *"Acceptance"* and *"Change in the perspective of the environment The woman's presence is always noticed"* . And it is characterized by processes that involve the ability to face barriers and adversities constructively, resulting in personal and professional growth, all consequences in this category had less than 5 occurrences. *"Overcoming"* had the highest number of occurrences (3) and the excerpt from A30 explains the concept of this effect by stating the following: "`I suspect (but I have no proof, only anecdotal) that disadvantaged groups are represented in a larger group by those with above-average skills and perseverance, necessary to overcome the disadvantage.`" In other words, the overcoming effect is related to the fact of overcoming the Career Advancement Challenges that arise throughout the female career. The other two effects in this category were mentioned only once.

Finally, the last category, **Experience of Exclusion and Abuse** portrays factors that keep women away from the technology field. This category contains the following codes: *"Inhibits women from entering the field"* with 7 occurrences and *"Abuse"* with only 3. "*Inhibition of women from entering the field*" addresses the aspects

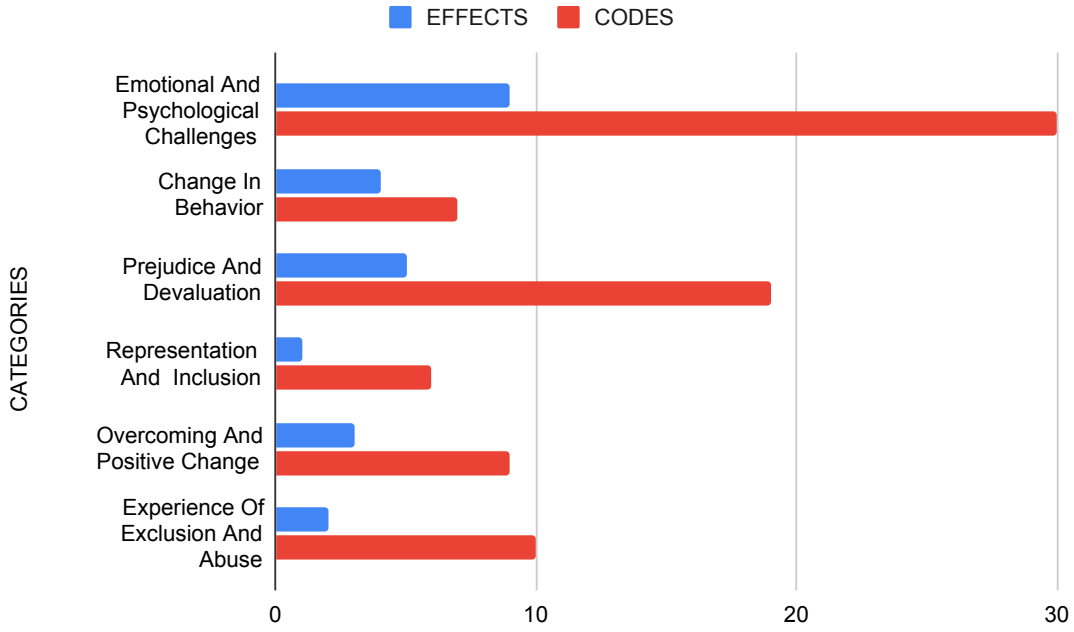


Figure 4.8: Relationship between different categories and the frequency of effects and codes in each of them.

that discourage women's interest in the career technological professional, in (A1), one of the reasons cited as a characteristic of repulsion is the presence of a greater number of men, the author says the following: "`Furthermore because it is dominated by men, unconscious prejudice prevents women from working in technology. Women already know that it is dominated by men.`"

The Figure 4.8 represents the number of effects per category. On the one hand, there is a predominance of factors defined as effects on women's professional lives. "Emotional and psychological challenges" and "Prejudice and devaluation" are the biggest consequences caused by the barriers, as Table 4.3 shows. On the other hand, Representativeness and inclusion factors are effects that receive fewer complaints. With these related data, there is evidence related to the lack of women representation in software projects, as prejudice and psychological factors are major impediments to the presence and permanence of women in this environment.

## 4.4 RQ3: How to build a more inclusive environment for ICT professionals?

Table 4.4 presents the set of suggestions identified in this study, their number of occurrences and the categories in which they were grouped. And the figure 4.9 presents a word cloud that functions as a visual resource that complements the

Table 4.4: Suggestions to make the workplace more inclusive for women.

| **Category** | **Suggestion** | # |
|---|---|---|
| Self-knowledge and self-confidence | Recognize your abilities | 18 |
| | Finding a secure professional position | 4 |
| | Get to know the company culture | 2 |
| | Negotiate salary | 2 |
| Mental health and well-being | Take care of your mental health | 1 |
| Overcoming | Speak without fear of retaliation | 11 |
| | Embrace Failure | 7 |
| | Ignoring Prejudice and Imposter Syndrome | 5 |
| | Never give up | 3 |
| | Encourage sisterhood | 1 |
| Promoting inclusion and equity | Inclusive organizational culture | 16 |
| | Change in recruitment processes | 16 |
| | Being a role model / publicity | 13 |
| | Equity | 6 |
| | Avoid sexism | 2 |
| | Valuing women | 1 |
| | Promoting the benefits of diverse teams | 1 |
| | Normalization of motherhood at Tech | 1 |
| Professional Development | Continuous Learning | 10 |
| | Invest in training for women | 10 |
| | Participation in technology events | |
| | Document your journey | 1 |
| Building networks and support | Build a support system, both to help others and to be helped | 10 |
| | Consider help | 6 |
| | Generate female connections | 2 |
| | Be social | 1 |

textual analysis, synthesizing in an accessible way the most significant information obtained during the study. The suggestions for dealing with the professional and gender problems faced by women in the software industry are presented in such a way that the words that represent the most recurrent effects appear in larger fonts and in darker tones.

The first category is **Self-Knowledge and Self-Confidence** and is related to suggestions involved with aspects of women's personal security in themselves. In this category, the suggestion "*Recognize your Skills*" had 18 occurrences and deals with female self-recognition about their professional skills. The following excerpt from the article (A25) exemplifies this suggestion: "`Never stop believing in yourself. Ever. That might be the only reason I'm still standing. Because I never stopped believing in what I originally set out to do.`" The other listed suggestions had less than 5 occurrences, which are: "*Finding*


Figure 4.9: Word cloud containing suggestions for mitigating gender barriers according to the quantity identified in code extraction..

*a secure professional position*," "*Getting to know the company's culture*" and "*Negotiating salary.*" The **Mental Health and Wellbeing** category deals with female mental health care and had only one occurrence, despite this being a frequently cited problem, both as a barrier and as an effect.

The third category is **Overcoming**, which refers to five suggestions "*Ignore prejudice and impostor syndrome*," *"Speak without fear of retaliation,"* *"Embrace failure,"* *"Encourage sisterhood and Never give up*," all of which are related to the process of coping with barriers within software project environments. "*Speak up without fear of retaliation*" is a message that encourages women to position themselves within companies without fear of repercussion as seen in the article (A21): "`During my career, I have learned that asking questions is very important, especially if you you are new to the project, but also if you have been part of a team for some time. Asking questions allows you to get a complete overview, and everyone should ask. There are such things as someone's point of view you would like to understand or some company-specific questions about the documentation, if anything is not clear.`" And *"Embracing failure"* is an expression that refers to learning from mistakes and failures, in (A24), it is suggested that "`First, remember that it is okay to make mistakes. Just apologize and try to do better next time.`" The other suggestions mentioned had fewer than 5 registrations.

**Promoting inclusion and equity** is a category that addresses eight suggestions

to improve the software industry regarding female presence and equal treatment compatible with the competence and training of women about men. In this category, suggestive quantities of occurrences were obtained. *"Inclusive Organizational Culture"* had 16 records and the article excerpt (A38) "`Companies need to do more to create opportunities for individuals of diverse gender identities to advance to leadership positions and create a culture of inclusion that values diversity`" characterizes this suggestion. "*Change in recruitment processes*" had also 16 records and refers to the way recruiters organize the set of steps and activities to select and hire qualified candidates to fill vacancies in a technological organization, the following statement appears as a suggestion for implementation in the article (A27): "`The study also explained that implementing blind hiring techniques can reduce bias. They call for a process that consists of blind screening of applicants, pre-employment testing, and insisting that shortlists include an equal share of women to create better awareness.`"

*"Being a role model"* had 13 occurrences and alludes to women who work in technological sectors and should serve as an example or standard to be followed. To this end, some recommendations were cited in articles (A1) and (A25), respectively: "`Let people know that you are a developer`" and "`Give visibility to women who already work in the sector.`" *"Equity"* was cited 6 times and is the principle that seeks to assure that all people receive fair treatment and equal access to opportunities, resources, and rights, taking into account their individual circumstances and needs, as noted in the following excerpt from the article (A38): "`promoting gender equity in the tech industry is crucial to creating an inclusive and diverse community that empowers everyone to succeed and contribute to innovative solutions.`" The other suggestions were: *"Avoid Sexism"*,*"Valuing women"*, *"Promoting the benefits of diverse teams"* and *"Normalization of motherhood at Tech"* had less than 5 occurrences.

The **Professional Development** category includes suggestions that encourage the dissemination of courses and mentoring aimed at better female training for the software industry. Cited 10 times, *"Continuous Learning"* indicates that women must always be constantly updating their professional skills to achieve due legitimacy, as described in article (A9): "`One thing I learned is that self-taught skills are the art of mastery. In technology, we never stop learning.`" And *"Investing in training for women"* is the promotion of courses and mentoring for female professional development. Mentoring is further cited as an incentive for meaningful learning of coding techniques, with the following statement from the article (A31): "`I also believe that mentoring is very important to encourage women programmers and help them on their journey of codification.`" *"Participation in Technology Events"* and *"Document your journey"* were only recorded once each.

The last category is called **Building networks and support** and are suggestions that refer to creating connections and relationships to improve relationships, resource

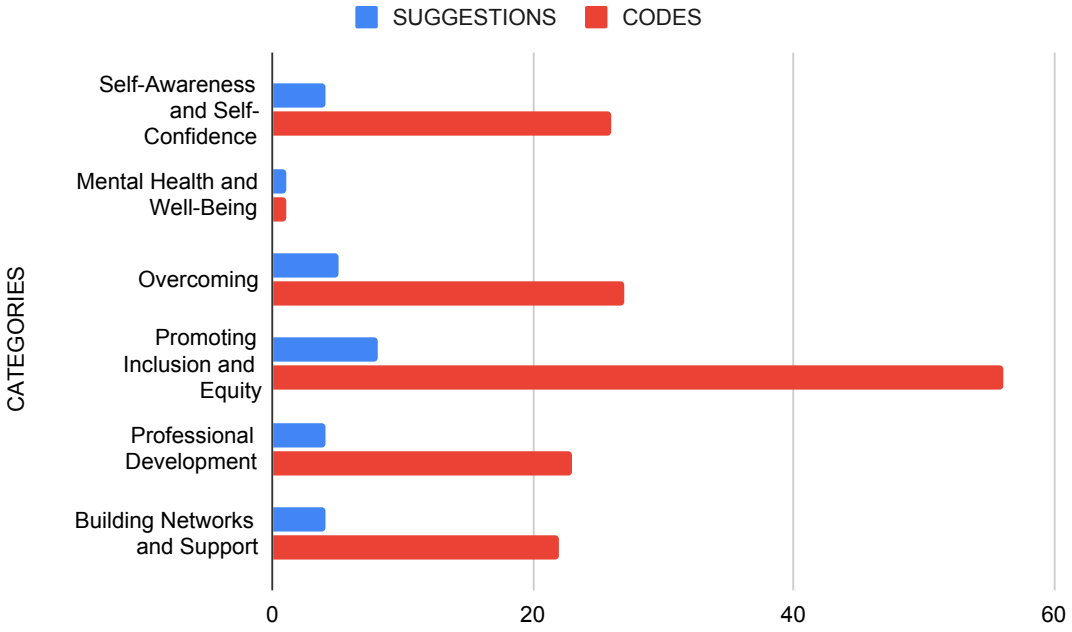


Figure 4.10: Relationship among categories, suggestions, and codes.

availability, opportunities, and positive results in the work environments of software projects for companies. Women, such as: *"Building a Support System, Both to Help Others"* and to *"Be Helped"* which deals with the practice of generating a good working group as supporters and encouragers, for this suggestion the article (A9) provides the following information: "`Find a good mentor. Navigating your career in technology alone will be a difficult path and will leave you feeling exhausted and always wanting to give up.`", "*Consider Help*" suggests that female software engineers accept and ask for help from their co-workers in their difficulties. The excerpt from the article (A1) says the following about this situation: "`Be bold and ask for help. No man is an island.`" The two other suggestions found for this category had few registrations: "*Generating Female Connections*" with 2 and "*Being social*" with just 1.

Figure 4.10 shows the number of suggestions per category. The most recommended suggestions are those that encourage and promote female access, permanence, and maintenance in the software industries, while aspects regarding mental health care were little mentioned. Even though the barriers and effects are largely in this area, female professional preparation appears as the biggest suggestion for increasing inclusion and equity in professional technology environments.

## 4.5 RQ4: How to organize the body of knowledge made up of barriers, effects, and solutions to support the reduction of gender disparities?

We organized the barriers, the effects caused by them, and the suggestions to mitigate them in a conceptual map, as Figure 4.11 shows. The map is inspired by the one proposed by Freire et al. (2024, 2023b). The map shows each element (barriers, effects, and suggestions) in their corresponding categories. This enables software teams and organizations to reflect on these barriers and recognize them within their work environments. For example, suppose a software team perceives that *Lack of Recognition* is a barrier in its workspace. This barrier belongs to the *Systemic Gender Inequality* category. In that case, the team can refer to this category to identify whether other related barriers are also present.

In the map, the elements and their categories contain percentages, which were based on the number of times a specific code was found in all the articles analyzed. For example, the map shows that almost 50% of the barriers identified as *Gender Barriers* are related to Systemic Gender Inequality (49.19%). Furthermore, the categories *Emotional & Psychological Challenges*,and *Promoting Inclusion & Equity* exhibit the highest percentages, respectively, in the dimensions of Effects and Suggestions, indicating their prominence within the body of knowledge.

When analyzing the *Systemic Gender Inequality* category, one can see that its barriers are the primary factors that cause the greatest impasse for women, showing that these aspects appear in the dissertation as results of an organizational system still dominated by masculine values, perpetuating the exclusion and underrepresentation of women in technological areas. In addition, the barrier called *Male-Dominated Culture*, despite representing a single category and code on its own, is the one that occurs most frequently among the codes when analyzed individually. This shows that the greater presence of men is also an exclusionary factor for female professionals.

The map not only displays the structure of gender-based issues in the software industry but also helps identify interdependencies between the different elements. Barriers such as microaggressions or underestimation of abilities often trigger emotional effects like impostor syndrome and lack of self-confidence, which then inhibit professional development. In this sense, the conceptual map serves as a dynamic diagnostic tool, allowing for recursive analysis — once a barrier is identified, its possible effects and corresponding solutions can be traced directly, enabling more targeted interventions.

Regarding the effects, in the *Emotional& Psychological Challenges* category, we observe that the emotional and behavioral impacts of the most harmful barriers to women extend beyond the individual level, affecting collective diversity and organizational innovation. The lack of support and the pressure to conform to masculine norms contribute to the loss of female talent in technology, reinforcing existing dis-

parities. The map provides a thought indicating that companies and leaders can implement practical measures to address these challenges, such as mitigating the effects of impostor syndrome, which causes many women to leave the field. Psychological support programs can serve as a valuable resource to help employees cope with impostor syndrome and other emotional challenges, alongside internal initiatives aimed at increasing awareness among managers and teams about the importance of mental health.

The *Promoting Inclusion & Equity* category reinforces the need for a more inclusive organizational culture, ensuring that sexism is prevented and women are more valued. Additionally, the category highlights the importance of normalizing motherhood in software companies and fostering a more supportive and equitable work environment. Here, the map emphasizes that solutions must be not only reactive but also preventive, addressing the roots of exclusion through education, representation, and structural transformation.

While the map provides a generalized classification, it is important for organizations to adapt these insights to their specific context. Solutions should not be one-size-fits-all but should address both individual empowerment and the structural transformation of organizations. For example, solutions such as mentoring programs or changes to recruitment processes can support women's professional development and enable their inclusion in traditionally male-dominated fields.

Finally, it is worth noting that the conceptual map fosters an integrative vision of gender disparities in the software industry by making explicit the feedback loops that sustain inequality. By visually connecting barriers, effects, and solutions, the map allows practitioners to not only understand what the problems are, but also why they persist — and more importantly, how they can be dismantled. This makes the map not only a contribution to research, but also a practical artifact for organizational learning and change.

## 4.6 Final Remarks

Chapter 4 presented the main results obtained through the analysis of 62 articles extracted from the gray literature, specifically from the DEV Community and InfoQ platforms. Initially, the demographic profile of the publications was outlined, revealing a significant increase in interest in the topic since 2019. Then, based on the four research questions, the barriers faced by women in the software industry, the effects caused by these barriers, suggestions for a more inclusive environment and a proposal for organizing the knowledge produced were discussed.

The barriers identified — such as male domination, stereotypes, exclusion and devaluation — highlight a scenario of structural inequality that still persists in the technology sector. These obstacles generate profound and harmful effects, such as impostor syndrome, emotional exhaustion and the need to adopt masculine behaviors to be accepted in the professional environment. However, women also pointed

out possible ways to transform this reality, suggesting practices such as mentoring, professional appreciation, building support networks and developing negotiation skills and self-confidence.

Finally, this chapter proposed a conceptual map as a way to systematize the body of knowledge formed by barriers, effects, and solutions, contributing with a useful tool for both professionals and researchers in the field. This structure favors the understanding of gender dynamics in software projects and reinforces the importance of concrete actions in favor of equity. Thus, the results presented here consolidate the relevance of listening to the voices present in the gray literature and recognize its power as a legitimate source of empirical data to transform practices in the technology sector.

The next chapter presents a discussion of the study's findings, comparing them with related work and addressing potential threats to the validity of the research.

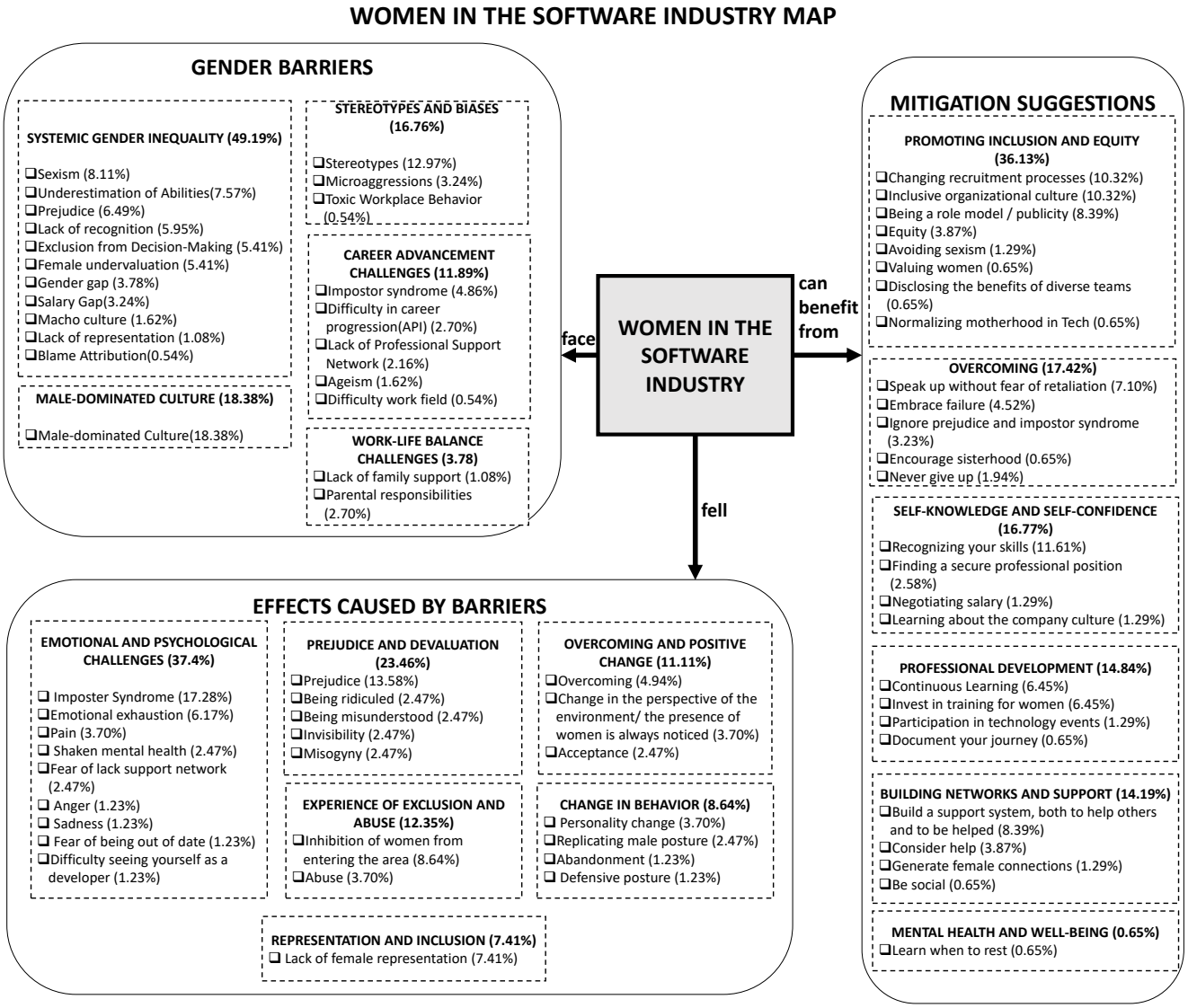


Figure 4.11: Women in the software industry map

# Chapter 5

# Discussion

In this section, we offer implications for practitioners and researchers and compare the findings with those reported by related studies and papers, highlighting the similarities and differences, as well as the innovative contributions of our research. We also discuss the trustworthiness of the study. This chapter consists of four sections:

**Section 5.1** Advancing Gender Equity in Software Engineering: Barriers and Strategic Interventions This section discusses the importance of understanding the barriers faced by women in software engineering, the effects of these barriers, and strategies to overcome them. It presents a conceptual map as a tool to diagnose problems and guide educational policies and actions, highlighting practical applications in different organizational and training contexts.

**Section 5.2** Comparison to Related Work. Compares the research findings with those of previous studies (white literature), using Venn diagrams to highlight overlaps and new contributions. The study expands knowledge by including barriers such as age and perception of the complexity of the field, in addition to exploring personal coping strategies, which are rarely addressed in formal research.

**Section 5.3** Trustworthiness of the Study. It assesses the reliability of the study based on the ACM SIGSOFT criteria. To mitigate the risks of bias and subjectivity, the analysis process was carried out by multiple researchers, with clear categorization protocols and independent review. Strategies were also adopted to provide representativeness and transferability of data extracted from the gray literature.

**Section 5.4** Final Remarks. The section concludes the chapter by highlighting how the integration of grey and academic literature resulted in a broader and more practical view of gender inequalities in software engineering. The results are presented clearly and consistently, strengthening the methodological proposal of the research and preparing the ground for the study's conclusions.

## 5.1 Advancing Gender Equity in Software Engineering: Barriers and Strategic Interventions

Creating a more inclusive and equitable software industry requires a thorough understanding of the barriers women face, their impact, and actionable strategies for change. This section presents a structured approach to addressing gender disparities by mapping out key challenges, their consequences, and potential solutions. The conceptual map developed in this study serves as both a diagnostic tool and a roadmap for organizations, policymakers, and educators aiming to foster an environment where women can thrive in software engineering.

The following subsections explore practical implications for the industry, adaptations for different organizational contexts, applications for training and education, and potential extensions to this body of knowledge. These insights provide actionable steps for stakeholders committed to bridging the gender gap in software engineering.

### 5.1.1 Practical Implications for the Industry

The findings of this study have direct implications for companies and software teams. Organizations can use this conceptual map to:

- **Diagnose internal barriers**: Identify which barriers are present in their work environment and take measures to mitigate them. Examples of measures are: regular performance reviews, public recognition of achievements, and transparent promotion criteria.
- **Support diversity and inclusion policies**: Create mentorship programs, review recruitment processes, and offer training to minimize unconscious biases. Companies should strive to promote more women into leadership roles, as this not only provides role models for other women but also helps to dismantle the male-dominated culture that perpetuates gender inequality.
- **Develop retention strategies**: Foster a more welcoming work environment by providing emotional and structural support for women in the software industry. Creating support networks within the organization can foster a sense of community and belonging, reducing feelings of isolation and emotional exhaustion.

### 5.1.2 Adapting the Map to Different Contexts

The conceptual map can be adapted to different realities, considering the context of each company or institution. For example:

- **Startups**: Can use the map's categories to enable diversity from the early stages of organizational growth.

- **Large technology companies**: Can apply the model in internal audits to identify and solve structural problems.
- **Academic institutions**: Can incorporate these findings into technology course curricula to prepare future professionals for more equitable environments.

### 5.1.3 Using the Map for Training and Education

The body of knowledge organized in this study can be used for training in diversity and inclusion. Some applications include:

- **Training for managers and recruiters**: Raising awareness about the barriers faced by women and how to make processes more inclusive.
- **Workshops for developers**: Discussions on unconscious biases and best practices for fostering a more welcoming environment.
- **Mentorship and professional development**: Supporting women in the sector to overcome challenges and advance in their careers.

## 5.2 Comparison to Related Work

This section clarifies how our study complements existing academic literature (white literature) by identifying new barriers, effects, and suggestions that were not previously reported. The comparative analysis between gray and white literature (those reported in the related work (see Table 2.2)) reveals that, while women in the technology field face common challenges, our study provides additional perspectives that further deepen the understanding of these difficulties. To illustrate this complementarity, we use Venn diagrams (Figures 5.1, 5.2, and 5.3) to highlight key differences and unique insights from our research. Each diagram consists of set **A**, representing the data identified in the related work, set **B**, which contains information derived from the thematic synthesis of the gray literature, and their intersection.

A key distinction of our study is the focus on firsthand narratives from women actively experiencing these barriers in their daily professional lives. While prior research has largely relied on structured surveys and interviews (e.g., Canedo et al. (2021a), Trinkenreich et al. (2022a)), gray literature enables us to capture spontaneous and detailed accounts of workplace discrimination, career limitations, and coping mechanisms. This methodological difference allows us to uncover nuanced experiences that might be overlooked in more structured studies.

Another major contribution of our study is the identification of barriers that were either underrepresented or not previously documented in academic research. Figure 5.1 shows the overlap and distinctions between the barriers reported in related work and those found in our study. For example, Main e Schimpf (2017) and Rocha et al. (2023a) identified work-family conflict, excessive domestic responsibilities, and

maternal and structural barriers. However, our study (set B) did not reveal new categories, only barriers, such as ageism and the perceived complexity of the field, which are codes identified in the text excerpts and included in the professional challenges category, due to their similar aspects identified by the interpretation of the data. While Canedo et al. (2023b) acknowledged the marginalization of female participation in the software industry, they did not explicitly address age as a contributing discriminatory factor. Other related studies (Kohl e Prikladnicki (2021b), Silva et al. (2022)) introduced the themes of ageism and the perceived complexity of the field but did not explore them in depth.

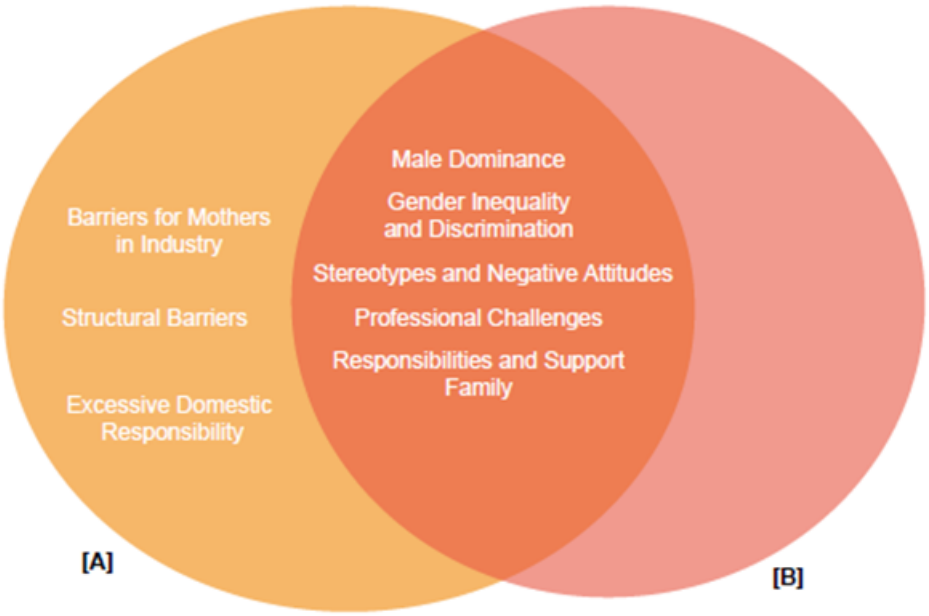


Figure 5.1: Relationship between barriers found in related [A] and current work [B].

Regarding the intersection between sets **A** and **B**, we observed that women frequently encounter challenges related to professional recognition, often facing constant scrutiny of their skills and difficulties in establishing support networks within the corporate environment (Canedo et al., 2021a). Additionally, the culture of intense competitiveness in the gaming sector exacerbates the exclusion of women, fostering a hostile environment resistant to diversity (Drummond et al., 2022). Furthermore, barriers such as *lack of exposure to technology, low self-confidence, and the absence of female role models* were reaffirmed by (Clayton et al., 2012; Hong e Bouchon, 2014).

In summary, the barriers identified in both types of studies highlight the need for a broader and more intersectional approach—one that considers not only gender-related challenges but also factors such as age, access to education, and societal perceptions of the field's complexity. Addressing these issues is essential to foster a more equitable and inclusive work environment. Moreover, there is a pressing need

to reformulate educational strategies and inclusion policies that actively encourage more women to enter and persist in the technology sector.

Regarding the effects of gender barriers, previous studies have mainly explored professional outcomes, such as prejudice and devaluation, representation and inclusion, as well as experiences of exclusion and abuse (Happe e Buhnova (2021), Rocha et al. (2023a), Canedo et al. (2023a), Rocha et al. (2023b), Canedo et al. (2021a), Catolino et al. (2019), Colomo-Palacios e Casado-Lumbreras (2019), Drummond et al. (2022), Clerc e Kels (2013) ). Our findings extend this discussion by highlighting personal and social consequences, such as change in behavior, loss of self-confidence, and overcoming and positive change. Figure 5.2 shows a comparison between the effects found in previous studies and those newly identified in our research. It also shows that no new effects were identified in related studies (set **A**). By analyzing firsthand testimonials, we gain a deeper appreciation of how systemic biases in the industry impact women's mental health and overall well-being, aspects that have received comparatively less attention in structured research.

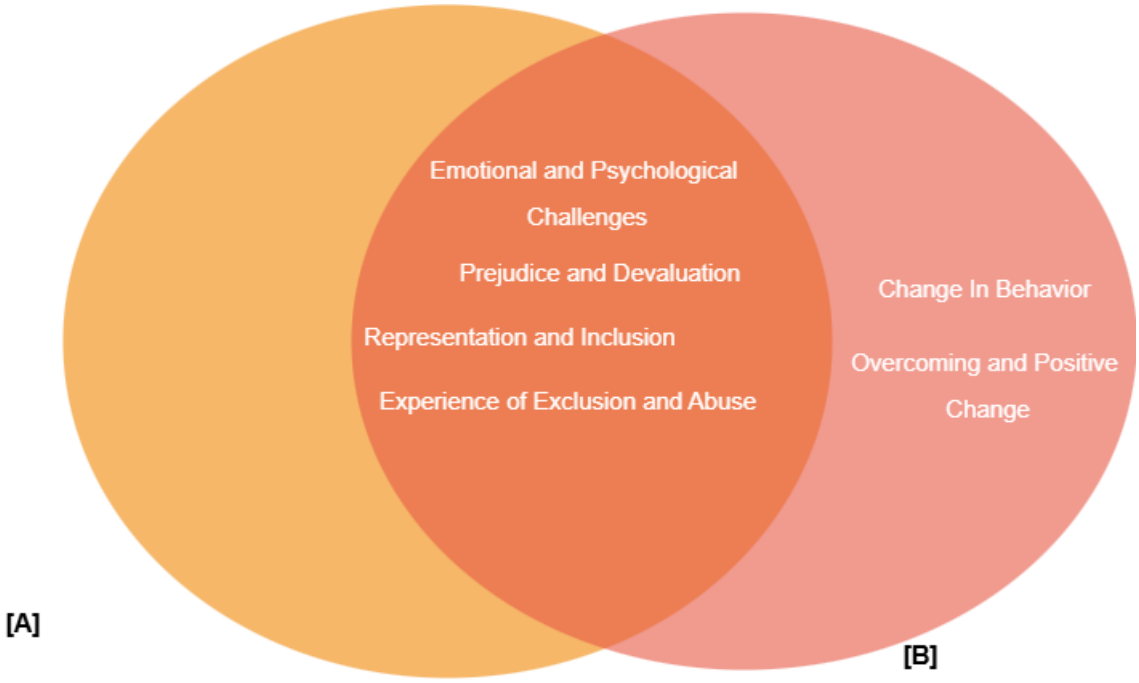


Figure 5.2: Relationship between effects found in related [A] and current work [B].

Additionally, our study introduces other relevant aspects, such as *behavioral change,*

*overcoming and positive transformation, invisibility, and being misunderstood*, effects that have not been explored in the same depth in related studies. While previous research primarily emphasizes the negative impacts of gender discrimination, our study not only highlights these difficulties but also sheds light on the coping mechanisms women develop to navigate these challenges. Overall, the inclusion of resilience and positive change in our study suggests that, despite the barriers, some women find ways to empower themselves—whether by seeking supportive communities, developing greater assertiveness, or transitioning to more inclusive work environments.

Finally, when considering possible solutions, white literature primarily focuses on organizational interventions, such as mentorship programs and diversity policies (Dagan et al. (2023),Canedo et al. (2021a), Happe e Buhnova (2021), Catolino et al. (2019), Rocha et al. (2023b), (Drummond et al., 2022) ). While these approaches are essential, our study reveals that women also emphasize the importance of personal strategies, such as self-advocacy, peer support networks, and continuous upskilling. By incorporating these strategies, our study suggests that initiatives aimed at strengthening women's psychological resilience can be as impactful as institutional policies in ensuring their retention in the industry. Figure 5.3 compares the solutions identified in both literature sources, demonstrating that tackling gender disparities requires a multi-layered approach, combining institutional change with strategies that empower individuals to navigate and challenge these barriers effectively.

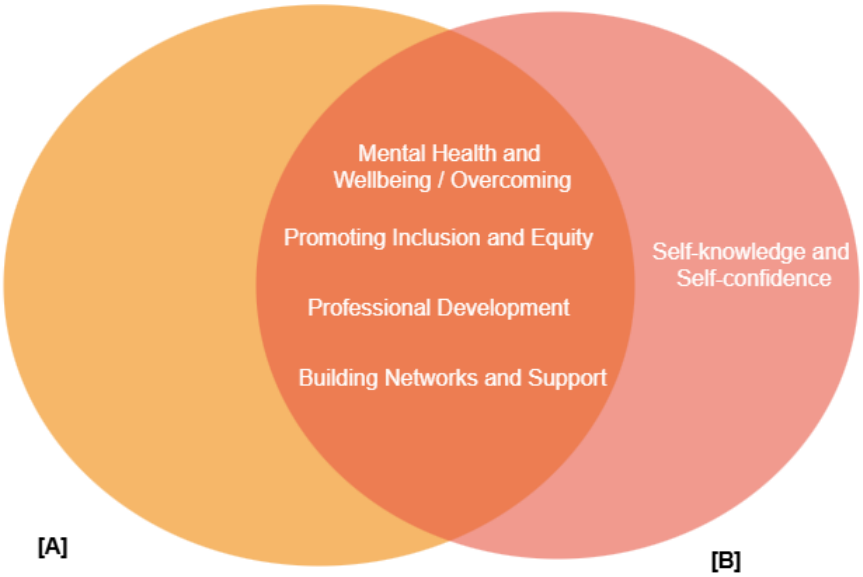


Figure 5.3: Relationship between solutions found in related [A] and current work [B].

In summary, this section demonstrates that our study does not merely replicate existing findings but significantly extends them by capturing aspects that are less explored in academic research. It becomes evident that while previous studies have

primarily focused on structural barriers and the need for institutional changes, the current study complements this perspective by emphasizing personal development as a crucial factor in achieving gender equity in technology. The integration of gray literature with white literature provides a more comprehensive and actionable understanding of gender barriers in software engineering, emphasizing the need for both structural reforms and personal resilience strategies.

## 5.3 Trustworthiness of the Study

When conducting research using the thematic synthesis method to select studies from the gray literature and define thematic labels for articles, testimonies, and text excerpts on gender issues faced by women in software projects, several threats to validity may arise. Thus, we discuss the reliability of the study according to the criteria described in the Empirical Standards for SE (Acm Sigsoft, 2023).

Using data from the gray literature poses a risk that the selected studies may not be fully representative, possibly including biased sources or ignoring relevant ones. To address this concern and promote the **credibility** of our method, we employed clear and objective criteria to select papers from representative communities in the software development field and created a sequence based on terms commonly found in the technical literature on women in SE. This approach increases representativeness and minimizes bias. Regarding data analysis, researchers may interpret the data subjectively, influenced by their own beliefs and expectations. To mitigate these threats, data analysis was conducted independently by two researchers, and results were compared to identify potential biases. In cases of inconsistency, a third author re-ran the analysis and compared the results. The application of thematic labels may vary between different researchers or even be inconsistent by the same researcher over time. To mitigate these threats, we employed a clear categorization protocol that was defined and approved in advance by the authors to alow consistency in the application of labels. Finally, an experienced researcher then reviewed all extracted codes and categories.

To promote **transferability** or the applicability of the findings in different contexts (Acm Sigsoft, 2023), we provided a characterization of the article's authors. While this may be a limitation of our study, we observed that it is common when using GL. Regarding **dependability**, we described the research method used to collect and analyze the data. Additionally, we provided examples of the data analysis to support a comprehensive understanding of the process.

Lastly, concerning the **confirmability** of the study's findings, we detailed how our method allows for the scrutiny of the results. Additionally, we compared our findings with those reported in the existing technical literature.

## 5.4 Final Remarks

This chapter delved deeper into the discussion of the barriers faced by women in software engineering and the strategic interventions that can promote greater gender equity in this field. Based on the analysis of gray literature, it was possible to construct a conceptual map that integrates barriers, effects, and suggestions, functioning as a practical diagnostic and guidance tool for both the academic sector and the industry. This map proved to be applicable in different contexts, such as organizational training, educational environments, and public policy initiatives, expanding the potential impact of the research findings.

The comparison with related works revealed that this study complements and expands the existing literature, bringing to light topics little explored in previous studies, such as the perception of the area as complex and the role of age, in addition to valuing personal strategies for overcoming obstacles. The inclusion of gray literature allowed us to capture voices and experiences that are often not present in traditional scientific production.

Regarding the reliability of the study, strict qualitative research guidelines were followed, such as the ACM SIGSOFT criteria, ensuring credibility, transferability, dependability, and confirmability of the results. The triangulation between researchers in the analysis and categorization of data, the use of multiple sources of gray literature, and the careful validation of the methodological steps reinforce the robustness of the research.

Thus, this chapter consolidates the relevance of gray literature as a legitimate source of knowledge and reinforces the value of empirical approaches in understanding gender inequalities in technical contexts. The discussion presented here strengthens the methodological proposal of the research and offers practical and theoretical support for software engineering to advance towards more diverse, fair, and inclusive environments.

The next chapter presents the conclusion of the work and future possibilities for continuity.

# Chapter 6

# Conclusions

## 6.1 Study Contributions

Aware of the urgent need to address gender diversity in the software industry, this study aims to identify and analyze, based on everyday descriptions found in the gray literature: (i) the gender barriers faced by women in software project work environments; (ii) the effects of these barriers on women; and (iii) the possible solutions suggested by women to make the software industry more inclusive. Additionally, this study seeks to organize the body of knowledge—comprising barriers, effects, and solutions—into a conceptual map to guide practitioners and researchers in discussions on gender diversity. Considering this goal proposed in this dissertation, we obtained the following results and contributions:

- **SG1. identifying reports in the gray literature that discuss gender issues faced by women in the software industry.:** Through a thematic synthesis using gray literature, we identified these reports in the DEV Community and InfoQ platforms. The specific contributions arising from this stage are described in Section 4.1 of Chapter 4.
- **SG2. analyzing the gender barriers faced by women in software project work environments:** Using the thematic synthesis steps, we analyzed data from the DEV Community and InfoQ platforms and found 22 barriers. The specific contributions are described in Section 4.2 of Chapter 4.
- **SG3. identifying the effects felt by women professionals due to the barriers faced by them:** In the DEV Community and InfoQ, we found 24 effects due to the barriers faced by women in the software industry. The specific contributions arising from this step are described in Section 4.3 of Chapter 4.
- **SG4. checking possible solutions to mitigate adversities involving gender in work environments focused on computing and technology:** We found 125 suggestions on the DEV Community and InfoQ platforms. The specific contributions resulting from this step are described in Section 4.4 of Chapter 4.

- **SG5. organizing the body of knowledge composed of the barriers, effects, and solutions:** We organize the body of knowledge composed of barriers, effects, and solutions using a conceptual map containing the percentage quantity of each identified element. We present the map and its structure in Section 4.5 of Chapter 4.

We also discuss our findings in light of the technical literature, demonstrating that our results both confirm and enlarge the set of barriers, effects, and solutions related to gender issues faced by women in the software industry.

## 6.2 Possible Extensions and Future Improvements

There is a set of activities to continue and complement the current study, such as:

- **Incorporation of new data**: Other sources, such as Stack Exchange, can enrich the categories and broaden the understanding of the challenges faced.
- **Use of interactive diagrams**: Visualizing the connections between barriers, effects, and solutions can be enhanced through interactive tools.
- **Longitudinal analyses**: Future studies can investigate how these barriers and solutions evolve over time in different organizational contexts.

# Referências


Acm Sigsoft (2023). Acm Sigsoft Empirical Standards for Software Engineering. `https://github.com/acmsigsoft/EmpiricalStandards`. [Online; accessed 07/02/2025].

Agapiou, A. (2002). Perceptions of gender roles and attitudes toward work among male and female operatives in the scottish construction industry. *Construction Management & Economics*, 20(8):697–705.

Ahmadi, M., Eilert, R., Weibert, A., Wulf, V., e Marsden, N. (2020). " we want to push the industry via communication"... designing communication measures to foster gender diversity in a video game company. *Proceedings of the ACM on Human-Computer Interaction*, 4(GROUP):1–26.

Armstrong, D. J., Riemenschneider, C. K., e Giddens, L. G. (2018). The advancement and persistence of women in the information technology profession: An extension of ahuja's gendered theory of it career stages. *Information Systems Journal*, 28(6):1082–1124.

Bhattacharya, S., Bhattacharya, S., e Mohapatra, S. (2018). Enablers for advancement of women into leadership position: a study based on it/ites sector in india. *International Journal of Human Capital and Information Technology Professionals (IJHCITP)*, 9(4):1–22.

Blincoe, K., Springer, O., e Wróbel, M. R. (2019). Perceptions of gender diversity's impact on mood in software development teams. *IEEE Softw.*, 36(5):51–56.

Braun, V. e Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, 3(2):77–101.

Brazilian Institute of Geography and Statistics (IBGE) (2020). Estatísticas de Gênero: indicadores sociais das mulheres no Brasil, 2019. Acesso em: 31 maio 2024.

Buhnova, B. e Prikrylova, D. (2019). Women want to learn tech: Lessons from the czechitas education project. In *2019 IEEE/ACM 2nd International Workshop on Gender Equality in Software Engineering (GE)*, páginas 25–28. IEEE.

Campello, B. S., Cendón, B. V., e Kremer, J. M. (2000). *Fontes de informação para pesquisadores e profissionais*, volume 23. Editora Ufmg.

Canedo, E. D., Bonifácio, R., Okimoto, M. V., Serebrenik, A., Pinto, G., e Monteiro, E. (2020). Work practices and perceptions from women core developers in oss communities. In *Proceedings of the 14th ACM/IEEE International Symposium on Empirical Software Engineering and Measurement (ESEM)*, páginas 1–11.

Canedo, E. D., Mendes, F., Cerqueira, A., Okimoto, M., Pinto, G., e Bonifacio, R. (2021a). Breaking one barrier at a time: how women developers cope in a men-dominated industry. In *Proceedings of the XXXV Brazilian Symposium on Software Engineering*, páginas 378–387.

Canedo, E. D., Mendes, F. F., Cerqueira, A. J., Okimoto, M. V., Pinto, G., e Bonifácio, R. (2021b). Breaking one barrier at a time: how women developers cope in a men-dominated industry. In Vasconcellos, C. D., Roggia, K. G., Collere, V., e Bousfield, P., editores, *35th Brazilian Symposium on Software Engineering, SBES 2021, Joinville, Santa Catarina, Brazil, 27 September 2021 - 1 October 2021*, páginas 378–387, https://doi.org/10.1145/3474624.3474638. ACM.

Canedo, E. D., Rocha, L., Silva, G. R. S., e Mendes, F. F. (2024). Do you think there is no gender inequality in software engineering? perhaps you should reconsider your opinion. *Journal of Software Engineering Research and Development*, 12(1):10–1.

Canedo, E. D., Soares, L., Silva, G. R. S., Santos, V. S. D., e Mendes, F. F. (2023a). Do you see what happens around you? men's perceptions of gender inequality in software engineering. In *Proceedings of the XXXVII Brazilian Symposium on Software Engineering*, SBES '23, página 464–474, New York, NY, USA. Association for Computing Machinery.

Canedo, E. D., Soares, L., Silva, G. R. S., Santos, V. S. D., e Mendes, F. F. (2023b). Do you see what happens around you? men's perceptions of gender inequality in software engineering. In *Proceedings of the XXXVII Brazilian Symposium on Software Engineering*, páginas 464–474.

Carver, J. C. e Serebrenik, A. (2019). Gender in software engineering. *IEEE Software*, 36(6):76–78.

Catolino, G., Palomba, F., Tamburri, D. A., Serebrenik, A., e Ferrucci, F. (2019). Gender diversity and women in software teams: how do they affect community smells? In Kazman, R. e Pasquale, L., editores, *Proceedings of the 41st International Conference on Software Engineering: Software Engineering in Society, ICSE 2019, Montreal, QC, Canada, May 25-31, 2019*, páginas 11–20, https://doi.org/10.1109/ICSE-SEIS.2019.00010. ACM.

Cerqueira, L., Freire, S., Bastos, J. P. S., Spínola, R. O., Mendonça, M. G., e Santos, J. A. M. (2023). A thematic synthesis on empathy in software engineering based on the practitioners' perspective. In *Proceedings of the XXXVII Brazilian Symposium on Software Engineering, SBES 2023, Campo Grande, Brazil, September 25-29, 2023*, páginas 332–341. ACM.

Cerqueira, L., Freire, S., Neves, D. F., Bastos, J. P. S., Santana, B. S. D., Spínola, R. O., Mendonça, M. G., e Santos, J. A. M. (2024). Empathy and its effects on software practitioners' well-being and mental health. *IEEE Softw.*, 41(4):95–104.

Chartier, R. (2002). *A aventura do livro*. Unesp.

Chauhan, J., Mishra, G., e Bhakri, S. (2022). Perceived career success and career advancement of women: Challenges in the indian it industry. *International Journal of Human Capital and Information Technology Professionals (IJHCITP)*, 13(1):1–21.

Clarke, V. e Braun, V. (2013). Teaching thematic analysis: Overcoming challenges and developing strategies for effective learning. *The Psychologist*, 26(2):120–123.

Clayton, K., Beekhuyzen, J., e Nielsen, S. (2012). Now i know what ict can do for me! *Information Systems Journal*, 22(5):375–390.

Clerc, I. e Kels, P. (2013). Coping with career boundaries in masculine professions: Career politics of female professionals in the ict and energy supplier industries in s witzerland. *Gender, Work & Organization*, 20(2):197–210.

Colomo-Palacios, R. e Casado-Lumbreras, C. (2019). National cultures and gender balance in ict: A preliminary study. In *Proceedings of the 13th European Conference on Software Architecture-Volume 2*, páginas 76–81.

Cooper, H. (2015). *Research synthesis and meta-analysis: A step-by-step approach*, volume 2. Sage publications.

Dagan, E., Sarma, A., Chang, A., D'Angelo, S., Dicker, J., e Murphy-Hill, E. (2023). Building and sustaining ethnically, racially, and gender diverse software engineering teams: A study at google. In *Proceedings of the 31st ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering*, páginas 631–643.

de Castell, S. e Skardzius, K. (2019). Speaking in public: What women say about working in the video game industry. *Television & New Media*, 20(8):836–847.

de Oliveira Andradade, A. S. (2025). Investigating the Challenges Faced by Women on Software Engineering: a Grey Literature Study - Supplementary Material.

Demartini, F. (2019). As dez mulheres mais importantes da história da tecnologia.

Dias Canedo, E., Rocha, L., Acco Tives, H., Ramos Sousa Silva, G., e Freitas Mendes, F. (2024). Unveiling women's expectations as ict professionals: A survey study. In *Proceedings of the 5th ACM/IEEE Workshop on Gender Equality, Diversity, and Inclusion in Software Engineering*, páginas 14–21.

Drummond, B. M., de Castro Salgado, L. C., e Viterbo, J. (2022). What are the challenges faced by women in the games industry? In *Anais do XVI Women in Information Technology*, páginas 167–178. SBC.

Dudziak, E. (2021). O que é literatura cinzenta.

Freire, S., Gomes, F., Barbosa, L., Mendes, T. S., Reges, G., Maciel, R. S., Mendonça, M., e Spínola, R. (2023a). Requirements engineering issues experienced by software practitioners: A study on stack exchange. In *Requirements Engineering: Foundation for Software Quality: 29th International Working Conference, REFSQ 2023, Barcelona, Spain, April 17–20, 2023, Proceedings*, páginas 3–20. Springer.

Freire, S., Pacheco, A., Rios, N., Pérez, B., Castellanos, C., Correal, D., Ramač, R., Mandić, V., Taušan, N., López, G., Mendonça, M., Falessi, D., Izurieta, C., Seaman, C., e Spínola, R. (2024). A comprehensive view on td prevention practices and reasons for not preventing it. *ACM Transactions on Software Engineering and Methodology*, 33(1):1–28.

Freire, S., Rios, N., Pérez, B., Castellanos, C., Correal, D., Ramač, R., Mandić, V., Taušan, N., López, G., Pacheco, A., Mendonça, M., Falessi, D., Izurieta, C., Seaman, C., e Spínola, R. (2023b). Software practitioners' point of view on technical debt payment. *Journal of Systems and Software*, 196:111554.

Gomes, F., Santos, E., Freire, S., Mendes, T. S., Mendonça, M., e Spínola, R. (2023). Investigating the point of view of project management practitioners on technical debt - a study on stack exchange. *Journal of Software Engineering Research and Development*, 11(1):12:1 – 12:15.

Gomes, F., Santos, E. P. d., Freire, S., Mendonça, M., Mendes, T. S., e Spínola, R. (2022). Investigating the point of view of project management practitioners on technical debt: a preliminary study on stack exchange. In *Proceedings of the International Conference on Technical Debt*, páginas 31–40.

Green, J. e Thorogood, N. (2018). Qualitative methods for health research.

Happe, L. e Buhnova, B. (2021). Frustrations steering women away from software engineering. *IEEE Software*, 39(4):63–69.

Hoda, R. (2021). Socio-technical grounded theory for software engineering. *IEEE Transactions on Software Engineering*, 48(10):3808–3832.

Hong, H. e Bouchon, A. (2014). Women who choose computer science: what really matters. Relatório técnico, Technical Report. Google, Inc. http://bit. ly/2x8r8nC https://static ....

Hoogendoorn, S., Oosterbeek, H., e van Praag, M. (2013). The impact of gender diversity on the performance of business teams: Evidence from a field experiment. *Manag. Sci.*, 59(7):1514–1528.

Jensen, H. (2005). *Judith Butler: Gender Trouble: Feminism and the Subversion of Identity, New York: Routledge 1990. Titel der Originalausgabe: Das Unbehagen der Geschlechter; aus dem Amerikanischen von Kathrina Menke. Frankfurt a. M.: Suhrkamp 1991.* Springer.

Johnson, V. L., Kiser, A., e Kappelman, L. (2020). Women in it management: Significant gains and continuing challenges. *Journal of Computer Information Systems*.

Jung, E. e Wang, Y. (2023). IT investment and firm performance: The role of board gender diversity. In Bui, T. X., editor, *56th Hawaii International Conference on System Sciences, HICSS 2023, Maui, Hawaii, USA, January 3-6, 2023*, páginas 5887–5895, https://hdl.handle.net/10125/103350. ScholarSpace.

Kanij, T., Grundy, J., e McIntosh, J. (2024). Enhancing understanding and addressing gender bias in it/se job advertisements. *Journal of Systems and Software*, 217:112169.

Kohl, K. e Prikladnicki, R. (2021a). Challenges women in software engineering leadership roles face: A qualitative study. In Filipe, J., Smialek, M., Brodsky, A., e Hammoudi, S., editores, *Proceedings of the 23rd International Conference on Enterprise Information Systems, ICEIS 2021, Online Streaming, April 26-28, 2021, Volume 2*, páginas 205–212, https://doi.org/10.5220/0010413602050212. SCITEPRESS.

Kohl, K. e Prikladnicki, R. (2021b). Challenges women in software engineering leadership roles face: A qualitative study. *arXiv preprint arXiv:2104.13982*.

Kohl, K. e Prikladnicki, R. (2022). Benefits and difficulties of gender diversity on software development teams: A qualitative study. In de Almeida Maia, M., Dorça, F. A., Araújo, R. D., von Flach, C., Nakagawa, E. Y., e Canedo, E. D., editores, *SBES 2022: XXXVI Brazilian Symposium on Software Engineering, Virtual Event Brazil, October 5 - 7, 2022*, páginas 21–30, https://doi.org/10.1145/3555228.3555253. ACM.

Kovaleski, N. V. J., Tortato, C. S. B., e de Carvalho, M. G. (2013). As relações de gênero na história das ciências: Contra todas as probabilidades, as mulheres participaram do progresso científico e tecnológico. *Emancipação*, 13(3):9–26.

Kuechler, V., Gilbertson, C., e Jensen, C. (2012). Gender differences in early free and open source software joining process. In *Open Source Systems: Long-Term Sustainability: 8th IFIP WG 2.13 International Conference, OSS 2012, Hammamet, Tunisia, September 10-13, 2012. Proceedings 8*, páginas 78–93. Springer.

Lima, L., Gouveia, P., Cardoso, P., e Pinto, C. (2021). Never imagined i would work in the digital game industry. In *2021 IEEE Conference on Games (CoG)*, páginas 1–7. IEEE.

Machado, L. Z. (2013). Gênero, um novo paradigma? *cadernos pagu*.

Main, J. B. e Schimpf, C. (2017). The underrepresentation of women in computing fields: A synthesis of literature using a life course perspective. *IEEE Transactions on Education*, 60(4):296–304.

Manikas, K. e Hansen, K. M. (2013). Software ecosystems–a systematic literature review. *Journal of Systems and Software*, 86(5):1294–1306.

Marçula, M. e Benini Filho, P. A. (2010). *Informática: conceitos e aplicações*. Saraiva Educação SA.

Margolis, J. e Fisher, A. (2002). *Unlocking the clubhouse: Women in computing*. MIT press.

Medeiros, C. B. (2019). Engaging women in computer science-past, present and future. *CLEI Electronic Journal*, 22(2):1–1.

Mishra, D., Mishra, S., e Ostrovska, S. (2022). Women's professional career and culture: Software organizations in india. *SAGE Open*, 12(1):21582440221082135.

Moresi, E. et al. (2003). Metodologia da pesquisa. *Brasília: Universidade Católica de Brasília*, 108(24):5.

Nowell, L. S., Norris, J. M., White, D. E., e Moules, N. J. (2017). Thematic analysis: Striving to meet the trustworthiness criteria. *International journal of qualitative methods*, 16(1):1609406917733847.

Oliveira, T., Barcomb, A., de Souza Santos, R. E., Barros, H., Baldassarre, M. T., e França, C. (2023). Navigating the path of women in software engineering: From academia to industry. *CoRR*, abs/2312.04809:1–12.

Oliveira, T., Barcomb, A., Santos, R. D. S., Barros, H., Baldassarre, M. T., e França, C. (2024). Navigating the path of women in software engineering: From academia to industry. In *Proceedings of the 46th International Conference on Software Engineering: Software Engineering in Society*, páginas 154–165.

Oreskes, N. (1996). Objectivity or heroism? on the invisibility of women in science. *Osiris*, 11:87–113.

Papaioannou, D., Sutton, A., e Booth, A. (2016). Systematic approaches to a successful literature review. *Systematic approaches to a successful literature review*, páginas 1–336.

Papoutsoglou, M., Wachs, J., e Kapitsaki, G. M. (2021). Mining dev for social and technical insights about software development. In *2021 IEEE/ACM 18th International Conference on Mining Software Repositories (MSR)*, volume 18, páginas 415–419, 10.1109/MSR52588.2021.00053. ACM.

Picard, R. (1997). Affeetive computing. cambridge.

Pinto, J. K., Patanakul, P., e Pinto, M. B. (2015). Gender biases in hiring project managers: perceptions of trust and likeability. *IEEE Transactions on Engineering Management*, 62(3):325–334.

Rocha, L., Canedo, E. D., Pereira, C. P., Bezerra, C., e Mendes, F. F. (2023a). Investigating the perceived impact of maternity on software engineering: a women's perspective. In *2023 IEEE/ACM 16th International Conference on Cooperative and Human Aspects of Software Engineering (CHASE)*, páginas 138–149. IEEE.

Rocha, L., Canedo, E. D., Pereira, C. P., Bezerra, C. I. M., e Mendes, F. F. (2023b). Investigating the perceived impact of maternity on software engineering: a women's perspective. In *16th IEEE/ACM International Conference on Cooperative and Human Aspects of Software Engineering, CHASE@ICSE 2023, Melbourne, Australia, May 14-15, 2023*, páginas 138–149, https://doi.org/10.1109/CHASE58964.2023.00023. IEEE.

Rubegni, E., Penzenstadler, B., Landoni, M., Jaccheri, L., e Dodig-Crnkovic, G. (2023). Owning your career paths: Storytelling to engage women in computer science. In *Gender in AI and Robotics: The Gender Challenges from an Interdisciplinary Perspective*, páginas 1–25. Springer.

Santana, B. S. D., Freire, S., da Cruz, L. S., Monte, L., Mendonça, M. G., e Santos, J. A. M. (2023). Exploring psychological safety in software engineering: Insights from stack exchange. In *Proceedings of the XXXVII Brazilian Symposium on Software Engineering, SBES 2023, Campo Grande, Brazil, September 25-29, 2023*, páginas 503–513. ACM.

Santana, B. S. D., Freire, S., Santos, J. A. M., e Mendonça, M. G. (2024). Psychological safety in the software work environment. *IEEE Softw.*, 41(4):86–94.

Santos, E. P., Gomes, F., Freire, S., Mendonça, M., Mendes, T. S., e Spínola, R. (2022). Technical debt on agile projects: Managers' point of view at stack exchange. In *Proceedings of the XXI Brazilian Symposium on Software Quality*, páginas 1–9.

Schöpfel, J. e Farace, D. J. (2010). Grey literature. *Encyclopedia of library and information sciences*, 3:2029–2039.

Schöpfel, J. e Farace, D. J. (2010). Grey literature. *Encyclopedia of library and information sciences*, 3:2029–2039.

Scott, J. W. (1988). *Gender and the Politics of History*. Columbia University Press.

Seaman, C. (1999). Qualitative methods in empirical studies of software engineering. *IEEE Transactions on Software Engineering*, 25(4):557–572.

Silva, L., Sampaio, S., e MARINHO, M. (2022). Gender diversity in technology sector: Barriers and perceptions success of women in porto digital. In *WORKSHOP Proceedings http://ceur-ws. org ISSN*, volume 1613, página 0073. sn.

Soares, T. A. (2001). Mulheres em ciência e tecnologia: ascensão limitada. *Química Nova*, 24:281–285.

Strauss, A., Corbin, J., et al. (1990). *Basics of qualitative research*, volume 15. sage Newbury Park, CA.

Strauss, A. L. e Corbin, J. M. (1998). *Basics of qualitative research: techniques and procedures for developing grounded theory*. Sage Publications, Thousand Oaks, Calif.

Swade, D. (2022). *The History of Computing: A Very Short Introduction*. Oxford University Press.

Thomas, J. e Harden, A. (2008). Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC medical research methodology*, 8:1–10.

Tretiakov, A., Bensemann, J., Jurado, T., et al. (2023). Social outcome expectations and women's intentions to return to it employment. *Australasian Journal of Information Systems*, 27.

Trinkenreich, B., Britto, R., Gerosa, M. A., e Steinmacher, I. (2022a). An empirical investigation on the challenges faced by women in the software industry: A case study. In *Proceedings of the 2022 ACM/IEEE 44th International Conference on Software Engineering: Software Engineering in Society*, páginas 24–35.

Trinkenreich, B., Wiese, I., Sarma, A., Gerosa, M. A., e Steinmacher, I. (2022b). Women's participation in open source software: A survey of the literature. *ACM Trans. Softw. Eng. Methodol.*, 31(4):81:1–81:37.

Van Breukelen, S., Barcombt, A., Baltes, S., e Serebrenik, A. (2023). "still around": Experiences and survival strategies of veteran women software developers. In *2023 IEEE/ACM 45th International Conference on Software Engineering (ICSE)*, páginas 1148–1160. IEEE.

Wang, Y. e Redmiles, D. F. (2019). Implicit gender biases in professional software development: an empirical study. In Kazman, R. e Pasquale, L., editores, *Proceedings of the 41st International Conference on Software Engineering: Software Engineering in Society, ICSE 2019, Montreal, QC, Canada, May 25-31, 2019*, páginas 1–10, https://doi.org/10.1109/ICSE-SEIS.2019.00009. ACM.

Wolff, A., Knutas, A., e Savolainen, P. (2020). What prevents finnish women from applying to software engineering roles? a preliminary analysis of survey data. In *Proceedings of the ACM/IEEE 42nd International Conference on Software Engineering: Software Engineering Education and Training*, páginas 93–102.

Wynn, A. T. e Correll, S. J. (2018). Puncturing the pipeline: Do technology companies alienate women in recruiting sessions? *Social studies of science*, 48(1):149–164.

Yong, M. S., Paganini, L., Qiu, H. S., e Calderón, J. B. S. (2021). The diversity-innovation paradox in open-source software. In *18th IEEE/ACM International Conference on Mining Software Repositories, MSR 2021, Madrid, Spain, May 17-19, 2021*, páginas 627–629, https://doi.org/10.1109/MSR52588.2021.00089. IEEE.

# Appendix A

# Table showing barriers, suggestions and effects with their respective links and IDs.

Table A.1: Barriers, effects, suggestions and article links

| **Barriers** | **Effects** | **Suggestions** | **Link** | **ID** |
|---|---|---|---|---|
| Being the only woman, lack of encouragement, male dominance | Forced maturation, change in perspective, unconscious bias, Impostor syndrome, feeling of pain | Seek security, ignore, appropriate responses, consider constructive criticism, female connections on social media, continuous learning, ask for help, participate in technology events, have a "code friend", never underestimate yourself, let your work be a reflection of you, letting people know that you are a developer | dev.to/asayerio$_t$*echblog*/*programming*$-$*as* $-$ *a* $-$ *woman* $-$ *in* $-$ *tech* $-$ 2*a*15 | A1 |
| Most people are men, unequal salaries | Behaving like a boy, adapting to other people's vision, exhausting and challenging | Don't change yourself under pressure, master your skills, evaluate the company culturally, negotiate salaries, companies with women as mentors, don't feel influenced by prejudice, look for positions that challenge you | dev.to/ilonacodes/what-i-wish-as-a-woman-in-tech-i-knew-early-on-kpc | A2 |

Continues in the next page

| Barriers | Effects | Suggestions | Link | ID |
|---|---|---|---|---|
| Exclusion, lack of recognition, lack of professional advancement | Being ridiculed | Change jobs | dev.to/jesssolka/reflections-on-my-career-as-a-woman-in-tech-3l9e | A3 |
| Prejudice | Anger | Consider evolution | dev.to/mim/because-you-are-a-woman–2393 | A4 |
| Labeling, lack of professional recognition, underestimating | Shaken confidence, Pretending lack of ability, sadness, Being misunderstood | Consider developments, do not remain silent, the manager needs to be aware | dev.to/heyjtk/the-typecast-tango-avoiding-the-frontend-label-as-a-woman-in-tech-5a6m | A5 |
| Toxic masculinity, stereotypes, few trans women | Language replication, pain | N/a | dev.to/penelope$_z$*one*/*the*−*incredible*−*weight* − *of* − *being* − *a* − *trans* − *woman* − *in* − *tech* − 45*n*0 | A6 |
| Search for visibility, prejudice, exclusions, microaggressions | Invisibility, impotence and exhaustion, contempt and pain, shaken mental health | Presence of an "ally" | dev.to/eevajonnapanula/sometimes-i-feel-like-im-invisible-experiences-of-a-woman-in-tech-3glb | A7 |
| Stereotypes | N/a | N/a | dev.to/eevajonnapanula/sometimes-i-feel-like-im-invisible-experiences-of-a-woman-in-tech-3glb | A8 |
| Male dominance | Loneliness, doubt and frustration | Various professional areas, find a good mentor, progression above perfection, learn when to rest, embrace failure, continuous learning, document your journey, kill self-doubt imposter syndrome, speak up, build a support system, be patient, find out what motivates you, embrace failure, get social, consistency | dev.to/emma$_d$*onery*/*being* − *a* − *woman* − *in* − *tech* − *my* − *journey* − 1*mo*8 | A9 |
| Few women ready for the market | N/a | Leadership, encouragement, investing in education for women | dev.to/marinaserranomontes/yes-i-am-a-developer-and-yes-i-am-a-woman-4f8f | A10 |
| Ageism | N/a | Never give up | dev.to/studio$_{ms}$*ong*/*be* − *a* − *yes* − *woman* − 2*m*3*h* | A11 |
| Lack of recognition, lack of role models, impostor syndrome | Lack of confidence | Support systems, being a role model, not being afraid of failure, highlighting your strengths, mentoring other people, not being afraid of asking questions | dev.to/codementor/what-it-means-to-be-a-women-in-tech-in-2019–4el6 | A12 |

Continues in the next page

| Barriers | Effects | Suggestions | Link | ID |
|---|---|---|---|---|
| Feeling stupid, exclusion, devaluation | N/a | N/a | https://dev.to/hbalenda/nevertheless-it-still-sucks-to-be-a-woman-in-tech-1ghh | A13 |
| Lack of confidence in female potential, not being invited to meetings | Discouragement, overcoming, scared of entering the area | N/a | https://dev.to/$_s ugarcoded/so-this-what-it-s-like-being-a-woman-in-tech-432o$ | A14 |
| Invisibility | N/a | N/a | dev.to/mcampourcy/the-first-french-computer-science-thesis-author-was-a-woman-but-nobody-knows-ho7 | A15 |
| Aggressive work environment | N/a | N/a | dev.to/sabrinasuarezarrieta/developer-world-as-a-woman-2h6l | A16 |
| Salary disparity | N/a | N/a | dev.to/educative/hercode-tips-for-negotiating-compensation-as-a-woman-in-tech-50bl | A17 |
| Male dominance | N/a | Participate in open-source projects | dev.to/dellamora/boosting-woman-participation-in-open-source-projects-a-beginners-guide-to-contributing-5g49 | A18 |
| Gender prejudice, lack of equality between genders | N/a | Stop comparing, don't be ashamed, women helping women, be proud of what you have achieved | dev.to/techlorean/career-in-tech-why-bother-if-you-re-female-1pa4 | A19 |
| Lack of appreciation, role stereotypes, male dominance, ageism, difficulty in career progression, prejudice in the hiring process | Fewer women leaders receive less credit | Promoting equity | dev.to/stateofdevnation/on-the-role-of-female-coders-in-software-development-3nii | A20 |
| Male dominance, ES seems to be complicated, only woman on the team, Lack of help, being treated differently, afraid to ask questions | Discrimination, loneliness, invisibility and lack of support, lack of help | Ask questions, remain professional, have more female support, be confident in your skills and knowledge, give your opinion | dev.to/duomly/how-is-it-to-be-a-female-programmer-in-the-tech-world-341c | A21 |
| Job description, sexism, Insecurity | Personality change, fear of failure, prejudice, rejection | Change in recruitment processes | dev.to/char$_b$one/could-your-recruitment-process-be-discouraging-female-developers-4pch | A22 |
| Masculine dominance, being able to identify as a developer, unconscious bias hostile work environment, female minority, not feeling able | Pressure, anxieties and anguish, difficulty in seeing oneself as a developer, lack of confidence | Avoid sexism, have confidence | dev.to/rizz0s/persisting-past-dissonance-adapting-to-the-identity-of-a-female-developer-4413 | A23 |

Continues in the next page

| Barriers | Effects | Suggestions | Link | ID |
|---|---|---|---|---|
| Underestimation, role stereotypes, insecurity, proof of knowledge | Underestimation, generation of stereotypes, passive aggression, impostor syndrome and lack of confidence, unconscious bias | Female role models, diversity in workplaces, avoiding assumptions, accepting mistakes | dev.to/whatminjacodes/4-annoyances-of-being-a-female-developer-and-how-to-help-making-it-better-2ckg | A24 |
| Sexism, lack of respect, difficulty in entrepreneurship | Acceptance of rejection, misogeny, humiliation | Support and empathy, never stop believing in yourself, impose yourself | dev.to/rhiannonmonks/what-it-s-like-to-be-a-technical-female-founder-of-a-mobile-app-5pk | A25 |
| Few women | N/a | Disclosure of the advantages of diverse teams, female networking, recognition of competence, hiring more women, promoting professional development, providing a clear profile description, investing in training for women | dev.to/studio$_{ms}ong/taking-the-perspective-of-a-female-dev-581m$ | A26 |
| Female underrepresentation, male dominance, bias in hiring | Lack of female representation,fLack of career progression | Reduction of prejudice and incentives in the hiring process, use blind hiring techniques, promote inclusive culture, female opportunities, organizational awareness, encourage more women, motivate women to study disciplines related to exact sciences | dev.to/blueoptima/why-are-there-so-few-female-software-developers-4e47 | A27 |
| Male dominance, lack of women in IT to share, no negotiation, internal pressure, exclusion, stereotypes, lack of recognition, sexism | Excessive caution, pay gap, panic attacks, subtle abuse, lack of recognition | Avoid 100% male interviewers, offer flexibility, open and collaborative culture, -equivalent salary, identify problems | dev.to/ilonacodes/being-a-female-programmer-how-is-it-for-you-i7d | A28 |
| Female minority, difficulty entering the job market, reasons for giving up a career, sexism, stereotypes, men are more prone to the area | N/a | N/a | dev.to/annietaylorchen/why-are-there-less-female-developers-1d3d | A29 |

Continues in the next page

| Barriers | Effects | Suggestions | Link | ID |
|---|---|---|---|---|
| Male dominance, lack of respect and harassment, cultural pressure, discouragement, lack of visibility | Overcoming, harassment and lack of respect | Innovative job selections, flexible hours and remote work, having a good organizational culture | dev.to/maria$_m$$ichou/why-do-we-have-more-male-applicants-than-female-ones-32c7$ | A30 |
| Male dominance, lack of family support, toxic messages | N/a | Visibility, promotion of female work, mentoring, encouraging from childhood | dev.to/devdrake0/what-must-we-do-to-encourage-more-female-coders-155a | A31 |
| Male dominance, ageism, lack of career promotion, lack of advancement, AI penalizes women's resumes | N/a | Supporting the success of women in technology, encouraging companies | dev.to/thisdotmedia/the-future-of-ai-is-female-how-hiring-bias-mitigation-in-nlp-can-be-great-for-women-now-and-in-the-future-7fm | A32 |
| Male dominance, prejudice | Impostor syndrome | No one knows everything, have a support group | dev.to/eevajonnapanula/5-things-i-ve-learned-as-a-female-developer-p19 | A33 |
| Gender disparity | N/a | N/a | dev.to/kinas/becoming-a-female-software-engineer-who-studied-geography-3nnm | A34 |
| Being heard, stereotypes | N/a | Take risks, however you want, be heard, assertive communication | dev.to/aliracoffman/to-the-young-female-software-engineer-with-her-first-job-offer-4f4o | A35 |
| Exclusion, struggle for acceptance | Feeling scared | N/a | dev.to/studio$_m$$song/things-a-female-dev-who-has-been-in-the-industry-for-16-years-has-to-say-2li3$ | A36 |
| Conciliate | N/a | Constant learning, set limits and delegate tasks, ask for help, look for synergy, communicate clearly about your needs, redefine your victories, let go of blame, stay focused | dev.to/educative/6-tips-finding-your-balance-as-a-mother-and-software-engineer-47mn | A37 |
| Lack of female leadership | N/a | Gender diversity in companies, gender equity, training to deal with diversity | dev.to/kaviiiiisha/promoting-gender-equity-and-inclusion-in-the-tech-industry-and-beyond-41ic | A38 |
| Pay gap, discrimination | Lack of confidence | N/a | dev.to/whoisnnamdi/how-age-race-and-gender-affect-software-engineering-pay-59jo | A39 |

Continues in the next page

| Barriers | Effects | Suggestions | Link | ID |
|---|---|---|---|---|
| Lack of diversity, stereotypes and prejudices, lack of representation, workplace culture, poor hiring, compensation and promotion practices | Discouraged from following the area, they do not feel like they belong | Address stereotypes and biases, increase representation of women in the industry, promote inclusive workplace cultures, implement fair hiring practices and enable equal pay and advancement opportunities, offer mentoring and training programs, address unconscious biases, and promote the balance between personal and professional life. | dev.to/sayururehan/gender-equality-in-tech-breaking-barriers-and-building-a-better-future-3ho9 | A40 |
| Male dominance | N/a | Educate yourself, don't assume people's pronouns, recognize your privileges and bring diversity to the table, be patient with yourself, take action and speak up | dev.to/dionarodrigues/i-am-proud-to-be-a-transgender-it-developer-okh | A41 |
| Recognition | N/a | N/a | https://dev.to/calikat68/transgender-tech-o7i | A42 |
| Male dominance | Lack of empathy | Normalization of motherhood in tech | dev.to/erikaheidi/normalizing-maternity-in-tech-2oe9 | A43 |
| Always being responsible for sacrifices, not being able to work overtime, parental responsibilities, being a minority | It is only up to the mother to be absent from work, for fear of becoming out of date | Remote work, no time micromanagement | dev.to/rose/women-in-tech-being-a-developer-and-a-mom-gcf | A44 |
| Stereotypes, Devaluation of women | Abandonment | Valuation of women, Promote inclusive culture, Recognize your skills, Change recruitment processes, Be a role model/advertise, Build a support system, both to help others and to be helped, Invest in training for women, Change recruitment processes | www.infoq.com/news/2022/03/tight-cohesive-tech-teams/ | A45 |
| Stereotypes, Devaluation of women | Lack of female representation | Invest in training for women | www.infoq.com/news/2016/06/lack-women-in-tech/ | A46 |

Continues in the next page

| Barriers | Effects | Suggestions | Link | ID |
|---|---|---|---|---|
| Gender disparity | Change in the perspective of the environment / the presence of women is always noticed | Inclusive organizational culture | www.infoq.com/news/2014/10/west/ | A47 |
| Lack of recognition, Undervaluation, Sexism | Bias | Changing Recruitment Processes | www.infoq.com/news/2016/11/thoughtworks-women-friendly/ | A48 |
| Female Devaluation | N/a | Changing Recruitment Processes | www.infoq.com/news/2016/11 /managing-men-women/ | A49 |
| Stereotypes, Sexism, Male Dominance | N/a | Inclusive Organizational Culture | www.infoq.com/articles/book-review-good-guys/ | A50 |
| Sexism, Exclusion | N/a | Attending Tech Events, Being a Role Model/Spreading the Word | www.infoq.com/articles/book-review-good-guys/ | A51 |
| Sexism, Stereotypes, Microaggressions | N/a | N/a | www.infoq.com/news/2018/12/future-work-female/ | A52 |
| Underrepresentation | Imposter Syndrome, Underrepresentation of women, Acceptance, Overcoming | Recognizing your abilities, Being a role model/disclosing | www.infoq.com/articles/breaking-barriers-open-source/ | A53 |
| Ageism | Bias | Ignoring Bias | Imposter Syndrome, Inclusive Organizational Culture, Building a support system, both to help others and to be helped | www.in 02/ent thrive- tech/ |
| A54 | | | | |
| Undervaluation | N/a | N/a | www.infoq.com/presentations/women-hiring-inclusivity/ | A55 |
| Male Dominance, Feminine Devaluation, Stereotypes | Imposter Syndrome, Preventing Women from Entering the Field | Encouraging Sisterhood | www.infoq.com/ presentations/managing-men-women// | A56 |
| Male Dominance | N/a | N/a | www.infoq.com/presentations/women-ai-blockchain/ | A57 |
| Male Dominance | N/a | Be a Role Model / Spread the Word, Build a Support System, Both to Help Others and to Be Helped | www.infoq.com/presentations/women-agile// | A58 |
| Male Dominance | Bias | N/a | www.infoq.com/presentations/cs-culture-history/ | A59 |
| Stereotypes | N/a | N/a | www.infoq.com/presentations/women-agile-confidence/ | A60 |

Continues in the next page

| **Barriers** | **Effects** | **Suggestions** | **Link** | **ID** |
|---|---|---|---|---|
| Male Dominance, Gender Disparity | Imposter Syndrome | Recognizing Your Skills,Recognizing Your Skills, Being a Role Model / Promoting | www.infoq.com/presentations/women-programming/ | A61 |
| Male Dominance, Gender Disparity | Emotional Exhaustion | Recognizing Your Skills,Recognizing Your Skills, Being a Role Model / Promoting, -Changing Recruitment Processes | www.infoq.com/presentations/diversity-inclusion-panel/ | A62 |
| End of Table | | | | |

# Appendix B

# Demographic data

Table B.1: Demographic characteristics of the authors of the articles

| Article | Gender | Profession | Location | Year of registration |
|---|---|---|---|---|
| A1 | Woman | Front-end developer, software engineering student | Paris/São Francisco | 2021 |
| A2 | Woman | Software Engineer | Berlin, Germany | 2019 |
| A3 | Woman | Tech Lead/Senior Software Engineer | Washington | 2020 |
| A4 | Woman | Software Engineer at Adobe | San Francisco, CA | 2018 |
| A5 | Woman | Senior Backend Software Engineer | - | 2018 |
| A6 | Woman | - | New York | 2019 |
| A7 | Woman | Senior Android Developer | Helsinki, Finland | 2019 |
| A8 | Woman | Developer | Ohio | 2020 |
| A9 | Woman | Data Scientist/Software Engineer | Nairobi, Kenya | 2021 |
| A10 | Woman | Software Engineer | Granada, Spain | 2020 |
| A11 | Mixed | Engineers Group | Germany and Prague | 2020 |
| A12 | – | Development | - | 2019 |
| A13 | Woman | Developer | Seattle, Washington | 2018 |
| A14 | - | - | - | 2019 |
| A15 | Woman | JavaScript Developer | Nantes, France | 2019 |
| A16 | Woman | Software Engineer | Bogotá, Colombia | 2020 |
| A17 | Woman | Technical Content Writer | Seattle, Washington | 2022 |
| A18 | Woman | - | Porto Alegre, Brazil | 2021 |
| A19 | Woman | SAP Consultant/Tech Blogger | - | 2020 |

Continues in the next page

| Article | Gender | Profession | Location | Year of registration |
|---|---|---|---|---|
| A20 | - | - | - | 2023 |
| A21 | - | - | - | 2019 |
| A22 | Woman | Senior Full Stack Developer | United Kingdom | 2019 |
| A23 | Woman | Software Engineer | New York, New York | 2020 |
| A24 | Woman | Information Security Specialist | Helsinki, Finland | 2020 |
| A25 | Woman | Developer | London | 2020 |
| A26 | Male | - | - | 2019 |
| A27 | - | - | - | 2020 |
| A28 | Woman | Software Engineer | Berlin, Germany | 2019 |
| A29 | Woman | Front-end/Full-stack Developer | Stockholm, Sweden | 2020 |
| A30 | Woman | Software Engineer | - | 2017 |
| A31 | Male | Senior Full Stack Developer | London | 2019 |
| A32 | Woman | - | - | 2018 |
| A33 | Woman | Senior Android Developer | Helsinki, Finland | 2019 |
| A34 | Woman | Software Engineer | Berlin, Germany | 2019 |
| A35 | Woman | Content and Community Manager | Hamburg | 2020 |
| A37 | Woman | Researcher and Writer | - | 2021 |
| A38 | - | London | 2020 | |
| A39 | Male | Partner at Lightspeed Venture Partners | San Francisco, CA | 2019 |
| A40 | Male | Software Engineering Intern | Colombo, Sri Lanka | 2022 |
| A41 | Woman | Senior Front-end Developer | Dublin, Ireland | 2020 |
| A42 | Woman | Business Systems Analyst | Los Angeles, California | 2018 |
| A43 | Woman | Developer Experience Engineer | The Hague | 2019 |
| A44 | Woman | Development Manager | Victoria, British Columbia | 2019 |
| A45 | Male | Independent Consultant | - | 2012 |
| A46 | Male | Editor-in-Chief, Culture and Methods | - | 2009 |
| A47 | Male | Agile Coach | - | 2018 |
| A48 | Male | Editor-in-Chief, Culture and Methods | - | 2009 |
| A49 | Woman | Agile Coach | - | 2016 |
| A50 | Woman | Engineering Manager | - | 2023 |
| A51 | Male | Independent Consultant | - | 2012 |
| A52 | Male | Independent Consultant | - | 2012 |
| A53 | Woman | CTO | China | 2022 |
| A54 | Woman | Software Developer | - | - |

Continues in the next page

| Article | Gender | Profession | Location | Year of registration |
|---|---|---|---|---|
| A55 | Woman | Leadership Development Expert | San Francisco | - |
| A56 | Woman | Various Roles in AI and Blockchain | - | - |
| A57 | Woman | Film Producer | - | - |
| A58 | Woman | Agile Coach | - | - |
| A59 | Woman | Programmer | - | - |
| A60 | Woman | Agile Coach | - | - |
| A61 | Male | Independent Consultant | - | 2012 |
| A62 | Woman | Engineering Leader | - | - |
| End of Table | | | | |