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Reflecting aspects of gender inequality in the brazilian software development sector

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Abstract. *Software development encompasses activities from conception, design, implementation, testing, and maintenance. Despite efforts in the sector to include women, some limitations still persist. For a more specific view of this scenario, it is essential to reflect on aspects of gender inequality in the software development industry. We propose a study based on Equity Theory, which aims to promote equal conditions among individuals in the workplace. To this end, we conducted an Exploratory Survey with 67 professionals in this sector, followed by a quantitative analysis of these data. The analysis revealed several key characteristics, including female under-representation, salary inequality—especially in back-end positions—barriers to entering the sector and to educational qualification, insecurity when applying for a job, the impacts of parental responsibilities, and motivations for choosing the field. We believe that these results can motivate reflections on organizational policies that minimize gender inequalities in the software development sector and contribute to inclusive and diverse initiatives in this industry.*

Keywords. *Software Industry; Software Development; Women in Technology; Gender Equity*

Resumo. *O desenvolvimento de software abrange uma ampla gama de atividades, desde a concepção, design, implementação, teste e manutenção. Apesar de iniciativas do setor para inclusão de mulheres, algumas limitações ainda persistem. Para obter uma visão mais específica deste cenário, é essencial uma reflexão sobre os aspectos de desigualdade de gênero em cargos profissionais*

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de desenvolvimento de software. Esta pesquisa é fundamentada na Teoria da Equidade, que promove a igualdade de condições entre indivíduos no ambiente de trabalho. Para isso, foi conduzido um Survey Exploratório com 67 profissionais deste setor, seguido de uma análise quantitativa desses dados. A análise revelou algumas características-chave, incluindo sub-representatividade feminina, desigualdade salarial —– especialmente no cargo de back-end —–, dificuldades de entrada no setor e de qualificação educacional, insegurança ao se candidatar a uma vaga de emprego, impactos de responsabilidades parentais e motivações para a escolha da área. Acreditamos que esses resultados podem motivar a reflexão sobre políticas organizacionais que minimizem as desigualdades de gênero no ambiente de desenvolvimento de software e contribuam com iniciativas inclusivas e diversas neste setor.

Palavras-Chave. *Indústria de Software; Desenvolvimento de Software; Mulheres na Tecnologia; Equidade de Gênero*

1. Introduction

Inequity is a pervasive concern in many contexts, including the working environment in the industry sector [Adams 1963]. To define the fairness of the relationship between employee and employer, Adams (1963) proposed the Equity Theory. This theory evaluates perceptions of fairness among individuals by comparing their inputs — *e.g.*, effort, gender, ethnicity — and outcomes — *e.g.*, salary, recognition, and opportunities — [Adams 1963], in which disparities in the perceived relationship between a Person's inputs and outcomes relative to those of Others may lead to feelings of injustice, dissatisfaction, and reduced motivation.

Disparities may be related to various inputs [Adams 1963], and gender is an aspect of great interest in the literature [Canedo et al. 2024, Canedo et al. 2021, de Andrade et al. 2017, Soares et al. 2023]. According to the 2024 Annual Socioeconomic Report on Women (Raseam), gender inequality is a social reality in Brazil, manifested in various spheres, such as education, health, public life, human rights, and economic empowerment. This scenario worries, since many Brazilian women still live in disadvantage or vulnerability compared to men. In the Information Technology (IT) sector, this situation is no different, since few women works in IT companies [Geller and Chun 2021], especially in software and hardware companies—36% and 33%, respectively [Atal et al. 2019]. More recently, in 2024, the Brazilian Association of Information and Communication Technology Companies (Brasscom) conducted a census with 20,600 IT professionals, identifying only 34.2% of them were women [Brasscom 2025].

Nevertheless, stereotypes, including gender stereotypes, affect many contexts, producing negative effects — *e.g.*, on performance — [Pennington et al. 2016]. In software development, gender-specific characteristics, such as product color, can affect users' perceptions of products [Santos et al. 2022]. Furthermore, negative stereotypes are intertwined in the software industry [Matthiesen et al. 2023, Kovaleva et al. 2023], which raises concerns about gender inequality in the Brazilian software development industry. Therefore, it is necessary to promote inclusive and equitable environments in this sector,

as this can be reflected in the created products [Kovaleva et al. 2023, Kovaleva et al. 2022, Fine et al. 2020, Williams 2014], a concern associated with Grand Challenge 4 for Information Systems Research in Brazil for the decade 2016-2026 [Araújo and Suzana 2017], which addresses the search for a sociotechnical vision of information systems, also associated with the United Nations (ONU) Sustainable Development Goal (SDG) 5 for Gender Equality, which can be analyzed from the perspective of Equity Theory.

However, despite initiatives to include women in the IT industry, more specifically in software development positions, some limitations still persist, such as the low enrollment of women in IT programs, discrimination, stereotypes, and salary differences [Silva 2021, Constante et al. 2022]. Furthermore, prior studies have examined a range of gender-related aspects in the software development sector, including maternity [Rocha et al. 2023b], participation in open-source communities and software development projects [Canedo et al. 2019, Bosu and Sultana 2019], ageism [van Breukelen et al. 2023], benefits of diversity and inclusion [Kohl and Prikladnicki 2022], and underrepresentation of women [Silva et al. 2022]. More closely related to our research are the studies of Canedo et al. (2023) and their subsequent work [Canedo et al. 2024], which investigate men's perceptions of inequality within software development teams. In addition, Canedo et al. (2021) examine women's perceptions, challenges, barriers, and proposed strategies in software development teams.

Explicitly, what differentiates this study from other recent and thematically similar studies is that our work lies in its comprehensive examination of a broad set of gender-related aspects within the Brazilian context. Specifically, we analyze the perceptions of both men and women regarding their own professional contexts, rather than in comparison to the opposite gender, thus enabling the identification of perceptual disparities across the software development sector in Brazil from the perspective of Equity Theory. To this end, we study the following Research Question (RQ): "*What is the macro-level social, academic, and professional profile of software development professionals in Brazil, and how does this profile relate to gender inequality in the sector?*". Our main goal is to characterize the macro-level social, academic, and professional profile of software development professionals in Brazil and to examine the relationships between these characteristics and manifestations of gender inequality in the sector, considering aspects of personal characterization, academic education, and professional experience.

To answer our RQ, we conducted a Survey with 67 professionals from the software development sector. We instrumented the Survey with an online questionnaire containing 21 questions designed to address our RQ, considering the social, academic, and professional aspects of the participants. Our analysis revealed the participants' social and professional profiles, highlighting specific inequalities and barriers faced by women in the sector, such as a pay gap compared to men, even when holding the same position; disparity in parental responsibilities; and lesser professional qualifications in some cases due to limited opportunities; and a lower chance of starting a first job in software development.

Thus, we contribute to the reflection and decision-making regarding the planning and implementation of organizational policies to minimize gender inequalities, as well as

to create a more inclusive and diverse environment in the software development sector.

The remainder of the paper is organized as follows: Section 2 contextualizes the IT industry, emphasizing the software development sector from a gender perspective; Section 3 discusses some key works related to this study; Section 4 presents our methodology; Section 5 presents our results and discusses the findings based on demographic characteristics and the professional performance of the participants; Section 6 exposes some threats to validity for this study; and, finally, Section 7 presents the conclusion.

2. Background

At the end of the 19th century, struggles for women's rights were already evident, including claims for social, political, and economic rights. It also stands out movements questioning the relationship between capital and jobs, as well as stereotypes of sexuality, marriage, and education [Tonelli 2023]. Despite these movements, they were not enough to significantly transform organizations' policies regarding the hiring of women in the industry [Tonelli 2023]. Considering this context, and to better understand this work, we provide explanations of some relevant concepts, including Equity Theory (Section 2.1), the organizational environment (Section 2.2), and gender in the IT organizational environment (Section 2.3).

2.1. Equity Theory

Equity Theory was originally introduced by Adams (1963) to define relationships within the work environment and was later formally redefined by Walster, Berscheid, and Walster (1973), incorporating both positive and negative inputs and outcomes. This theory applies whenever two individuals engage in an exchange, which may result in the perception that the exchange was not equitable [Adams 1963].

A central aspect of understanding this theory lies in the concepts of input and outcome. Input is characterized as attributes of individuals, perceived as existing either by the possessor alone or by both members of the exchange, and can vary widely, including, for example, age, sex, and ethnicity [Adams 1963]. In contrast, outcomes are recognized by the recipient or by both parties involved in the exchange and may include salary, status, and other benefits [Adams 1963]. Naturally, inputs and outcomes are imperfectly correlated, which may generate perceptions of inequality [Adams 1963].

Formally, Adams (1963) defines inequality as a perceived disproportionate relationship between a Person and Others with respect to their respective inputs and outcomes, where *Person* refers to any individual and *Other* refers to any individual used as a reference by the Person [Adams 1963]. This relationship can be expressed as:

$$\frac{O_A}{I_A} = \frac{O_B}{I_B} \tag{1}$$

where O_A and I_A represent the outcome and input of individual A, respectively, and O_B and I_B represent the outcome and input of individual B. Since inputs and outputs may assume negative values, Walster, Berscheid, and Walster (1973) reformulated the

formal relationship of exchange as:

$$\frac{Outputs_A - Inputs_A}{|Inputs_A|^{k_A}} = \frac{Outputs_B - Inputs_B}{|Inputs_B|^{k_B}} \tag{2}$$

where outputs correspond to positive (rewards) or negative (costs) consequences of the exchange. Conversely, inputs represent the contributions of a Person, which may be perceived by the recipient as either rewards or costs [Walster et al. 1973].

Equity Theory is an important concept in Information Systems (IS) research and has been widely applied in the literature. Arvanitis and Hantzi (2016), for instance, employed this theory to determine causal schemas, identifying whether outcomes are caused by the inputs of others in an exchange process [Arvanitis and Hantzi 2016]. Similarly, Ahmadpour-Samani *et al*. (2022) investigated two central questions: "what is the magnitude of equity that one may perceive in comparison to other members of an organization?" and "how much should the resources (outcomes) of an underpaid member be reduced or increased to achieve a perception of equity?".

In the present study, we specifically investigate Equity Theory in the context of perceived gender inequalities within the software industry, focusing on how the inputs and outcomes on women workers were perceived in comparison to those of male professionals.

2.2. Organizational Environment

The job market is a relationship between employers and employees, involving opportunities and skills in fields such as economics, construction, healthcare, and IT [Escola 2014]. However, a problem arises when the number of qualified candidates is incompatible with the open opportunities [Fortune 2023].

In IT industry, careers vary in salaries and flexibility [Heiler et al. 2023]. Inpser (2024) pointed out that 2023 presented a period of restructuring and layoffs in the IT industry. However, the sector had already achieved growth compared to the same period in 2022 [Insper 2023]. Furthermore, a Survey from Advance Consulting found that the IT industry in Brazil grew 22% in the second quarter of 2024 alone [Consulting 2024].

Despite improvements, companies are highlighting problems, ranging from a lack of a qualified workforce in skills such as critical thinking, complex problem solving, creativity, originality, and emotional intelligence [Di Battista et al. 2023]. Additionally, there is low participation of women in the field, accounting for only 23.6% of the workforce, compared to men [Ey 2023].

2.3. Gender in the IT Organizational Environment

Gender equity is the respect for diversity in an environment. This concept refers to everyone feeling respected, valued, and able to contribute in their roles [Vitorino 2023]. Regarding gender equity in hiring new employees, some studies stand out addressing this aspect [Machado et al. 2021, Gustmann et al. 2021, Castro et al. 2023, Vitorino 2023, Santos and Gibertoni 2023].

To achieve gender equity in hiring new employees, some aspects must be observed, from the job interview to the actual position in the company [Vitorino 2023, Santos and Gibertoni 2023], including salary differences, barriers to career advancement, double work shifts, and abuse and moral and sexual harassment [Machado et al. 2021, Gustmann et al. 2021, Vitorino 2023, Santos and Gibertoni 2023].

Reports related to the IT field are not far from this problem. Despite organizations' constant efforts to promote change, gaps between men and women still exist in aspects such as representation, differential treatment, differences in positions held, and pay disparity [Machado et al. 2021].

Aware of these issues, companies have been encouraged to promote a cultural shift toward a more equitable society [Castro et al. 2023], since it is understood that equity promotes financial results, in terms of performance, which tends to outperform competitors in innovation, profitability, and growth [Gazquez and Macuch 2021]. Therefore, it is important to develop strategies to encourage the inclusion of women in the IT industry, addressing emerging concerns, such as the opportunity to work in a hybrid or remote way; the facilitation of the conciliation of work, home, and childcare; the promotion of the full, equal, and meaningful leadership of women; and the promotion of career advancement and recognition in the workplace [Gustmann et al. 2021].

3. Related Works

Many studies reported low participation of women in the industry [Souza Leal de and Filha 2023, Tonelli 2023]. Given this scenario, initiatives, such as #EDUCASTEM2030 from the United Nations Educational, Scientific, and Cultural Organization (UNESCO), aim to minimize this in the exact sciences, reversing inequalities [Unesco 2020]. Another initiative from the company Oi proposed the Female Leadership Acceleration Program, aiming to increase the representation of women in executive leadership positions [Oi 2022]. Despite these examples, fields such as IT are still underrepresented by women.

Canedo et al. (2024) investigated men's perceptions of gender inequality in the Software Engineering sector. Through a two-stage study (investigation and confirmation), the authors revealed that most men did not identify sexist behavior in their workplaces and were satisfied with their careers. Although acknowledging a low presence of women in leadership positions, studies indicated that challenges faced by men differ from those faced by women, with communication and lack of training being the main barriers cited by participants. The authors emphasized the importance of involving men in promoting a more inclusive culture, suggesting that actions such as training courses can help to reduce gender barriers and promote equity in the sector.

To understand diversity on agile teams, Motta and Silva (2023) conducted a quali-quantitative analysis of a productivity and quality measurement tool. The Survey addressed three dimensions: diversity profile, technical profile, and soft skills. The questionnaire was created using Google Forms and sent to different teams, with most questions using a 5-point Likert scale. Results showed that productivity and quality were positive,

and there is a correlation in teams' diversity.

Trinkenreich et al. (2022) investigated challenges faced by women in software development teams, particularly those leading them to leave their companies. To this end, the authors conducted exploratory research with women in the software development department of a global company. Results showed that women face challenges such as difficulty balancing work and personal life, hostile and benevolent sexism, lack of recognition and equality among their colleagues in the same role, and impostor syndrome.

Kovaleva et al. (2023) illustrated how careers have historically been divided by gender according to physical characteristics and qualities required for their achievement. However, currently, software engineering and computer science remain male-dominated fields, in spite of women participating as much as men in the creation of the first computer and programming language. Furthermore, diversity brings several benefits, such as innovation and a better understanding of the needs of different groups, bringing higher quality to development.

As discussed by Rocha et al. (2023a), mothers face several difficulties in their professional trajectories in the Information and Communication Technology field. Among the study's main findings, the difficulty of reconciling motherhood with work demands stands out, especially during the COVID-19 pandemic, a period in which domestic and professional overload intensified. Furthermore, the authors highlight the occurrence of harassment and prejudice related to motherhood in the workplace. It is concluded that the discrimination experienced by mothers working in the field of Software Engineering may not only discourage women from entering this field, but also limit their opportunities for professional growth and development.

Silva et al. (2022) sought to identify, through an online questionnaire, the possible reasons for the low number of women in the technology field. The results indicated that more than half of the participants stated that they faced obstacles to professional advancement. Among the main difficulties mentioned were the need to work harder than men to be recognized, salaries that are incompatible with the market, leadership issues, lack of female role models, work-life balance, lack of transparency in teams, and gender discrimination.

Considering these challenges, studies addressing the expansion and exploration of Diversity, Equity, and Inclusion (DEI) in IT teams are interesting [Marques et al. 2024]. Furthermore, initiatives such as lectures promoting gender equity; the development of a *maker* culture, teaching and training women in programming languages; proposals of educational projects guiding adolescent women in schools; and collective, political, and social articulations seeking the creation and consolidation of labor inclusion laws for women in IT are important to increase women's participation [Frade 2022].

4. Methodology

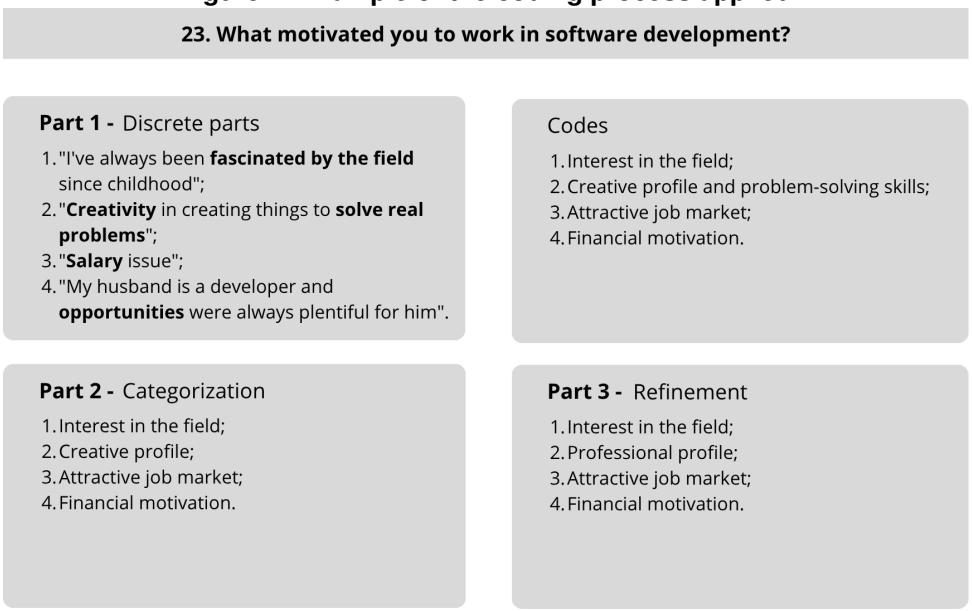
We conducted a qualitative–quantitative study of the software development sector to better understand gender inequalities, with some consideration of sexual orientation. Qualitative research aims to understand a phenomenon, interpreting it from the perspective of the sub-

jects in the situation [Guerra 2014]. Quantitative research aims at identifying indicators and trends in reality (*i.e.*, representative and objective data) [Mussi de Freitas et al. 2019]. Therefore, a quali-quantitative research uses both qualitative and quantitative techniques to collect and analyze data [Guerra 2014, Mussi de Freitas et al. 2019].

The quantitative research collected numerical data. We obtained data from objective questions from an online questionnaire and quantified it in integer and percentage formats, generalizing the results according to their context. We adopted qualitative research to understand opinions and motivations absent in quantitative research. To this end, we used elements of the Grounded Theory (GT) method, consisting of three stages: (1) open coding, (2) axial coding, and (3) selective coding [Corbin and Strauss 2014].Therefore, we explored data from open-ended questions, standardizing the raw data. It is important to emphasize that the raw data were words or terms of the sector and were continually reviewed to obtain inferences aligned with the context of participants.

In this study, Grounded Theory was applied to the open-ended questions relevant to coding. Thus, the coding stage occurred as follows: to perform open coding, the data were divided into small parts, and these parts were labeled to create codes. Then, axial coding was applied by reading the small parts extracted from the data and the assigned codes to identify connections between the codes and to group them into categories. Finally, selective coding was carried out through the review and refinement of the generated categories and codes. An example of the coding process is shown in Figure 1. The example presents the coding of a set of responses to Q23 regarding the motivation to work in software development. The complete coding process is available in the Supplementary Material.

Figure 1. Example of the coding process applied



4.1. Planning

To answer our RQ, we developed an online questionnaire with objective and subjective questions, using *Google Forms*[1]. We constructed the questionnaire based on the literature of this area [Oliveira 2022, Frade 2022, Queiroz Ferreira and Bueno 2023, Santos and Marczak 2023, Marques et al. 2024] with twenty-one (21) questions, seventeen (17) objective and four (4) subjective. The main goal of this instrument was to obtain data from a macro view of the social, academic, and contextual environment of professionals working with software development in Brazil. More specifically, we want to understand aspects of gender equality, including the participation and profile of women in this context. It was important to note that stereotypes in software development could affect the products created [Pennington et al. 2016], impacting the sociotechnical view of information systems. Canedo et al. (2019) pointed out that the literature identified gender diversity as promoting innovation, problem-solving skills, and a healthier work environment. The literature also indicated that diversity could reduce community smells in software organizational structures [Catolino et al. 2019, Canedo et al. 2021]. The questions from the questionnaire can be seen in Table 1.

To investigate women's participation in software development, we analyzed profiles of women working in IT, more specifically in software development, aiming to identify personal characterization, academic education, and professional experience, and in this context, understand the challenges and inequalities faced by these professionals. The questionnaire is available in the Supplementary Material for this study (Section 8).

4.2. Data Collection

We collected data between August 27th and September 22nd, 2023. We sent the questionnaire by email to a group of professionals selected from the social network *LinkedIn*[2] focusing on the software development field. In total, we sent one hundred and thirty-five (135) emails and received sixty-nine (69) responses. It is important to highlight that participants were also asked to share the questionnaire with their professional network in the software development field to expand the sample of individuals investigated. Therefore, this factor may justify the concentration of a larger number of responses from participants in the state of Paraíba.

4.3. Analisys Method

After an initial analysis of the raw data, we checked data consistency and removed invalid records. At the end of this activity, we discarded two (2) responses since they reported never having worked in software development. Thus, for the final analysis, we considered sixty-seven (67) responses. We standardized raw data to ensure they were consistent with the objective of this study. We entered data into Google Sheets[3] for organization and filtering, allowing us to identify relevant patterns.

[1]*Google Forms*: `https://www.google.com/intl/pt-BR/forms/about/`
[2]*LinkedIn*:`https://www.linkedin.com/home`
[3]*Google Sheets*: `https://workspace.google.com/intl/pt-BR/products/sheets/`

Table 1: Questions from the questionnaire

Questions	**Type / options**
1. State of residence	Brazilian states list + abroad / prefer not to say
2. City-country (if abroad)	Open response
3. Gender	Male / Female / Prefer not to say
4. Age	Age ranges / Prefer not to say
5. Sexual orientation	Heterosexual / LGBTQIA+ / Prefer not to say
6. Ethnicity	Mixed-Race / Black / White / Indigenous / Quilombola / Prefer not to say
7. Marital status	Single / Married / Separated / Divorced / Widowed / Prefer not to say
8. Number of children	None / 1 / 2 / 3 / More than 3 / Prefer not to say
9. Primary caregiver for children	Open response
10. Family routine interference	Yes / No / Not sure / Prefer not to say / Other
11. Undergraduate degree in IT	Listed programs / Prefer not to say / Other
12. Graduation year	Before 2010 / List of years between 2010 and 2023 / Prefer not to say
13. Postgraduate education	Specialization / MBA / Master's / Doctorate / Postdoctoral / Prefer not to say
14. Postgraduate field	Open response
15. Companies worked for	1 / 2 / 3+ / Prefer not to say
16. Years working in IT	Time ranges / Never worked in IT / Prefer not to say
17. First IT work area	Database / Teaching / Back-end / Front-end / Testing / Other
18. Employment type	Informal / Temporary / Formal / Public service / Self-employed / Other
19. Work modality	On-site / Remote / Hybrid / Prefer not to say
20. Changes due to home office	Yes / No / Prefer not to say
21. Salary range	Salary brackets / Prefer not to say
22. Confidence when applying for jobs	Yes / No / Prefer not to say
23. Professional motivation	Open response
24. Programming languages used	Multiple choice + Other
25. Development category	Front-end / Back-end / Mobile / Embedded systems / Other
26. Other development category	Open response
27. Communication tools	Slack / Discord / etc. / Other
28. Software trends awareness	Listed trends / Prefer not to say
29. Essential technologies	Listed technologies / Other
30. Version control tools	CVS / SVN / Git / etc. / Other
31. Agile methodologies	Kanban / Scrum / XP / etc. / Other
32. Databases used	Oracle / PostgreSQL / etc. / Other

Based on this, it was possible to apply qualitative-quantitative methods and evaluate how the results could contribute to answering our RQ. The raw data can also be found in our Supplementary Material (Section 8).

It is important to highlight that in this study, the coding process was adopted only for question 23 of the questionnaire presented in Table 1. The other open-ended questions in the questionnaire referred to optional answers provided by the participants or in a complementary way. Therefore, the answers provided in questions 02, 09, 14, and 26 were not mandatory or did not provide sufficient input for an analysis based on coding.

5. Results and Discussion

In this section, we presented the results and discussed the Survey. First, we created a demographic profile of the participants, detailing their personal and academic backgrounds. Next, we addressed their professional profiles and technological trends in software development.

5.1. Demographic Data

Regarding demographic information, we collected data such as place of residence, gender, sexuality, ethnicity, marital status, whether they had children, their primary caregiver, whether childcare interfered with their work routine, and their current work model (face-to-face, remote, and hybrid). Furthermore, we also assessed the participants' academic profiles.

5.1.1. Personal Characterization

The participants in this study were from Paraíba (38), São Paulo (9), Rio Grande do Norte (5), Pernambuco (4), Ceará (2), and Rio de Janeiro (2); the others are distributed in Sergipe, Santa Catarina, Rondônia, Rio Grande do Sul, and Mato Grosso do Sul (one per state). Two participants indicated living abroad, in Germany and Spain, respectively.

Regarding gender, forty-two participants identified themselves as heterosexual men, fifteen as heterosexual women, three as LGBTQIA+ men, six as LGBTQIA+[4] women, and one preferred not to say their sexual orientation, totaling sixty-seven participants. Therefore, most participants were men, reflecting a reality that was still observed in the IT field, where the majority of the active workforce was male [Botella et al. 2019, Canedo et al. 2020, Sousa et al. 2021, Al Tamime and Weber 2022, Trinkenreich et al. 2022b, Trinkenreich et al. 2022c, Rodrigues Magalhães et al. 2024]. In this context, Canedo et al. (2021) pointed out that men represented 91.88% of the workforce in software development. Izquierdo et al. (2019) reinforced these data, indicating around 10–12% participation of women as both code and non-code contributors in OpenStack communities. In the Brazilian context, Brasscom (2025) reported that women accounted for only 34.2% of participation in the

[4]LGBTQIA+: Acronym used to refer to the lesbian, gay, bisexual, transgender, queer, intersex, and asexual community.

IT sector. In turn, the National Federation of Information Technology Workers (FENATI) indicated that men represented 81% of the workforce in the IT sector [FENATI 2023]. Similarly, the Institute for Applied Economic Research (Ipea) pointed to male participation of around 77% in the sector between 2010 and 2023, based on data from the Annual List of Social Information (RAIS), a dataset on employment in Brazil.

The nine LGBTQIA+ participants were equivalent to 13.4% of the responses. Among the nine participants in this community, six were women and three were men. When comparing this percentage with that of women in the sector, it was clear that, although the proportion of women was still small, it was 2.45 times higher than that of LGBTQIA+. Pinheiro (2020) identified similar figures in IT companies, where 19.82% of participants identified as homosexual and 26.87% were women. In the context of companies and universities, Pichardo et al. (2019) also conducted a survey with 8,557 respondents, identifying that 13.4% of participants identified as LGBTQIA+. In its census of 20,600 professionals, Brasscom (2025) reported that LGBTQIAP+ individuals accounted for only 10.9% of professionals in the Information and Communication Technology (ICT) sector.

The majority of participants were young, between 21 and 30 years old (Table 2). Two participants preferred not to say their age. Regarding ethnicity, thirty-five participants identified themselves as white, while twenty-three identified themselves as mixed race. From the fifty-eight (86.6%) white and mixed-race participants, nineteen were women. Five identified themselves as black (two of them women). Furthermore, although this study focused on the profile of software development professionals, the results were consistent with other studies, indicating that the IT field was predominantly occupied by white men between the ages of 25 and 30 [Souza 2017]. This finding highlighted the need for greater participation of minority groups in the sector, which was composed of 91.9% male developers [Statista 2022]. Regarding age, the Brasscom (2025) census indicated that ICT professionals were predominantly between 26 and 35 years old. With respect to ethnicity, Brasscom (2025) reported that 15.5% of ICT professionals were black, whereas white professionals accounted for 72.7%. Mixed-race professionals represented 19.5% of the workforce, followed by 2.5% identifying as yellow, and only 0.4% were classified as indigenous [Brasscom 2025].

Table 2. Age range of participants by gender

	Man	Woman	Quantity	%
From 26 to 30 years	15	7	22	32.8
From 21 to 25 years	9	4	13	19.4
41 years or older	7	4	11	16.4
From 31 to 35 years	7	3	10	14.9
From 36 to 40 years	6	3	9	13.4

When considering the marital status of the participants, thirty (44.8%) were married, thirty-five (52.2%) were single, and two (3.0%) preferred not to say. Among the twenty-two women participants, nine were married, twelve were single, and one preferred

not to say. The percentage of married women was similar to that reported by Canedo et al. (2024), which indicated that 42.9% of women were married. The remaining participants either had partners (27.6%) or were single (27.2%). In an empirical study of the challenges faced by women in the software industry, Trinkenreich et al. (2022) identified that 62.8% of women were married, while 25.5% were single or divorced. In this context, Canedo et al. (2024) indicated that gender stereotypes might perpetuate inequalities, as women were often led to perform socially assigned roles (e.g., childcare and household tasks), while men were expected to act as family providers. As a result, professional women might experience work overload, since historically women had been associated with domestic responsibilities, leading to a double burden between household duties and participation in the labor market [Rocha et al. 2023b].

Regarding paternity/maternity, forty-six (68.7%) of the participants did not have children; of these, twenty-nine were men and seventeen were women. Among the twenty-one who did have children, fifteen had one child, four had two children, and two had three children. No participant abstained from responding or reported having more than three children. The twenty-one respondents with children were asked about the primary caregiver for their child(ren) while they worked. fourteen (66.7%) indicated their wife as the caregiver, two (9.5%) their husband, two (9.5%) informed themselves, one (4.8%) themselves and their spouse, one (4.8%) a relative (grandmother), and one (4.8%) someone else (nanny). In Rocha et al. (2023), the majority of women had two children (48.2%); the remaining participants had one child (39.0%), three children (9.9%), four children (2.1%), or five or more children (0.7%). Considering this context, Trinkenreich et al. (2022) indicated that childcare could be particularly challenging for women, especially with respect to work–life balance issues, highlighting the need for inclusive policies. Such policies included sponsoring childcare services, preferably on-site, providing adequate maternity leave beyond what was required by national legislation, and offering flexibility in working hours and location. In addition, Trinkenreich et al. (2022) pointed out that mothers also faced difficulties when returning to work, such as sexism, the need to constantly prove themselves, excessive supervision, and receiving fewer work opportunities. Rocha et al. (2023) also identified work–life balance issues as a significant challenge for mothers, in addition to other forms of prejudice, such as inappropriate jokes and moral harassment, which could lead to insecurity and decreased work performance.

When asked if their childcare routine interfered with their work and whether they would like help with childcare, thirteen (61.9%) reported not feeling any interference in their routine, six (28.6%) reported interference in their childcare routine and would like help, one (4.8%) reported interference but did not want help, and one participant (4.8%) preferred not to say. Of the group of thirteen participants who reported having children and did not feel it interfered with their work routine, only two were women; six reported interference in their work routine and would like a support network — of this group, two were women; one man reported interference in his work routine and would not like a support network. Only one participant preferred not to say. When analyzing the impact of childcare on her work routine, of the five women with children, three responded that they did not experience impacts. Of these, one reported working remotely and having a nanny care for her child(ren); the second responded that she worked in a hybrid mode

and her father was the primary caregiver; and the third reported that she worked remotely and shared childcare responsibilities with her husband. The other two mothers experienced interference and would like more help — in this case, one worked remotely and was primarily responsible for her child's care, and the other worked in a hybrid format, and her husband was the primary caregiver. In another study of women alumni of IT programs, Alves, Sousa, and Gonçalves (2024) also identified occasional difficulties among graduates in balancing work with family responsibilities (not specifically with children). Regarding maternity, Rocha et al. (2025) investigated the challenges of motherhood in software development teams.

Participants were also asked about their current work modality, and forty-nine (73.1%) reported remote work, eight (11.9%) indicated hybrid work, eight (11.9%) reported in-person work, and two (3.0%) preferred not to say. These results diverged from the findings of Rocha et al. (2023), in their study on maternity, which reported that 42.6% of participants worked face-to-face, while the remaining participants worked in a hybrid mode (33.3%) or remotely (22.0%). Canedo et al. (2024) also identified the adoption of flexible working hours and remote work as measures that could promote a more inclusive work environment.

5.1.2. Academic Education

Regarding education, sixty-two (92.5%) participants were graduates. Of this group, forty-three (69.4%) were men and nineteen (30.6%) were women; another two (2.3%) women, although in the job market, indicated that they were still pursuing a degree; one (1.5%) male participant did not have a higher education degree, and one (1.5%) woman preferred not to say. Concerning graduation, most participants were from Systems Analysis and Development, with six women and five men (16.42%); Computer Science, with eleven men and five women (23.88%); Computing and Information Technology, with six men and one woman (10.45%); and Computer Engineering, with six men and one woman (10.45%). With respect to the year of graduation, of the sixty-two graduate participants, eleven (17.7%) men completed their degree in 2022; in the same year, only one woman was present (1.6%). Next, the period with the most participants completing their degree was before 2010, with seven (11.3%) participants, three of whom were men and four were women. In 2023, there were eight (12.9%) graduates, all women. Of the graduate participants, forty (64.5%) had postgraduate degrees, thirty-two (51.6%) of which were in IT.

Table 3 quantified participants by gender, according to their postgraduate programs. It was possible to see that male participants were more likely to pursue postgraduate degrees than women. Other studies have also reported a high number of participants holding at least a bachelor's degree. In their study on maternity, Rocha et al. (2023) indicated that only one woman did not have a bachelor's degree. Similarly, Canedo et al. (2024) reported that only 24.4% of participants did not hold a bachelor's degree, as they were undergraduate students. Based on these findings, it can be concluded that members of software development teams generally present a high level of educational attainment. The low proportion of individuals without a bachelor's degree suggests that access to

Table 3. Types of postgraduate of participants (IP: In progress; C: Completed)

	Man	Woman	Quantity	%
Academic Master's Degree (C)	7	2	9	22.5
Specialization (IP)	3	2	5	12.5
Specialization (C)	4	1	5	12.5
MBA (C)	5	0	5	12.5
MBA (IP)	2	0	2	5.0
Academic Master's Degree (IP)	2	0	2	5.0
Professional Master's Degree (IP)	0	2	2	5.0
Doctorate (IP)	1	0	1	2.5
Doctorate (C)	0	1	1	2.5

higher education is common among professionals in this context, which may influence career opportunities, participation in the labor market, and perceptions of work–life balance.

About postgraduate education in master's and doctoral programs, 22.5% of the participants had completed a stricto sensu master's degree, seven men and two women. Only one participant, a woman, had completed a doctorate. Within the context of postgraduate studies, we investigated participants' areas of specialization. Thirty-three responses were obtained, with a balanced distribution across areas, with the largest number in Software Development (12.1%), with three men and one woman. It was worth noting that eight participants (four men and four women) preferred not to say. Observing the proportions between men and women who were pursuing or had a postgraduate degree, some disparities were observed, such as while twenty-four (53.3%) of the men were qualified with a postgraduate degree, only eight (36.4%) of the women met the same criteria. Analyzing women with a postgraduate degree, it was possible to see that four (50.0%) had one or more children. Thus, of all women with children (five), the only one who did not have a postgraduate degree was the one who took care of her child alone; all the others attributed the main responsibility either to another person or to themselves together with their husband. The literature also pointed to greater male participation and gender disparities in postgraduate courses in the IT area, such as Oliveira, Mello, and Rigolin (2020), who pointed out that women accounted for 43.6% of the scientific production of theses and dissertations in this area in Brazil, while only 35.2% were supervisors. Canedo et al. (2024) also identified a similar proportion of postgraduate participants, reporting that 12.4% held a master's degree and 10.6% held a Ph.D. degree. In contrast to our findings, Rocha et al. (2023) identified a high proportion of women pursuing postgraduate education, with 36.2% of women holding a master's degree and 29.1% holding a Ph.D. degree.

5.2. Professional Experience

In this section, we discussed the characteristics of participants concerning work experience in software development, salary range, technologies used, essential technologies for work, and emerging technologies.

To understand the development of participants' careers, they were asked how many companies they had worked for. The majority of participants (forty) indicated having worked for "three or more" companies, with twenty-five men and fifteen women. The participants were also asked whether they felt insecure when applying for a job; forty-six (68.7%) participants responded "yes," with the majority being twenty-eight men and eighteen women. About this topic, 12.6% of participants felt insecure when applying for a job, which may have been due to the difficulty of women being present in the exact sciences and technology fields. This factor may have been related to the stereotype that women could not hold certain professional or leadership positions, with deep-rooted prejudices causing insecurity and leading to impostor syndrome (Parrella et al., 2022). Alves, Sousa, and Gonçalves (2024) also highlighted insecurity among IT graduates, with 78.3% of them refusing to apply for a job because they did not consider themselves competent or good enough for the position. Franco, Lopes, and Breternitz (2019) pointed out that women claimed to be negatively influenced at work. Through sexist jokes and bullying, they might lose belief in their own career growth and face judgment in the workplace. This ultimately generated a feeling of devaluation and professional discouragement. The Ministry of Women (2024) also pointed out that the labor force participation rate for men aged 14 and over in Brazil in 2022 was 71.9%. Furthermore, the survey data also pointed to barriers for women, considering salary and parenthood.

Concerning work experience, twenty-nine (43.3%) participants reported having worked for more than five years, twenty-three men and six women. Regarding the field of their first job, twenty-one (31.3%) respondents indicated Software Development — Back-end (sixteen men and five women), followed by Software Development — Front-end, with ten (14.9%) respondents, including six men and four women. Other options indicated were Full-stack Development, also with ten (14.9%) responses, all from men; Software Testing, with six (9.0%) responses, including four women and two men; and the fifth most reported field was Database, with three (4.5%) responses, including two men and one woman. A notable difference was found in the Back-end development area, with seventeen (37.8%) of forty-five men working in this area, while only three (13.6%) of twenty-two women indicated this area. Results suggested that participants' positions were directed toward software development, with thirty-three of forty-five (73.3%) men indicating this area, while eleven of twenty-two (50.0%) women indicated it — a significant result, but lower than that observed for men. It was noteworthy that many professionals could work multifunctionally, performing different roles throughout the development of projects. In this context, Fuller (2019) pointed out that an overarching functional structure in the software industry may cause cross-functional software teams to become counterproductive. Regarding the first job, of the twenty-two women, fifteen (68.2%) had their first job in software development, while seven (31.8%) had their first job in areas that did not fit into software development. For men, a higher percentage had their first job in the software field, 88.9%, which was equivalent to forty of the forty-five male participants.

This factor corroborated the previous discussion regarding women's insecurity in applying for positions in the sector. However, this aspect alone was not sufficient to justify the predominance of men entering the software development sector. It was important to investigate the motivations leading women to not consider this sector as their

first job opportunity. Canedo et al. (2023) also identified a high level of experience among professionals in the software development sector, with 51.9% having worked in the field for more than three years. The remaining participants reported four or more years of experience, including 28.1% who had been working in the field for more than fifteen years. In the Brazilian context, Campos (2023), in a study conducted for Ipea using RAIS dataset from 2010 to 2021, identified an increase in the length of service of ICT professionals over time, with the highest average observed in 2020, when the mean length of service reached 5.8 years. Sousa and Prado (2026) also identified that this figure remained high in the public sector, with a mean length of service of ten years or more among professionals.

The most reported current employment type was formal, with thirty-two (47.8%) respondents. Another eight (11.9%) participants reported working informally (without an employment relationship), eight (11.9%) worked as freelancers (self-employed), six (9.0%) worked in public service, four (5.8%) worked as scholarship students or interns, three (4.5%) worked as legal entities (PJ), and four (6.0%) preferred not to say. Concerning work style, forty-nine (73.1%) participants worked remotely. Of these, thirty-four (50.7%) reported that working remotely interfered with their family routines — twenty-three (34.3%) men and eleven (16.4%) women. The remaining fourteen participants who worked remotely reported that it did not interfere with their family routines, and only one participant preferred not to say. Souza (2021) also pointed out the existence of informal work relationships in ICT jobs, outside the scope of the Brazilian Consolidated Labor Laws (CLT). It was also common for work performed outside formal CLT arrangements to involve meeting tight deadlines, which could lead to continuous work over several days, including nights and weekends, as well as vacation disruption due to work demands [Souza 2021].

Regarding salary, the data were analyzed by range, observing gender differences among the participants. The analysis of the salary of Back-end developers (Figure 2) showed that it was predominantly male-dominated and, in certain instances, men's salaries surpassed those of women. Concerning the salary of front-end developers (Figure 3), women's participation was higher, and salaries were comparable between men and women. For full-stack developers (Figure 4), women's participation was low, and men's salaries exceeded those of women. According to Rocha et al. (2023), sociocultural challenges in the software industry could lead to demotivation or even job resignation.

The salary range most indicated by participants was above eight thousand Brazilian current money (R$ 8.000,00), with twenty-six (38.8%) indications, twenty-one men and five women. It could be seen that, among the twenty-two women, those earning salaries above R$ 8.000,00 worked as Back-end and Front-end developers. In this range, Back-end development had the highest number of responses, with eleven men and two women. For the other areas in this sector, Front-end developers' salaries received only one indication above this threshold — a woman. Full-stack development indications had only two salaries above this threshold, both from men. Mobile development indications also received one salary above this threshold, from a man. It was also possible to find that, in the embedded systems development area, women participants' salaries were between R$ 2,000.00 and R$ 4,000.00, while male participants' salaries were between R$

Figure 2. Salary range for the *Back-end* position

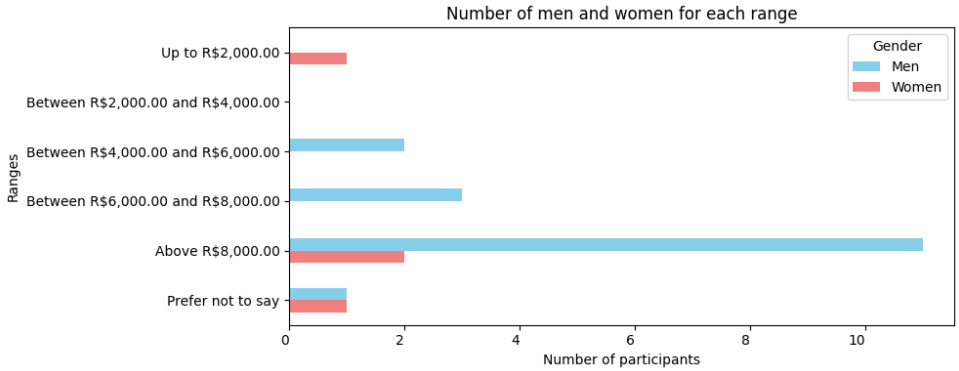


Figure 3. Salary range for the *Front-end* position

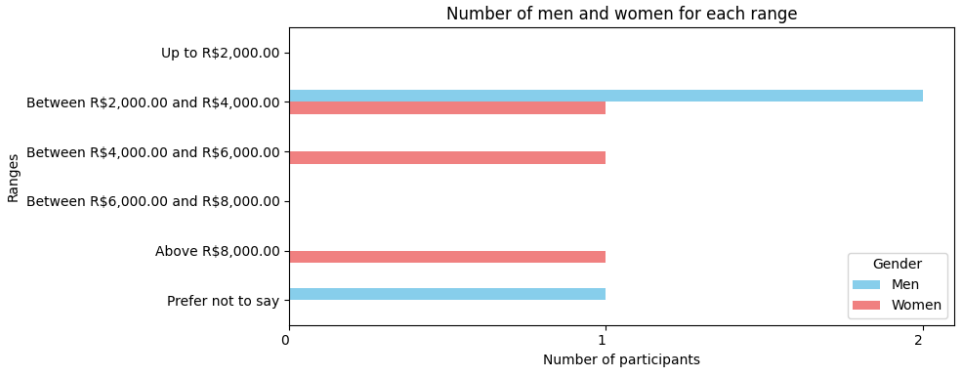
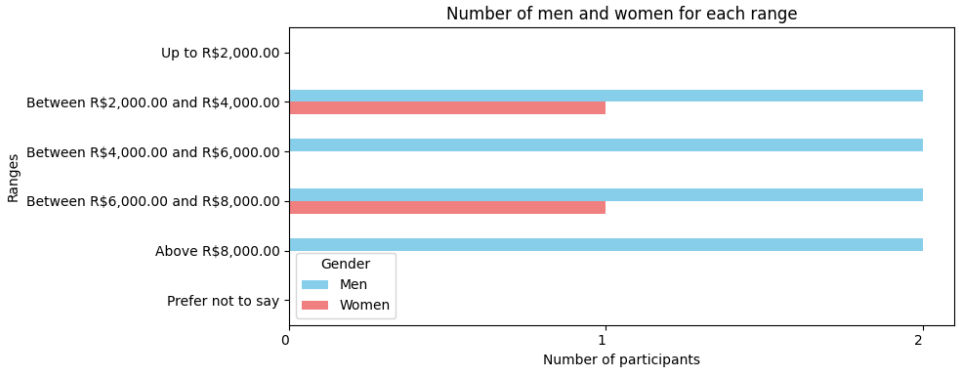


Figure 4. Salary range for the *Full-stack* position



6,000.00 and R$ 8,000.00 or above R$ 8,000.00 (one indication). Thus, there was a greater salary upgrade for men compared to women in the development area (fifteen indications of salaries above eight thousand versus one indication, respectively). Overall, among the forty-five male participants, twenty-one had a salary above R$ 8,000.00, while among the twenty-two female participants, only five received the same salary. This result was also highlighted in Souza and Oliveira (2023), which indicated a salary difference regardless of position in the software development sector. This reality was also significant in other areas. The National Household Sample Survey (PNAD) indicated that Brazilian

Table 4. Programming languages currently used by participants

	Man	Woman	Quantity	%
Java	30	14	44	65.7
JavaScript	20	10	30	44.8
Python	14	7	21	31.3
React	9	9	18	26.9
Ruby	7	1	8	11.9
Bootstrap	6	1	7	10.5
Rails	5	1	6	9.0
C#	3	3	6	9.0
C	3	3	6	9.0
Angular	4	1	5	7.5
C++	2	2	4	6.0
GO	4	0	4	6.0
PHP	1	2	3	4.5
Typescript	2	1	3	4.5
SQL	2	1	3	4.5
Swift	2	0	2	3.0
Elixir	2	0	2	3.0
Delphi	0	1	1	1.5
Thunkable	1	0	1	1.5
Dart	1	0	1	1.5
Flutter	1	0	1	1.5
Spark	1	0	1	1.5
ADVPL	0	1	1	1.5
UiPath	0	1	1	1.5
R	1	0	1	1.5
Automation Anywhere	0	1	1	1.5

women earned, on average, 76% of men's salaries (Ipea, 2019; Magalhães, Fernandes, and Sousa, 2024). In a study based on the Brazilian employment dataset (RAIS), Campos (2023) identified an increase in salaries in the ICT sector, rising from R$ 5,560.00 in 2010 to R$ 11,760.00 in 2021. On the other hand, in a study with ICT professionals, Brasscom (2025b) reported salaries ranging from R$ 4,314.00 to R$ 4,635.00 between September 2024 and August 2025.

Concerning the programming languages in use, forty-four (65.7%) of responses indicated Java, comprising thirty men and fourteen women; next was JavaScript, with thirty (44.8%) of responses, including twenty men and ten women. Other languages were mentioned: Delphi, Thunkable, Dart, Flutter, Spark, ADVPL, UiPath, R, and Automation Anywhere (Table 4). Only one woman preferred not to say. Canedo et al. (2024) also found a high usage of JavaScript (56%) and Java (46%). Other languages were also reported by them, such as Python (34%), TypeScript (31%), and PHP (19%), which differed from the other languages identified in our study.

With respect to the area of actuation, twenty-one (31.3%) interviewees worked with Back-End Development, being seventeen men and four women, followed by Full-Stack Development, with eleven (16.4%) responses (eight men and three women). Other categories were mentioned: Front-end Development (9.0%), Engineering Manager (1.5%), Software Testing (4.5%), Data Science (3.0%), Tech Lead (3.0%), IoT (1.5%), Data Engineering (3.0%), Reliability Engineering (1.5%), Computer Maintenance (1.5%), Product Manager (1.5%), and Software Development Management with 1.5% (Table 5). The specific areas considered as development included Front-End Development, Mobile Development, Embedded Systems Development, Full-Stack Development, Web Development, and Automated Test Development. Only three participants (two men and one woman) preferred not to say. Canedo et al. (2024) also pointed out that a large number of professionals worked as developers, accounting for about half of the respondents.

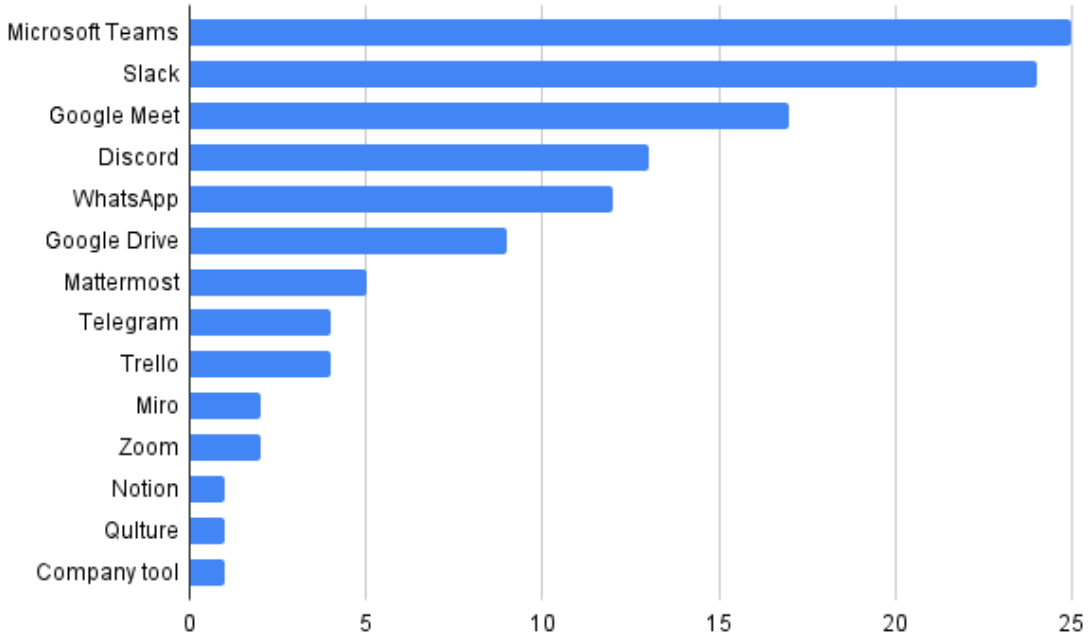
Table 5. Participants' Software Development Category

	Man	Woman	Quantity	%
Back End	17	4	21	31.3
Full-stack	8	3	11	16.4
Front End	3	3	6	9.0
Mobile	4	1	5	7.5
Embedded Systems	2	1	3	4.5
Software Testing	0	3	3	4.5
Data Science	1	1	2	3.0
Tech lead	2	0	2	3.0
Data Engineering	2	0	2	3.0
Automated Testing	0	2	2	3.0
Engineering Manager	1	0	1	1.5
IoT	1	0	1	1.5
Web Development	1	0	1	1.5
Reliability Engineering	1	0	1	1.5
Computer Maintenance	0	1	1	1.5
Product Manager	0	1	1	1.5
Software Development Management	0	1	1	1.5

The communication tool most used was Microsoft Teams, with twenty-five (37.3%) responses, eighteen from men and seven from women. Another twenty-four (35.8%) used Slack, eighteen men and six women. Google Meet also received a considerable number of responses (seventeen). Other tools were mentioned: Asana, Jira, Notion, Qulture, Zoom, and company-specific tools (Figure 5). To the best of our knowledge, there was little literature comparing the use of communication tools. One example was Flame et al. (2023), who compared Skype and Microsoft Teams in terms of usability.

Concerning development trends, thirty-seven (55.2%) participants reported SaaS (Software as a Service), with thirty men and seven women. DevSecOps was indicated in seventeen (25.4%) responses, with eleven men and six women (Table 6). Twelve

Figure 5. Communication tools currently used by participant companies



participants (six men and six women) preferred not to say. SaaS and DevOps had long been seen as trend in Computer Science and Information Technology. SaaS was a cloud service model that united infrastructure management and user experience, while, in the context of cloud services, DevOps brought together development and operations teams [Gangula 2021].

Table 6. Development trends highlighted by participants

	Man	Woman	Quantity	%
SaaS (Software as a Service)	30	7	37	55.2
DevSecOps	11	6	17	25.4
Progressive Web App	15	0	15	22.4
Low Code	8	6	14	20.9
DesignOps	4	1	5	7.5
Mixed Reality	4	1	5	7.5
Civic Technology	4	1	5	7.5
Hyperautomation	0	3	3	4.5

In respect to technologies essential in the industry, JavaScript was the most cited language, with fifty-five (82.1%) responses, thirty-nine men and sixteen women; next came Java, with thirty-nine (58.2%) responses, twenty-seven men and twelve women. With similar numbers, HTML and CSS were mentioned, with thirty-eight (56.7%) responses, thirty men and eight women. Python followed, accounting for 50.8% of the responses. Numbers for other technologies could be seen in Table 7. Only two women

preferred not to say. Concerning these technologies, the programming, scripting, and markup languages report showed that JavaScript was at the top, with 66% of responses, followed by HTML/CSS at 61.9%. In third place was SQL, with 58.6% of responses, which was somewhat similar to what was presented in this study.

Table 7. Main technologies considered essential for the market from the perspective of participants

	Man	Woman	Quantity	%
JavaScript	39	16	55	82.1
Java	27	12	39	58.2
HTML e CSS	30	8	38	56.7
Python	21	13	34	50.8
Spring Boot	21	7	28	41.8
AngularJS	8	5	13	19.4
PHP	8	3	11	16.4
Apache Maven	9	1	10	14.9
Bootstrap	5	4	9	13.4
GO	8	1	9	13.4
Ruby	6	2	8	11.9
Java para Android	5	2	7	10.5
React	3	0	3	4.5
SQL	2	0	2	3.0
Git	2	0	2	3.0
C, C++	1	0	1	1.5
Vue	1	0	1	1.5
Dart (Flutter)	1	0	1	1.5
Terminals	1	0	1	1.5
Tail Wind	1	0	1	1.5
Docker	1	0	1	1.5
Apache Kafka	1	0	1	1.5
Apache AirFlow	1	0	1	1.5
AWS	1	0	1	1.5
Azure	1	0	1	1.5

Git was the versioning technology with the most indications, sixty-four (95.5%) — forty-four men and twenty women. Regarding agile approaches, sixty-four (95.5%) participants indicated Scrum, forty-four men and twenty women, as could be seen in Table 8. Kanban was also cited by 79.1% of the responses (thirty-four men and nineteen women). In third place was XP, with 20.9% of citations (eleven men and three women). Only two women preferred not to say. Regarding this aspect, the 2025 software development survey pointed out that Git was predominant in software development, with 59.3% of respondents indicating the use of GitHub and 25.6% indicating the use of GitLab [Stack Overflow 2025]. Furthermore, agile methods such as Scrum and Kanban were increasingly gaining interest and adoption in the software industry [Hossain 2023].

Table 8. Agile methodologies used by participants

	Man	Woman	Quantity	%
SCRUM	44	20	64	95.5
Kanban	34	19	53	79.1
XP	11	3	14	20.9
Lean	3	6	9	13.4
SAFe	2	1	3	4.5
FDD	2	0	2	3.0
XGH	1	0	1	1.5
TDD	1	0	1	1.5
Extreme Go horse	1	0	1	1.5

PostgreSQL was the most frequently mentioned database, with thirty-nine (58.2%) responses — thirty-two from men and seven from women — followed by "Oracle", with twenty-three (34.3%) responses, seventeen from men and six from women. The remaining responses could be seen in Table 9. Only two women preferred not to say. The 2025 software development report indicated that PostgreSQL continued to hold the top position, with 45.55% of responses, followed by MySQL at 41.09%. Oracle appeared in only 9.8% of the responses [Stack Overflow 2025]. Therefore, the main database technologies reported were aligned with the findings of this study.

Table 9. Databases used by participants

	Man	Woman	Quantity	%
PostgreSQL	32	7	39	58.2
Oracle	17	6	23	34.3
MySQL	16	6	22	32.8
SQL Server	12	6	18	26.9
MongoDB	14	4	18	26.9
Redis	15	2	17	25.4
SQLite	11	0	11	16.4
Cassandra	2	0	2	3.0
DB2	0	1	1	1.5

Concerning motivations to work with software development (open question), to facilitate analysis, responses were grouped by gender. Some answers provided by women were "*The job market*", "*Salary issue*", "*My husband is a developer, and there were always opportunities opening up for him, so I decided to take a chance*", "*Flexibility*", "*Money*", "*The desire arose during my undergraduate studies*", "*Remote work and being close to family*", "*Work environment and salary issue*", "*Quality of life and the expectation of working from home*", "*Personal skills, better job opportunities, and salary*", "*Search for knowledge in the technology area*", "*I like development*", and "*Financial stability*". While the answers provided by men were "*I like the area*", "*I have always been fasci-*

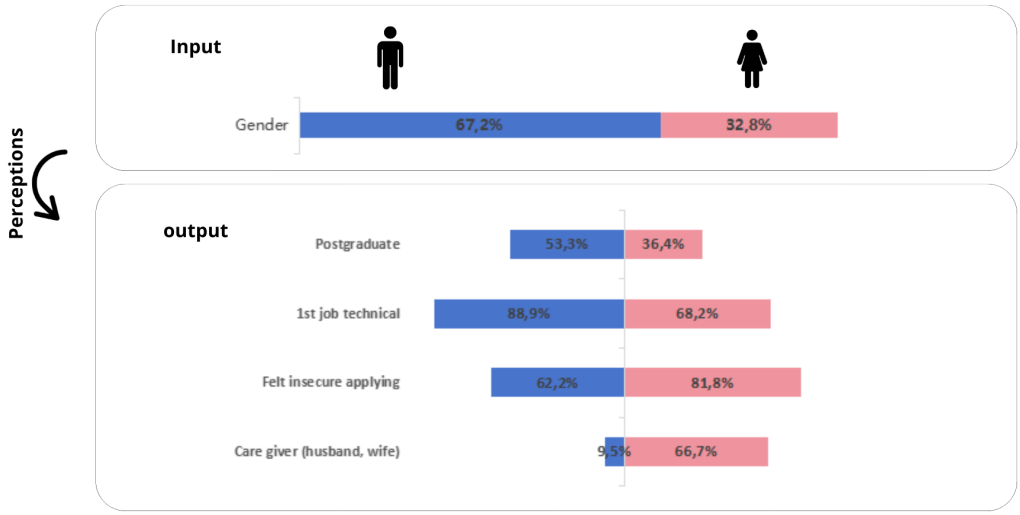
nated by the area since my childhood", "*Salary*", "*Creativity in creating things to solve real problems*", "*I have always liked technology and wanted to work with something related*", "*Affinity with the area*", "*Greater availability of job openings*", "*The challenges of the profession*", "*Games and money*", and "*Satisfaction in working in what I like*".

Therefore, most women chose the development field due to job opportunities and salaries. Only three of them reported that their motivation was because they enjoyed the field. Others reported the flexibility of the type of work, which could bring them closer to their families. Men's motivations, however, were quite different. Most indicated that their main motivation was a passion for the field, confirming the study by Calitz, Cullen, and Fani (2020), which reported that men's entry into the IT field occurred naturally, through exposure to technology, games, and programming. Only four men reported that their motivation was salary-related or that their choice was related to job opportunities. On the other hand, no evidence of participants' lack of motivation to remain in the sector was observed. However, these aspects could be considered in future studies, mainly to identify and validate issues related to gender equity in the sector.

5.3. Equity Theory

In this section, we analyzed the data from the perspective of Equity Theory, considering gender as an input and different aspects, such as salary and qualifications, as outputs, in order to visualize inequalities in the software development sector. This analysis was based on data collected from both men and women. Figure 6 summarizes the outcomes perceived as inequitable when gender is considered as an input factor. The results reflect respondents' perceptions of how changing an individual's gender affects the fairness of the outcomes received.

Figure 6. Equity theory – results summary



Regarding the sense of representation, our results showed that men represented

67.2% of the sample (forty-five out of sixty-seven), while women represented only 32.8% (twenty-two out of sixty-seven). In this way, these numbers could lead to a perception of the under-representation of women in the software development sector, as also pointed out in several other studies [Canedo et al. 2024].

Concerning salary, we found that 46.7% of men (twenty-one out of forty-five) earned more than R$ 8,000,00, whereas only 22.7% of women (five out of twenty-two) were in the same salary range. This difference was even more pronounced in Back-end development, where eleven men (24.5% of men) earned within this range, compared to only two women (9.1%). Such disparities contributed to the perception of inequality in the software development sector. As discussed throughout this work, salary was an outcome that was often perceived as unequal in this field.

Inequalities were also observed in academic background, as 53.3% of men (twenty-four out of forty-five) reported having completed postgraduate studies, while only 36.4% of women (eight out of twenty-two) reported the same. Another source of inequality related to entry into the sector and self-perception of competence. While 88.9% of men (forty out of forty-five) had their first job in a technical role, only 68.2% of women (fifteen out of twenty-two) reported the same experience. In contrast, 81.8% of women (eighteen out of twenty-two) reported feeling insecure when applying for a job, compared to 62.2% of men (twenty-eight out of forty-five).

Furthermore, women had historically been associated with household and childcare responsibilities, which resulted in a double work burden. In this context, 66.7% of respondents—predominantly men—indicated that their wives were primarily responsible for childcare. Therefore, multiple aspects related to inequality in the software sector were identified and discussed in this study, which could lead to job dissatisfaction or even to women leaving the sector [Rocha et al. 2023b].

6. Threats to Validity - Limitations

Some threats to validity were identified, and initiatives were taken to mitigate them.

External validity is perceived in the predominance of participants from certain states (*e.g.*, Paraíba). Therefore, study participants may not uniformly represent all regions of Brazil or other countries, which may affect the generalizability of the results. To minimize this threat, we sought to expand the survey's reach to other states and compare the results presented with those of other studies in the literature. Another aspect to consider is the year in which our survey was conducted (2024), which may lead to different results if the study is replicated. To minimize this threat, we compared our results with existing literature, such as the 2025 software development report [Stack Overflow 2025], highlighting similarities and differences between our findings and those reported in the literature.

There is a threat to *internal validity* related to the design of the instrument used in the study, in this case, a questionnaire. To minimize this threat, the Survey was designed with typical questions of software development and related to the realities of software developers. The threat to *construct validity* lies in the Survey design, which may mis-

represent the reality of software developers regarding question consistency. To maintain alignment between questions, the Survey was designed and structured around common themes from the literature on work, gender, and IT. Furthermore, options were included for participants in areas other than software development. Responses from male developers were also included, allowing a contrast between the realities of women and male developers.

Finally, a threat to the *conclusion validity* was perceived regarding the number of responses received in the Survey. To minimize this threat to validity, we sought to select as many women as possible, including participants from different states and even countries. Furthermore, responses were also collected from male participants, allowing a more accurate understanding of the perceptions of women software developers, expanding the response pool to 67 participants. We employed a non-probability sampling strategy (*i.e.*, convenience sampling). This approach is appropriate in our context because probability sampling requires access to the entire target population (unfeasible in our case). Furthermore, sampling in the Software Engineering sector is often challenging [Baltes and Ralph 2022, Ghazi et al. 2019, Punter et al. 2003]. Our online self-recruited survey [Punter et al. 2003] invited 135 LinkedIn members, receiving 67 valid responses, corresponding to a response rate of 49.6%. Our sample size is consistent with, and compares favorably to, those reported in prior Software Engineering surveys. For instance, Punter et al. (2003) reported sampling sizes in their five surveys ranging from 45 to 220 respondents and response rates between 8.2% and 19.6%.

7. Conclusion

This study is related to the topic of interest *"Diversity, Equity, and Inclusion in Information Systems"*, indicated in the Information Systems Research Track (TPSI) of the Brazilian Symposium on Information Systems (SBSI). The results contribute to *"Challenge 4 - Sociotechnical Vision of Information Systems"*, related to the Grand Challenges of Information Systems Research in Brazil for the Decade 2016-2026 [Boscarioli et al. 2017].

To obtain the data used in the research, a Survey was developed. This Survey received 67 participants, professionals in the field. The study provided an overview of the participation of men and women in software development teams in Brazil from the perspective of Equity Theory. It analyzed the profiles of professionals to identify gender inequalities and barriers faced by women, such as salary disparities, differences in educational background, insecurity when entering the job market, and challenges in balancing parental responsibilities with career development, including their differences and motivations to remain in the sector.

The general results revealed patterns related to the demographic characteristics and professional performance of the participants, including aspects such as gender, diversity and inclusion, parenting, academic background, job insecurity, entry into the sector, the predominant areas of software development, salary, and motivation to choose the development area.

To minimize such disparities, gender-sensitive organizational policies and actions

are essential. Some examples of these policies are paid parental leave for both genders, childcare allowances, hybrid or remote work, equal and transparent pay, and inclusive organizational culture.

Unlike recent thematically similar works, our study examines men's and women's perceptions simultaneously within the Brazilian software development sector. Rather than examining perceptions of the opposite gender, we analyze how professionals perceive their own social, academic, and professional contexts, thereby enabling a macro-level assessment of gender inequalities through the lens of Equity Theory.

As future work, this study proposes *(i)* to investigate gender-sensitive organizational policies in the software industry to understand the implementation of practices that support the entry and retention of women in this sector; and *(ii)* to explore the evidence that discourages the entry and retention of professionals in this sector, particularly about diversity and inclusion issues.

8. Supplementary Material

The Supplementary Material for this research can be accessed in the following repository: `https://zenodo.org/records/20683160`.

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