







Research Article

Perception of gender stereotypes in the intention to undertake in the area of information technology: A qualitative study with undergraduate students at a federal university

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Abstract

The **objective** The aim of this study is to understand how women in higher education in Information Technology (IT) perceive the influence of gender stereotypes on their intention to undertake their field of activity. Through basic qualitative research, nine semi-structured interviews were conducted with students of the Bachelor's Degree in Information Technology (BTI) at a Brazilian federal university. As an analysis strategy, content analysis was used, in the thematic/categorical modality, with the support of the ATLAS.ti® software. The **main results** showed that gender stereotypes are common in the IT sector and that the insertion of women in entrepreneurship tends to be affected by this perception. As **theoretical contributions**, a lack of female self-representation in leadership positions in business was observed, and sexism was perceived as a social problem and a cause of the reported inequalities. The **relevance** of this article lies in the gap in the literature on female entrepreneurship from the perspective of gender stereotypes, especially in the IT sector. **Social contributions** to management consist of producing insights into the problem of female entrepreneurship in the IT sector, an area with little empirical research on the subject, which can assist in the development of public policies and initiatives that promote gender equality and the empowerment of women in this field.

Keywords: Female entrepreneurship, Gender stereotypes, University education, Male chauvinism.

Percepção de estereótipos de gênero na intenção de empreender na área de tecnologia da informação: Um estudo qualitativo com estudantes de graduação de uma universidade federal

Resumo

O **objetivo** deste trabalho é compreender como mulheres em formação de ensino superior em Tecnologia da Informação (TI) percebem a influência do estereótipo de gênero na intenção de empreender em sua área de atuação. Por meio de pesquisa qualitativa básica, foram realizadas nove entrevistas semiestruturadas com alunas do curso de Bacharelado em Tecnologia da Informação (BTI) de uma universidade federal brasileira. Como estratégia de análise, empregou-se a análise de conteúdo, na modalidade temática/categorial, com apoio do software ATLAS.ti®. Os **principais resultados** evidenciaram que os estereótipos de gênero são comuns no setor de TI e que a inserção das mulheres no empreendedorismo tende a ser afetada por essa percepção. Como **contribuições teóricas**, observou-se uma carência da autorrepresentação feminina em posições de liderança em negócios, e o machismo foi percebido como um problema social e uma causa das desigualdades relatadas. A **relevância** deste artigo reside na lacuna existente na literatura sobre empreendedorismo feminino sob a ótica dos estereótipos de gênero, especialmente no ramo da TI. As **contribuições sociais** para a gestão consistem na produção de insights sobre a problemática do empreendedorismo feminino no setor de TI, área com pouca pesquisa empírica sobre o assunto, o que pode auxiliar no desenvolvimento de políticas públicas e iniciativas que promovam a igualdade de gênero e o empoderamento das mulheres nesse campo.

Palavras-chave: Empreendedorismo feminino, Estereótipos de gênero, Ensino superior, Machismo.

INTRODUCTION

The gender discourse has expanded in recent years, driven by the need to address social inequities. Bourdieu (2001) posited that gender is primarily a social construct that integrates a relational principle of symbolic domination, where male power permeates relationships between men and women. Sexual differences and the social classifications of masculinity and femininity contribute to the complexity of gender, extending beyond culture and symbols. Since the late nineteenth century, as noted by Engels (2019) and Saffioti (2013), the understanding of womanhood has been intrinsically linked to capitalist production relations.

This dynamic, characterized by power inequalities and male privileges, is often understood as machismo—a system that subordinates women and perpetuates domination relationships. In a patriarchal society, a historical system of male domination manifests in various spheres of life (Saffioti, 2015). These inequalities are normalized and justified through gender stereotypes that limit women's opportunities and potential (Federici, 2004). Consequently, gender differences in entrepreneurial decisions can have significant economic, cultural, and social implications (Machado et al., 2013).

Despite advancements in the 21st century, the subordinate position of women in the workforce remains a persistent challenge in many contexts (Carreira et al., 2015). For instance, the wage gap index between men and women in Brazil is 23.6%; on average, women earn around 76.4% of men's wages (IBGE, 2021). Gender equality, therefore, remains an elusive goal in the country.

A significant proportion of the female workforce comprises self-employed individuals, informal workers, and entrepreneurs. As women manage multiple roles, they often face conflicts between their business responsibilities and household activities, leading to work overload (Gimenez et al. 2017). Theoretical reflections on female entrepreneurship remain scarce, with few studies attempting to formulate general propositions about its characteristics, motivations, and outcomes.

From a gender perspective, some scholars associate entrepreneurship with symbolic male dominance (Bruni et al., 2004; Sweida & Reichard, 2013). The literature on entrepreneurship frequently highlights gendered roles, favoring what Gupta et al. (2013) term Stereotype Threat Theory (STT), which examines how stereotypes influence differences in evaluating work and business opportunities between men and women.

Literature reviews, such as those by Brush et al. (2019) and Balachandra et al. (2019), reinforce the persistence of structural inequalities that hinder women's advancement in entrepreneurship. Balachandra et al. (2019), in particular, emphasize gender biases that manifest as challenges in accessing funding, with women often perceived as less competent and less likely to succeed.

In the field of information technology (IT), the situation is even more challenging for women. Visentini et al. (2021) argue that the sexual division of labor legitimizes the IT field as a male domain, emphasizing stereotypically masculine traits such as leadership, determination, and autonomy. IT entrepreneurship, often perceived as a masculine and unwelcoming field, presents significant barriers for women (Romano et al., 2020).

Faulkner (2007) discusses how male-dominated engineering cultures marginalize women through norms and practices that perpetuate gender stereotypes, limiting their participation in technological fields. Glass et al. (2013) compare the retention of women in STEM (Science, Technology, Engineering, and Mathematics) fields with other professions, arguing that organizational cultures and gender biases significantly exclude women from higher-level and higher-paying positions.

A survey by a technology recruitment company, based on data from over 14,000 companies, revealed that only 13% of IT professionals are women, with men occupying 92% of management positions (Lazaretti, 2020). Globally, women hold only 26% of all positions in the technology industry and a mere 16% at the

executive level (Sullivan et al., 2020). Moreover, only 19% of women in the technology sector report being inspired by female role models in their community (Kaspersky, 2021). Additional data from the Diversity Report in the ICT Sector (BRASSCOM, 2022) indicate that women occupy only 39% of jobs, while black women account for just 11.6%.

The underrepresentation of women in the IT workforce, particularly in leadership positions (Needle, 2022) and as founders, underscores the importance of addressing gender inequalities and challenging stereotypes. The lack of representation in IT companies, compounded by wage disparities, highlights the social relevance of researching the relationship between gender stereotypes and female entrepreneurship in IT.

From a theoretical standpoint, there is a lack of studies on gender stereotypes in female entrepreneurship, particularly in the IT sector. This gap underscores the need for further research to enhance understanding of these dynamics (Glass et al., 2013; Sullivan et al., 2020; Borges et al., 2022; Borges, 2022).

In light of this context and to address the identified theoretical gap, this study seeks to answer the following research question: How do information technology students perceive the influence of gender stereotypes on their entrepreneurial intentions in the IT field?

This article is organized into five sections. The introduction contextualizes the problem. The second section provides the theoretical foundation, offering a conceptual review of gender stereotypes, patriarchy, and Stereotype Threat Theory in the IT context. The third section details the methodological procedures. The fourth section presents and discusses the research findings. Finally, the fifth section concludes with a discussion of the study's limitations and suggestions for future research.

THEORETICAL FOUNDATIONS

The main concepts of gender stereotypes and the oppression of women and patriarchy, along with the topic stereotype threat theory, are reviewed and presented in two subsections.

Gender stereotypes and the oppression of women

To contextualize the emergence of stereotypes, we discuss the book *Gender, Patriarchy, Violence* by Marxist feminist Heleieth Saffioti (2015), which focuses on violence against women and seeks to conceptualize gender, patriarchy, power, race, ethnicity, and the exploitation-domination relationship based on their contradictions. The author emphasizes the importance of feminist debates tied to broader societal transformation.

Historically, women have been relegated to subordination to men and deemed unproductive in capitalist societies. In such societies, which are rooted in socioeconomic relations, it becomes evident that 'power is male, white, and preferably heterosexual' (Saffioti, 2015, p. 33). This observation underscores the ongoing relevance of discussions surrounding gender, race/ethnicity, and power, which remain current.

Saffioti (2015) further explores the process of domination-exploitation in which women are embedded, particularly through the lens of patriarchy, which aligns directly with the analysis presented here. This perspective reveals that the hierarchical organization of men over women cannot be disentangled from the existence of rights and societal structures.

Miguel and Biroli (2014) observe that the term 'patriarchy' is controversial, even within feminist theories. Some perspectives find the term valuable, as it encapsulates the interrelated aspects of female subordination, serving as a comprehensive framework for understanding male domination. However, others argue that patriarchy represents only one historical manifestation of male



domination and may no longer sufficiently describe modern systems of gender inequality. These critics advocate for the use of 'male domination' as a more expansive and inclusive term.

Following Saffioti's (2013), tradition and incorporating the insights of Miguel and Biroli (2014), this study adopts the concept of oppression as outlined by Vogel (2022). This concept encompasses not only symbolic interactions and gender relations but also the material relations that underpin the production and reproduction of life. This comprehensive perspective is crucial for understanding how oppression intersects with the exploitation of female labor.

These reflective elements, derived from the discussion, Saffioti and Vogel's work, do not resolve the issue of gender and inequality between women and men in the world of work, but certainly contribute to expanding the necessary understanding. The expression of oppression can also be related to 'structural machismo', which, for example, represents the actions, practices, and speeches of male domination in the organizational field. However, according to Vogel (2022) and Saffioti (2015), it is not machismo that found relations of oppression; therefore, it would not make sense to consider machismo as something structural. Machismo is, in fact, an expression of the exploitation of capital over labor in the Marxist paradigm (Engels, 2019).

Referring to the sexual division of labor, Saffioti (2013, p. 73) stated that the fact that women accumulate productive work (in the market) and reproductive work (domestic, but also reproduction and childcare) means that women suffer more directly than men from the effects of exploitation and precariousness.

Such issues have been debated today in the field of Administration, as can be seen in a recent special issue on women's work in the renowned *Revista de Administração Contemporânea* (Guimarães et al., 2023). However, Souza et al. (2021) demonstrated that when trying to combat oppression and prejudices, research often ends up reaffirming them. For example, when studies support alleged female leadership that would be benevolent, humanistic, and unambitious, considering that women would be more emotional and would prioritize their private lives (and family) over their careers (Eagly & Karau, 2002; Heilman, 2001), these studies could indicate that the tension between motherhood and career, for example, only exists because men (fathers) do not assume their role in raising children, as it is the (almost) exclusive responsibility of the mother (Budig & England, 2001; Corell et al., 2007). However, after pregnancy, which cannot be delegated, the rest of the work with the newborn could be shared, but instead of debating this issue, an idea of 'maternal spirit' (Souza, 2020) is socially produced, which would justify the sacrifices to be faced by women, including giving up their work (Tonelli, 2023).

Stereotype Threat Theory and Women in IT

The concept of gender stereotypes is understood through gender schemas, which are cognitive structures consisting of a network of associations that organize and guide the processing of gender-related information. These schemas were developed from childhood and were influenced by cultural and social factors (Bem, 1981).

Among the theories that provide an analytical framework to address the presence of gender stereotypes in areas of underrepresentation, such as women in entrepreneurship in the IT field, the Stereotype Threat Theory (STT) stands out (Steele & Aronson, 1995; Steele, 1997). The activation of a stereotype can mediate the effects of the so-called Stereotype Threat. This threat is perceived when individuals believe that their performance in a specific situation will be impaired due to the negative characteristics associated with their group (Steele & Aronson, 1995). In other words, the STH understands the forms and dimensions of the impact of stereotypes on the recognition of a threatened subject (Santos, 2018). However, Appel and Weber (2021) warned that stereotyping only affects individuals who identify with the stereotyped group, whereas non-stereotyped individuals may exhibit improved performance.

Similarly, Kray et al. (2002) measured gender gaps in performance expectations in the context of stereotype threat before the start of a task, documenting the relationship between expectations and performance unaffected by prior performance. Furthermore, the results suggest that the stereotype is only regenerated if the characteristics that are normally associated with the effectiveness of the task are redefined. With this, the authors point out traits considered a 'good negotiator' of the male sex, which are assertiveness, problem-solving ability, well-informed, prepared, rational, and patient. The results of this study provide the argument that context affects how individuals negotiate. Previous thoughts (prejudices, for example) and stereotypes of negotiators may influence the determination of the relative advantage of men over women at the bargaining table.

In two experiments by Davies et al. (2005), stereotype threat theory was tested after individuals watched TV commercials designed to encourage such characteristics. In the first experiment, researchers investigated whether exposure to stereotypical commercials could undermine women's aspirations in leadership tasks. In the second, an implicit measure of stereotype activation tested whether exposure to a composite gender stereotype elicits the female stereotype, and whether the resulting level of stereotype activation would mediate the effect of the commercials on women's aspirations. According to the authors (p. 285), by creating an identity-safe environment, susceptibility to stereotype threat can be eliminated, despite the priming of stigmatized social identities and their corresponding stereotypes, that is, non-threatening environments do not spontaneously activate stigmatized social identity stereotypes. The results showed that women who watched gender stereotypes in commercials activated feminine stereotypes, unlike women who saw neutral commercials. Despite this, according to the theory, stereotype activation is predicted only in women who are vulnerable to this type of threat. In contrast, women who feel safe are likely to moderate the effects of stereotype threat.

In Appel and Weber (2021, p. 154) investigation, the threat of stereotypes emerges with a broader meaning: aspects of dominant ideas, indisputable truths, subjective assumptions. They noted that whenever individuals are confronted with a stereotype, the group is despised or generally devalued in a specific context. Characterized as a state of discomfort, negative stereotypes affect only people in groups that are negatively portrayed. There is also research that characterizes specific attributes characteristic of each gender stereotype (Bem, 1974, 1981). Therefore, despite being activated from birth by the color of clothing, name, and specific toy, stereotypes are defined throughout the continuous development of the individual in the face of their experiences and socialization (Bem, 1981). Some authors characterize professional activity based on the differences shown in the behavior of entrepreneurs by 'biological sex' (Perez-Quintana & Hormiga, 2015), that is, an even more stereotypical perspective.

Among the possible 'pathways out' to overcome stereotypes, Adamus et al. (2021) argue that female gender stereotypes only begin to diminish as more women enter high-growth industries, such as technology companies. Lages (2005), in turn, stated that female gender stereotypes are potentially created by a people's culture. For him, the fact that women's work is constantly linked to domestic activities is one of the factors that most contribute to these labels, but it is not just about this aspect; women's work, seen as secondary, goes further and concerns the centrality of social reproduction in maintaining the model of capitalist domination.

Aiming to identify the male gender's perception of women working in the IT field in the job market, César Machado et al. (2021) based themselves on and pointed out the lack of women working in the field. The sample returned a rate of 45% of participants who believed that social barriers are more commonly faced by women in IT companies; Of these, 19% of the participants witnessed some type of discrimination, harassment, or inappropriate 'jokes'. Based on the feedback from the participants, many men support the inclusion of women in IT companies because, according to them, it

is not the gender of the professional that matters to companies, but rather their ability to perform their work and obtain good results. However, if this were the criterion, it would imply that women do not work in the IT field because they lack the necessary skills.

César Machado et al. (2021) also stated that even though the IT area is still one of the areas with the greatest deficit of women, there are many enthusiasts of programs that aim to encourage increased female participation in this area, but they justify that the absence of women in IT companies is-it is also a matter of affinity, that is, they would not be interested. Once again, as can be inferred, in the attempt to combat stereotypes, they are reinforced because, in short, if there are more men than women working in IT, it is because they are more competent and women are not interested, two stereotypes that are not supported theoretically and empirically.

It is observed that the machismo present in social relations permeates corporate walls and is cloaked in pseudo-professional justifications to exclude women from higher-income job opportunities, such as those in the information technology sector (Metcalf, 2010; Cheryan et al., 2017). Therefore, Adom and Anambane (2019) reiterated that the gender stereotype acts as a kind of 'push' for female entrepreneurial activity, generating businesswomen driven by necessity instead of guided by opportunity.

Visentini et al. (2021) also highlighted the notable absence of women in the IT field, as observed in the sample used for the research interviews. Of the 31 interviews conducted, only eight were women. Although they were sought, especially in undergraduate courses, they were not found. This excerpt is worth highlighting:

[...] To date, the advances achieved by women in the job market have not overcome the limitations imposed by the capitalist system, since women have greater difficulty in occupying prestigious positions, not due to biological or natural factors, as dictated by patriarchy, intrinsic to capitalism, but due to external factors that castrate the capabilities of minorities - among them, the category of women -, especially in the field of technology (Visentini et al., 2021, p. 35).

The women interviewed in Visentini et al. (2021, p. 34) report "an effort to gain space, as well as to obtain a higher position, since these are predominantly occupied by men," corroborating the finding that the IT field is predominantly male-dominated. However, this also contradicts the aforementioned statement that women would not be interested in IT.

The study by Petró et al. (2021) addresses aspects that influence the formation of female professional trajectories in the IT field, based on the academic and professional trajectories of graduates of a technical course in computer science integrated into high school. They highlight the forms of gender prejudice in the course and the forms of discrimination in the world of work, which are almost always veiled. The collected reports reveal that for many of the women who consulted, internship experience brought growth in learning, but that in many situations the workplaces were not the most favorable, not serving as an incentive to continue in the profession. The authors emphasize the importance of educational institutions by paying attention to these aspects. Romano et al. (2020) address the main reasons why women are a minority in exact and technological areas and the impacts on society, in addition to evaluating social aspects that consider the current patriarchal society that oppresses the female gender. The authors declare that there is a lack of female examples in large IT companies, a factor that contributes to the exclusion of women in the technology area, 'Examples of women who own their own company or occupy important positions are few and little is known about them' (Romano et al., 2020, p. 155).

In light of the studies reviewed, it can be inferred that the effects of stereotype threat may influence an individual's choice of professional path or entrepreneurial intention (EI), particularly among women with stereotyped identities who study or work in technological fields and experience identity-threatening contexts.

It is important to emphasize that the target audience for this research is women in an IT course, in which they are often a minority. The study of this problem contributes to understanding how gender stereotypes negatively affect EI. As discussed by Saffioti (2015), machismo and gender oppression are phenomena rooted in socioeconomic and cultural relations that create significant barriers for women in the job market. Therefore, academia plays a vital role in deepening the analysis of prejudices and oppressions that women face, especially in predominantly male fields such as IT, which can contribute to effective strategies that promote gender equality and empower women to overcome barriers.

METHODS

This research adopts a constructivist philosophy (Saunders et al., 2009) because it "recognizes the importance of subjective human creation of meaning, but does not reject some notion of objectivity". Pluralism, not relativism, is emphasized with a focus on the dynamic circular tension between subject and object" (Crabtree & Miller, 1999, p. 10). In turn, the methodological choice adopted was qualitative. This perspective is particularly concerned with the context of certain phenomena (Saunders et al., 2009). The qualitative method is an umbrella term for a series of interpretivist techniques used to describe, decode, and translate phenomena that naturally occur in the social world (Van Maanem, 1979). It is the study of the meaning of people's lives under real-life conditions, representing opinions and perspectives, and encompassing contextual conditions. Therefore, it is in line with the objectives and problem of this research.

The research strategy adopted was basic qualitative or generic, focusing on the meaning constructed by its participants, following Merriam and Tisdell (2015). This strategy is appropriate because it can capture the context of the participants. Gibbs (2009, p.186) asserted that this view portrays the social, and cultural world, and its meanings as a creation of human social interaction and, thus, socially constructed.

The sample comprises female students from the Bachelor's Degree in Information Technology (BTI) course at the Instituto Metrópole Digital (IMD) at the Federal University of Rio Grande do Norte (UFRN). IMD is considered a national reference in innovation, information technology, and entrepreneurship. The sample was selected intentionally in the initial stage. However, there were difficulties in accessing the interviewees because the number of female students was significantly smaller compared to the number of male students in the course. Therefore, as an alternative strategy, a second criterion was used to locate other key participants using the snowball technique. This consists of identifying the first participant who, in turn, indicates the next participant. This procedure is particularly suitable for qualitative research, especially when identifying and accessing participants is challenging (Merriam & Tisdell, 2015).

The selection strategy used was homogeneous. Sampieri e Collado (2013) state that these selected units have the same profile or characteristics or share similar traits. This approach is particularly useful for exploring specific aspects of a phenomenon in depth within a given context. In the case under analysis, the intentional choice was to select individuals (female students of the BTI program) who share similar characteristics, forming a relatively uniform group. The purpose is to focus on the research topic or to highlight situations, processes, or episodes within a social group.

Regarding the time frame, this empirical investigation was carried out in its transversal horizon to understand the perspective of entrepreneurial intention from the perspective of students at a given moment, without changes over time. Data were collected through semi-structured interviews (Flick, 2013) in person, using a previous script with nine questions, which were previously tested with three students, as a reference. After adjustments and validation by two senior researchers, a new interview script was

generated with 20 questions focused on female entrepreneurship in IT, encompassing the topics: Motivation, Support and initiatives, Gender stereotypes, Impeding factors, Entrepreneurial education, and Entrepreneurial intention.

As a data analysis approach, deductive reasoning has been predominantly adopted since the interpretations of the phenomena presented are based on the reviewed literature. Thus, the theoretical categories of analysis were previously known, although it was possible to incorporate a little inductivism when new categories emerged from the interviewees' statements. For the scope of this study, the topics of gender stereotypes and entrepreneurial intention stand out. The first aim is to understand how perceptions and prejudices related to gender roles influence the experience of female students. The second refers to the desire or plan to start one's own business or engage in entrepreneurial activities in the future. The relationship between these categories can reveal significant barriers for female students, negatively affecting their intentions, perceptions, and capabilities. This theme is essential for understanding the challenges faced by women in predominantly male-dominated fields.

To analyze the data obtained, Bardin's (2016) categorical/thematic content analysis technique was chosen, in three stages: pre-analysis, exploration of the material, and treatment of the results obtained through interpretation. As it was a nonlinear process, but rather a back-and-forth (interlacing) process, the decision was made to combine the procedures proposed by Gibbs (2009). In the pre-analysis phase of the material, coding was performed line by line, based on a dictionary of previous codes, containing theoretical concepts used in the survey of previous studies. At the end of this cycle, the content of the nine interviews generated 36 codes. During the exploration phase of the material, focused coding was conducted, involving the reconfiguration of codes into categories and a subsequent consultation of the literature review. Four categories were retained in the second phase. The final stage of the analysis encompassed the treatment of the results and their interpretation through inferences and the connection of ideas, which are presented in the next section.

In the initial analysis, the central theme of the investigation was "gender aspects" to understand the relationship with entrepreneurial intention. This theme was initially divided into two previous categories: 'gender stereotypes' (perceptions of gender roles) and 'structural machismo' (referring to manifestations of machismo rooted in social and educational structures). It is important to emphasize that, although from a theoretical point of view, there are inaccuracies, as explained in Section 2 of this article, it was decided to consider 'structural machismo' as an analytical category to preserve the perception of the interviewees, as an 'in vivo' code.

During the qualitative content analysis, two new codes emerged from the analysis: 'difficulty in financing' (a significant obstacle that would make it difficult to carry out the IED) and 'social inspiration' (referring to the social influences that motivate and inspire students to consider practice). Finally, four categories were analyzed, which relate to each other: gender stereotypes, structural machismo, social inspiration, and investment. In the incidence of speeches, the category 'gender stereotype' received the highest number of citations (15), while 'structural machismo' had 10 references. Regarding the co-occurrence analysis, passages from the subcategory 'gender stereotype' and 'structural machismo' were identified with aspects that would make it difficult to invest in a possible new business due to difficulties in accessing financing.

The Research Ethics Committee (CEP) of UFRN approved this study under protocol number CAAE 56622322.7.000.5292. Following this approval, nine interviews were conducted in June 2022 in a reserved room on the IMD premises. The audio recordings of the interviews were captured using a mobile phone, transcribed into Word, and imported into ATLAS.ti® software (version 8.4.24), which supported the analysis.

RESULTS AND ANALYSIS

As a profile of the interviewees, it is important to note that they are all single, between the ages of 18 and 23, and most of them live in the metropolitan region of Natal/RN and have previous technical training in 'Information' from the Instituto Federal do Rio Grande do Norte (IFRN). The course periods varied from the first semester (6 students), third semester (2 students), and fifth (1 student). To maintain anonymity, the names of the students are fictitious. Carmen, Fátima, Glenda, Joyce, Nicole, Sandra, Tânia, Vânia, Virgínia.

Gender stereotype

Regarding the category of 'gender stereotype' related to entrepreneurship, three interviewees (Tânia, Joyce, and Fátima) stated that men are more encouraged to carry out and that this activity is considered specific to the male gender. They also considered that men would have an advantage in the IT field, as can be seen from the following statements:

Men are the ones who are most encouraged to undertake; women are not as encouraged, although it is growing nowadays. [...] Entrepreneurship is more cultivated in the male sector, so it is more common for men to be entrepreneurs. [...] Sometimes it is more difficult for a person to accept an idea that came from a woman. (Tânia)

It is an area that is predominantly male; only men are here [at IMD], and this is something we have done, we have broken this paradigm, and we have tried to bring more women into the IT area. [...] I believe the conditions are the same, but the chances are not. And unfortunately, this is something very common in our area, right? (Joyce)

Interviewee Fátima adds that, in addition to men being more encouraged in the business world and in the IT area, men take advantage in all areas; she even mentions a "men's sector" which demonstrates her perception of the differences between genders. The participant also stated that people generally do not take women in the IT area seriously.

It is definitely much easier to get into any field as a man, especially in technology. [...] People don't usually take us seriously when we are here at the IT college, do you know? You can see that there is no incentive for women to enter this field or anything. For example, there are six girls in our class. So, besides being a niche that already has few people, it is like entrepreneurship, and a few people will even pursue it. In addition, there is all the prejudice. (Fatima)

In line with the three participants mentioned above, Sandra and Vânia reinforce the idea that men hold an advantage in both entrepreneurial activities and the IT field. However, this time, they focus on comparing gender relations:

Imagine that you are applying for a job, and there is you and next to you is a man, so if he has one hair more experience than you, he will get ahead of you. [...] There is that issue of prejudice. (Sandra)

[There was] a bad comparison relationship, and this put the girls down in relation to a situation that they didn't know how to plan, they didn't have this knowledge, and in fact, this is a lie. (Vânia)

In contrast, Glenda argues that the notion of an advantage is not valid in most cases but acknowledges the existence of "specific areas" for each gender. This statement highlights the persistence of gender stereotypes among the women participating in the study:

This is not true in most cases, but there must probably be some area where women are better suited than men. Something specific. [...] I trust a woman more for certain... certain things that I must do, like things of beauty. I don't know if I would trust a man because... I don't know. It's my prejudice. I don't know if everyone feels this way or if it is just me. [...] If you open a waxing business, more women

will probably look for it, and more women will feel comfortable. So, I think there are small areas, and small niches, but even so, they are specific niches. (Glenda)

Structural Machismo

Regarding the category 'structural machismo', the code "investment" appears in some passages. Machismo is perceived in the daily lives of the participants. This perspective can be observed in Carmen and Sandra's speech:

No, the same conditions because when we are talking... If you talk about a woman being a boss, sometimes it is easier for a man to be a boss. It is more accepted, not every guy accepts being commanded by a woman. I know today that it is less, but there is still no equality. (Carmen)

There is a case of machismo that is ingrained, unfortunately, so sometimes the man ends up going before the woman. (Sandra)

The category 'structural machismo' can also manifest in the way certain words are associated with the male domain. For example, student Tânia argues that this can influence women's distancing from this activity when she states: "Women are 'less', may be less encouraged. [...] If I talk about entrepreneurship, it is in the masculine."

Machismo, moreover, manifests as the cause of gender inequalities in five speeches (Sandra, Nicole, Virginia, Glenda, Joyce), covering manifestations that occurred in technical courses, at university, in the exact sciences area, or in the job market. Regarding the possible reasons for the presence of more male bosses, the students expressed themselves as follows:

Due to machismo itself (Sandra)

Society itself. Everything is rooted in society. (Nicole)

This is deeply rooted, as we know, people are very prejudiced against women, so sometimes I also felt this in my technical course. Boys were seen more favorably than girls. And we were also in a relationship that always put us down, that we did not know, we didn't know how to program. Therefore, this resulted in a bad view. (Vânia)

It is the way our society was built, especially in this area of exact sciences, and engineering, which has always been more geared toward men. (Glenda)

Because we live in a very sexist society. Unfortunately, our society has this structure. I see that today we have a huge predominance of men in these big companies, and so these are the ones with the greatest job opportunities. It is not just at university, but also in the job market too, right? I believe it is a struggle for women out there to also find their place in the world we currently live in. This is the society we have today, okay? (Joyce)

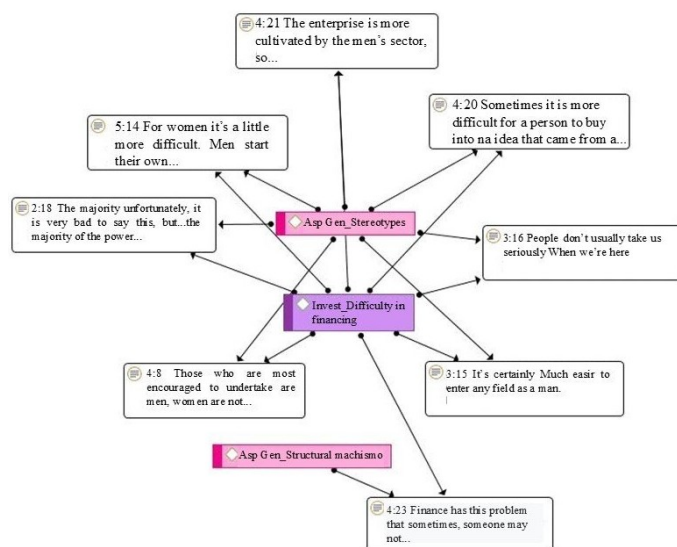
Machismo is recognized by interviewees as being rooted in a society that builds relationships and orders elements that seem common, as is the case for the greater incidence of men in leadership positions.

Regarding the emerging category 'Difficulty obtaining financing for entrepreneurs', interviewees perceive it as a factor that makes financing difficult, and this becomes an obstacle to the intention of having their own business (Figure 1).

To illustrate this issue, some students report the stereotype of women's difficulty in obtaining capital for their businesses. Participant Virginia reasons that most of the money would be in the hands of men and that this would possibly be a factor preventing her from obtaining investment, while Nicole demonstrates a discouraging belief for women in IT to open their businesses, as per the quotes:

Figure 1

Cooccurrence between stereotype and financing difficulty



Note: Elaborated by the authors.

Most of the time, unfortunately, it is very bad to say this, but... most of the capital power belongs to men, so... most of it. I don't know many female entrepreneurial investors, I don't know. So I would have to resort to men to ask for investment for my idea, let us say. So I think it is... that would be unfair because it would not have the same weight, you know? (Virginia)

It is a little harder for women. Men start their own business, it can be anything, and they have a better chance of getting the necessary investment, they believe more. Women, on the other hand, are easily discouraged by people. They don't get as much investment as if it was not something important. Therefore, they are more likely to give up or their project will fail. Because people are not as interested. (Nicole)

These statements confirm Jonathan's study (2003) that addresses the difficulties women face in obtaining funding due to their gender. Their perception also follows Steele and Aronson (1995), in which threatening situations lead group members to believe that the performance evaluation criteria will be based on stereotypical beliefs and judgments.

Social Inspiration

The category 'Social Inspiration' emerged in the conversation with the second interviewee (Virginia) about the conditions and chances of success for women to succeed in their businesses. Malmstrom and Oqvist (2021) deal indirectly with this concept since it treats entrepreneurial identity as a perspective rooted in beliefs induced by the social and cultural context. The speech of the student who gave rise to the category discussed is as follows:

Women are a little at a disadvantage. You had a hard time finding women to research here! Imagine entrepreneurs! There are very few, and I don't even know them. [...] I don't know anyone in technology. (Virginia)

Thus, when asked about successful entrepreneurs, businesswoman Luísa Trajano (from the Magazine Luiza chain of stores) was the most mentioned, receiving four mentions.

Student Tânia also refers to businesswoman Natália Arcury and the Shark Tank program (a reality show about aspiring entrepreneurs). The latter was also mentioned by Virginia. In Glenda's speech, the names of singers and businesswomen Luísa

Sonsa, Anitta, and Rihanna come up; and businesswoman Bianca Andrade (in the cosmetics industry, known as Boca Rosa), through Joyce.

Successful entrepreneurs. I hear a lot of names of people and artists, right? Famous. However, they are not from the technology field. I don't follow them, but I remember now, like Boca Rosa, an entrepreneur. Yeah! That is, when we realize, we realize how difficult, how complicated it is to be successful entrepreneurs. [...] There are definitely some. But even the fact that I cannot remember them right now shows how few there are. (Joyce)

There were also reports of situations in which students did not have female role models who were 'successful in the business world' (Nicole and Vânia). Nicole even mentioned a businessman, and when asked if the role model had to be female, the university student said she did not know of one. Vânia, on the other hand, had difficulty naming one but mentioned a teacher at a technical school who taught management, as can be seen in the following statements:

There are millionaires, for example, Elon Musk. [...] Does it have to be a woman? Then I have difficulty saying names. No. Success, success, I don't think. (Nicole)

Wow, now you got me. [...] In terms of female entrepreneurs, my management teacher was very good. (Vânia)

This difficulty in identifying such references is confirmed by the study by Silveira and Costa (2012), who points out that the entrepreneurial process also affects the capitalist system through the patriarchal ideology in the exploitation of women.

Regarding female role models in the IT field, which would be objects of inspiration, most participants (seven) did not know how to give an opinion, except the ninth participant (Joyce), who mentioned Rafaela Ballerini and Thifanny. However, this second female reference was only presented after the interviewee checked her cell phone. These results are ratified by Romano et al. (2020), who argued that the lack of female role models contributes to the exclusion of women in the IT field. The following statements reflect this thought.

I don't know anyone in technology. (Virginia) I don't remember. (Fatima)

I don't remember that now. (Tânia)

Woman? Not a woman per se. I think any woman in technology inspires me because it is not an area with many women. I don't think there are any women per se. In general, those who are in technology and are not giving up... friends, strangers. (Nicole)

I don't know. (Sandra)

No. No, I don't know any women. Not directly related to my field, but close, yes. A professor at IFRN inspired me to be here. (Vânia)

I really don't have anyone in the IT field who inspires me. (Carmen)

There is one. She is a girl who is also a YouTuber. Her name is Rafaela Ballerini. And she works in the front-end area. I think it is really cool, I always follow her, not just her, but other women in the IT area who have Instagram they share, and I think it is very necessary because it inspires me to continue. I think it inspires many other people, too, especially women, and girls in the IT area. This is very important. [...] Can I? I really like to get inspired, through Instagram, sometimes, by the people I follow, concerning the IT area, I follow predominantly girls who follow who are in this area. I found another girl. Her name is Thifanny. This Rafaela is from Brazil, I don't know where this one is from, but she is not Brazilian, but she is also in the technology area. (Joyce)

The category 'Structural Machismo' may once again be the reason why there are few female references in entrepreneurship and is even more critical in the IT field. As can be seen from the

students' statements, the activity is dominated by men; therefore, this affects students' intentions to continue in the IT market as a professional and also the desire to start their own businesses.

As I said before, entrepreneurship is more cultivated in the male sector. I am not 100% sure because there hasn't been any information about it, but apparently, there are fewer women entrepreneurs than men, so women entrepreneurs are rarely talked about, so you see them less prominently. (Tânia)

Because they have few and the ones they have are hidden so people think they don't have it, you know? Success...it is hard to think about them, they are really hidden. (Nicole)

I think it is because the market is dominated by men, and that is what happens. (Sandra)

Because there are few. Probably. (Vânia)

I think one is a lack of... of... disclosure. That kind of... information. Because, for example, Elon Musk has 347 websites talking about Elon Musk. Mark Zuckerberg... even because they have more space in the industry and that is why they are more famous. But I think part of it is my incompetence, even though I didn't look for it. (Glenda)

In summary, the results of these topics are in line with the fundamentals of the literature. Additionally, entrepreneurial activity in the IT area is once again treated as something specific to the male gender, and the lack of female role models in prominent roles interferes with the simple possibility of these women entering the field.

CONCLUSIONS

The main objective of the study was addressed, as the interviewees perceive the IT field as hostile to the inclusion of women who aspire to establish businesses in information technology. Entrepreneurial intention is viewed as an activity more associated with the male gender, which receives greater encouragement in both the business world and the IT sector compared to women.

Gender stereotypes were reported as common, with interviewees stating that certain activities are perceived as more suitable for men than for women. Other participants emphasized that the difficulty women face in entering and remaining in the IT field is not due to a lack of technical skills but rather to the male dominance in the field, which often discredits women's work. It became evident that women experience gender stereotypes on a daily basis and that these significantly influence their choices.

Machismo is perceived as a social problem, manifesting as a root cause of gender inequalities, including those observed in the technology sector. Gender stereotypes and machismo are identified by the interviewees as barriers that hinder access to financing, creating additional obstacles for women aiming to establish their own businesses. Oppression and exploitation are implicitly present, as women face greater challenges in securing higher-income positions, a dynamic also evident in the IT field.

The perception of entrepreneurial activity as specific to the male gender discourages women from even considering such practices, particularly in contexts that require investment, as is the case with IT entrepreneurship. This underlying notion limits students from envisioning bold ambitions for their future entrepreneurial endeavors.

The study also showed the lack of self-representation of female figures in IT entrepreneurship, as well as in business leadership positions. In an attempt to understand this phenomenon, after the study was completed, the researchers sought to find out from the BTI course coordinator the proportion of women among the faculty, the teaching staff, and the students. The result obtained was that women represent only 20% of the Institute's teachers, however, no data was provided regarding the proportion. Based on

the reports from the interviews conducted, it was clear that women are also a minority among BTI students. This underrepresentation may reflect the patriarchal ideology prevalent in Brazilian society.

Another aspect to highlight is the category of Social Inspiration, as entrepreneurial identity is cognitively rooted in beliefs where the social context induces decisions about having a business (Malmström & Öqvist, 2021). However, it is still necessary to discuss that in Brazil, entrepreneurial initiatives are, for the most part, related to low-complexity, low-revenue, and noninnovative businesses. Thus, the Schumpeterian model of the innovative entrepreneur, as would be expected in the IT field, remains relatively incipient in the country.

Based on the findings, it is not surprising that the interviewees report a lack of inclination toward entrepreneurship; on the contrary, they are more inclined to pursue formal employment with guaranteed rights in the field of information technology. However, gender inequalities remain a central aspect of the economic reality of the labor market, as highlighted in the introduction of this study. Therefore, it is essential to frame discussions on innovation, as well as economic and social development, in the context of the inequalities that affect and weaken the social fabric.

The main limitation of this study lies in the small number of interviewees, although the theoretical saturation technique was employed to support the analysis. Another limitation is the lack of comparison of entrepreneurial intention between male and female students. Additionally, conducting interviews with a more diverse group of students from different stages of the program could help uncover contradictions in students' perceptions. With accumulated experience, they might exhibit greater technical skills and confidence, potentially resulting in a stronger professional network comprising professors, peers, and industry professionals. This, in turn, could lead to a more realistic and informed understanding of the opportunities and/or barriers in IT entrepreneurship. Moreover, such an approach could underscore (or not) the importance of continuous support initiatives for students throughout their academic journey. Finally, another limitation is the absence of data triangulation, as suggested by Souza et al. (2019), which could have strengthened the quality of the research.

Other relevant insights for strengthening the connection between the study's objective and the implications for public policies in Science, Technology, and Innovation and management structures and models in the IT field include the development of specific public policies to promote women's participation in IT. These policies should encompass research, teaching, and the innovation ecosystem. Such actions must be supported by educational campaigns aimed at demystifying stereotypes and combating various forms of oppression (racism, sexism, and LGBTphobia), addressing the multiple dimensions of discrimination and inequality. Initiatives should foster inclusion and diversity in all its forms to create a fairer and more innovative environment in the IT sector.

Future studies should, therefore, investigate the themes of oppression and exploitation, considering not only gender issues but also race and LGBTphobia, as the growth of poverty and unemployment disproportionately affects these groups. Additionally, it is recommended that quantitative research be conducted to test theoretical models related to the entrepreneurial intentions of IT students. Finally, it would be valuable to examine initiatives developed by companies and governments aimed at combating sexism and reducing gender inequality in the IT sector.

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Conflict of interest statement

The authors declare that there is no conflict of interest.

Authors' statement of individual contributions

Roles	Contributions		
	Borges L.	Ramos A.	Ferraz J.
Conceptualization	■	■	■
Methodology	■	■	■
Software	■	■	
Validation	■	■	■
Formal analysis	■	■	■
Investigation	■	■	■
Resources	■	■	■
Data Curation	■		
Writing - Original Draf	■		
Writing - Review & Editing		■	■
Visualization	■		
Supervision		■	■
Project administration	■	■	■
Funding acquisition	■		

Note: Acc. CRediT (Contributor Roles Taxonomy): <https://credit.niso.org/>

Open Science: Data availability

The dataset supporting the results of this study is not publicly available.

Badge



Description

As informed to the participants in the ICF, "the data you will provide us with will be confidential and will only be disclosed in congresses or scientific publications, always anonymously, and there will be no disclosure of any data that could identify you".



Not applicable



<https://doi.org/10.48331/scielodata.AHDAY8>



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Not applicable

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