



## SOCIAL CAPITAL AND ONLINE SOCIAL NETWORKS FROM A GENDER PERSPECTIVE: A STUDY WITH INFORMATION TECHNOLOGY MANAGERS

*CAPITAL SOCIAL E REDES SOCIAIS ONLINE NA PERSPECTIVA DE GÊNERO: UM ESTUDO COM GERENTES DA ÁREA DE TECNOLOGIA DA INFORMAÇÃO*

*CAPITAL SOCIAL Y REDES SOCIALES ONLINE DESDE UNA PERSPECTIVA DE GÉNERO: UN ESTUDIO CON DIRECTIVOS DEL ÁREA DE TECNOLOGÍA DE LA INFORMACIÓN*

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### Cite as – American Psychological Association (APA)

Oliveira, M. A., Ramos, A. S. M., & Lucena, J. P. O. (2022, May/Aug.). Social capital and online social networks from a gender perspective: a study with information technology managers. *International Journal of Innovation - IJI*, São Paulo, 10(2), 241-266. <https://doi.org/10.5585/iji.v10i2.21347>.

### Abstract

**Objective:** This paper seeks to understand how social capital is developed by IT professionals in the use of Online Social Networks (OSN) and verifies the issue of gender.

**Methodology:** The research uses a basic qualitative approach, with semi-structured interviews with 12 IT managers working in the “S” System in Brazil. As a method of data analysis, Yin's (2016) five-phase cycle was used, through previous categories, but also it comprised an inductive process through the emergence of new categories.

**Originality:** A research gap was detected regarding the impact of these networks on the work of managers, especially those working in the Information Technology (IT) area, in addition to their relationship with gender.

**Main results:** It was verified that the OSN impacts the daily life of the managers, allowing the creation of groups that generate the social capital of bridge and connection. Through bridging social capital, OSNs streamline communication, problem-solving, and decision-making. As for bonding social capital, managers have access to scarce resources and support, especially when it comes to women from IT, who come together to strengthen themselves (sorority).

**Theoretical contributions:** This work contributed to the enrichment in the field of social capital, identifying new benefits such as support in decision-making and sorority.

**Practical Contributions:** The “S” System should use these networks as a strategic resource so that both the organization and the employee’s benefit.

**Keywords:** Online social networks. Information technology. Social capital. Managers. Sorority.

### Resumo

**Objetivo:** Este estudo busca compreender como o capital social é desenvolvido pelos profissionais de TI no uso das redes sociais on-line (RSO) e verifica a questão de gênero presente.

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**Metodologia:** A pesquisa utiliza-se da abordagem qualitativa básica, com entrevistas semiestruturadas com 12 gestores de TI atuantes no Sistema “S” do Brasil. Como método de análise dos dados, empregou-se o ciclo de cinco fases de Yin (2016), por meio de categorias prévias, mas compreendeu também um processo indutivo pela emergência de novas categorias. Originalidade: Detectou-se uma lacuna de estudo mais aprofundado quanto ao impacto dessas redes para o trabalho de gerentes, especialmente os que atuam na área de Tecnologia da Informação (TI), além da sua relação com o gênero.

**Principais resultados:** Dentre os resultados, verificou-se que as RSO impactam o cotidiano dos gestores, permitindo a criação de grupos que geram o capital social de ponte e ligação. Por meio do capital social de ponte, as RSO agilizam a comunicação, a resolução de problemas e a tomada de decisão. Quanto ao capital social de ligação, os gestores têm acesso a recursos escassos e suporte, principalmente quando se trata de mulheres da TI, que se unem para se fortalecerem (sororidade).

**Contribuições teóricas:** Este trabalho contribuiu para o enriquecimento do campo de capital social, sendo identificados novos benefícios como o suporte na tomada de decisão e a sororidade.

**Contribuições práticas:** O Sistema S deve utilizar essas redes como um recurso estratégico para que tanto a organização quanto os funcionários sejam beneficiados.

**Palavras-chave:** Redes sociais on-line. Tecnologia da Informação. Capital social. Gerentes. Sororidade.

### Resumen

**Objetivo:** Este estudio busca entender cómo el capital social es desarrollado por los profesionales de TI en el uso de las redes sociales on-line (RSO) y verifica la problemática de género presente.

**Metodología:** La investigación utiliza un enfoque cualitativo básico, con entrevistas semiestruturadas con 12 gerentes de TI que trabajan en el Sistema “S” en Brasil. Como método de análisis de datos se utilizó el ciclo de cinco fases de Yin (2016), a través de categorías anteriores, pero también comprendió un proceso inductivo para el surgimiento de nuevas categorías.

**Originalidad:** Detección de una brecha en el estudio posterior sobre el impacto de estas redes en el trabajo de los gerentes, especialmente los que trabajan en el área de Tecnologías de la Información (TI), además de su relación con el género.

**Principales resultados:** Desde los resultados, se encontró que las RSO impactan la vida diaria de los gerentes, permitiendo la creación de grupos que generan capital social como puente y conexión. Mediante la creación de puentes de capital social, RSO agiliza la comunicación, la resolución de problemas y la toma de decisiones. En cuanto a la conexión del capital social, los gerentes tienen acceso a recursos y apoyo escasos, especialmente cuando se trata de mujeres de TI, que se unen para fortalecerse (hermandad).

**Aportes teóricos:** Este trabajo contribuye al enriquecimiento del campo del capital social, identificándose nuevos beneficios, como el apoyo en la toma de decisiones y la hermandad.

**Aportes prácticos:** El Sistema S debe utilizar estas redes como un recurso estratégico para que tanto la organización como los empleados se vean beneficiados.

**Palabras clave:** Redes sociales on-line. Tecnología de la información. Capital social. Gerentes. Hermandad.

### Introduction

Increasingly present in people's routines, online social networks (OSN) - also called social networking sites (Social Network Sites - SNSs) - have been growing and becoming popular in the corporate world making social and professional relationships increasingly virtualized (Donelan, 2015). Social capital is a type of capital that can create for certain individuals or groups a competitive advantage in the pursuit of their ends if they know how to take advantage of the social network or structure in which they are inserted (Burt, 2001), i. e.,

an advantageous result from the use of networks (Portes, 1998; Recuero, 2012). However, there is a context in which many women build their professional relationships using online social networks (Smith, Smith, & Shaw, 2017) that needs to be better understood.

Since the 1970s, research on social networks and social capital has been developed and can be divided into two eras: a pre-internet (Granovetter, 1973; Friedkin, 1982; Coleman, 1988; Krackhardt, 1992) and a post-internet. (Pickering & King, 1995; Wellman *et al.*, 1996; Constant, Sproull, & Kiesler, 1996; Haythornthwaite, 2002; Williams, 2006; Lorenzo-romero & Alarcón-del-amo, 2012; Ahmad, Mustafa, & Ullah, 2016; Tiwari, Lane & Alam, 2019). Although they are numerous and diverse in the general field, studies of OSN and social capital involving the professional and gender context are scarcer (Aten, DiRenzo, & Shatnawi, 2017).

This paper starts from some findings, such as that the composition of electronic networks is different in terms of gender; men and women derive different values from these networks; individuals with electronic networks made up of higher proportions of male contacts experience shorter job search and achieve higher wages when securing new employment (Aten *et al.*, 2017). Regarding management positions, only 5% are held by women, according to data from the International Labor Organization (ILO, 2015).

In this sense, the Aten *et al.* (2017) research suggests that participation in online social networks can be a means of overcoming social barriers, as they facilitate reaching contacts that have a high value. In addition, OSNs allow women to broaden their bonds and gain social capital through networking opportunities. It is clear the importance of studying these tools as a means for the professional growth of women and the consequent construction of gender equity. Furthermore, diversity brings great benefits to innovation, problem-solving, and creativity (Ashcraft, McLain & Eger, 2016).

This paper constitutes a link for organizations to extract the results generated here and transform them into strategies in their professional environment, since online social networks are a means of generating social capital and overcoming social barriers on the part of women, it is up to the administration area to study and explore the consequences of its use for work.

Despite the relevance of this issue, only a limited number of studies specifically relate electronic networks, the issue of gender, the formation of social capital, and the professional context (for example, Mishra & Tyagi, 2013; Hanusch & Bruns, 2017; Hanzel *et al.*, 2017; Aten *et al.*, 2017; Benson, Hand, & Hartshorne, 2018). In addition, no studies were found focused on Information Technology (IT) professionals, an area characterized by a low incidence of

women, as shown by the 2010 IBGE census, in which only 20% of these professionals present in Brazil are female.

Given the theoretical context presented and the practical relevance of this theme, this research addressed the following research problem: *how is social capital developed by IT managers from the use of online social networks considering the issue of gender?*

To answer the main research question, this work has two goals: a) Understand how social capital is developed by IT professionals in the use of online social networks; b) Understand the gender issue present in the use of online social networks in IT work environment.

## **Theoretical framework**

### *Social capital and online social networks*

The term Social Capital gained prominence mainly with the studies of Pierre Bourdieu, James Coleman, and Robert Putnam. Bourdieu (1986) was one of the main pioneers on the subject, conceptualizing social capital as an aggregate of resources linked to a durable network of relationships between an individual and a social network. In this direction, the social network would be a system composed of ties and relationships based on reciprocal commitments and recognitions that generate direct or indirect benefits and advantages for the participating individual.

The literature has recognized that social relationships are different in the online context compared to the offline one (Williams, 2006). Social relationships mediated by computers caused significant changes in social resources and values (called social capital), in the way of obtaining and dividing these values. Thus, these tools began to create ways to invest and capture social capital, that is, access to resources that are normally not so accessible to groups and individuals in everyday life (Recuero, 2012). Within the field of digital social capital, online social networking platforms or sites are microcosms used to seek out and nurture social capital (Williams, 2019).

In social networks, social ties are formed. According to Granovetter (1973), it can be “strong ties” or “weak ties”. According to the author, strong ties are constituted by intense and frequent contact, in which the stronger the ties, the more similar they will be to each other. This characteristic allows greater motivation and assistance to the members of a network, while it denotes the reproduction of the same social structure since they are restricted to the connections of individuals with similar characteristics (Granovetter, 1973).

Weak ties, according to studies by Granovetter (1973), are formed on occasions when contacts are infrequent and usually of short duration. Corrêa and Vale (2017) add that these weak ties can integrate individuals in distant worlds and contexts, allowing connections to various networks that enable the dissemination and circulation of different information and opportunities in the business world. The relevance of weak ties, in Granovetter's (1973) perspective, lies in the fact that this type of connection is more likely to convey unique information and opportunities compared to strong ties. In his study about job seekers, this author found that the most successful candidates for a job were not those with strong networks, but those with large weak relationships.

In their studies, Recuero and Zago (2009) brought two new concepts about connections in OSN: emergent and associative. Emergent connection is based on effective conversation and verbal interaction maintained by actors, while associative connections maintained by OSN generate minimal social interaction. For instance, on the social network, subject A asks to follow subject B, who has the option to follow him back or not. “Anyway, this connection affects both since Actor A now has access to the information published by Actor B and Actor B begins to enjoy the attention of A” (Recuero, 2012, p. 605). For the author, emerging connections can evolve from weak to strong ties, while those that are only associative do not evolve, they are static, that is, they remain as weak ties (Recuero, 2012).

The connections are further classified as mutual interaction and reactive interaction (Primo, 2003). Mutual interaction is a system where the actors are intercommunicating agents who establish a relationship with the possibility of true dialogue. Reactive interaction is a more closed system, which has a limited type of interaction, its relationships are linear, unilateral, and stimulus-response.

Some networks and interactions differ from each other, resulting in different levels of social capital. Putnam (2000) divides social capital into bridging social capital and bonding social capital. Thus, a network of weak ties generates bridging social capital, as different people connect and allow the exchange of a greater range of information and opportunities, known as the strength of weak ties” (Granovetter, 1973). On the other hand, strong ties generate bonding social capital, which will not offer this knowledge and diversified opportunity but will support and help effectively. Taking advantage of this more general terminology, Williams (2006) developed an Internet Social Capital scale, as shown in Table 1.

**Table 1**

*Internet social capital scale*

Bonding social capital	Bridging social capital
- Emotional support	- Breadth of view
- Access to scarce or limited resources	- View of yourself as part of a larger group
- Antagonism with people outside the group	- Contact with many people
- Ability to mobilize solidarity	- Diffuse reciprocity with a larger community

**Source:** Williams (2006).

The Williams Social Capital Scale (2006) has been used as a methodology in recent studies (Jurkevičienė & Butkevičienė, 2018; Grottke, Hacker and Durst, 2018; Singh, Ghosh, 2017), which address social capital but are only related to online social networks, trust, or impact on socioeconomic capital.

“Bonding social capital” occurs when there is a network of tightly knit individuals, such as family and close friends, who provide emotional support for one another. They lack diversity in their networks, but they do have stronger personal connections. Emotional support corresponds to the emotional and social support offered through networks. Thus, this criterion assesses whether people trust other members of the network to help them solve problems and if they are people capable of giving advice and reducing the feeling of loneliness. Access to scarce or limited resources is related to something valuable, i.e., the other person can provide a scarce asset, which can be something tangible, such as money, or intangible, such as the act of risking your reputation to save the other or get your friend a job at a good organization. The antagonism with people outside the group shows that individuals do not trust and care for those who are not part of their group. This social capital is closed, aimed only at its group of people with similar profiles, and excludes those who do not have the same characteristics. Finally, to mobilize solidarity, subjects are motivated to help others fight injustice and organize people to do something important, which implies a cost, even if it is time (Williams, 2006).

In “Bridging social capital”, the connections of individuals from different scenarios are obtained from social networks, being composed of several weak ties, which can broaden horizons or worldviews, or open opportunities for information or new resources. However, they tend to provide little emotional support. The breadth of vision consists in expanding the look beyond their daily life, being more open and interacting with people outside the group, and looking for new information and experiences. In addition, bridging social capital can be related to contact with many people by making connections with different subjects, making them have a vision of themselves as part of a larger group. The diffuse reciprocity with a larger community

corresponds to the sense of charity, donation, of helping other people (even strangers), regardless of what they can receive in return (Williams, 2006).

According to a systematic review of the literature, the debate on the topic of online social networks and the formation of social capital linked to the professional context and gender has been intensified, mainly from 2016 onwards by the studies of Hanusch and Bruns (2016); Hanzel *et al.* (2017); Aten, DiRenzo and Shatnawi (2017); Benson, Hand and Hartshorne (2018); Yen, Chen and Su (2020), Maares, Lind and Greussing (2021) and Wu and Kane (2021). So, it was possible to conclude that they are current themes and are being related to professions such as the use of networks by journalists and doctors, not even still focused on studies corresponding with Information Technology professionals.

### *The gender issue in information technology*

The area of information technology (IT) has been growing, above all, due to the changes generated in the environment and the economic impact it has on organizations and society, in addition to the evolution of technology itself (Albertin *et al.*, 2005). It is IT professionals who support the complex technological infrastructure and information systems in a networked world but at the same time, these professionals need to know how to communicate both verbally and in writing, understand the institution's operations and could work with other people, especially with users of information systems (Servino, Neiva, & Campos, 2013). Therefore, in addition to technical skills, social and communication skills have become increasingly important in the IT job market (Ben, 2007).

Another characteristic of the IT area is the male predominance in its staff to the detriment of the female gender. The representation of women in the IT field reached its peak of 36% of workers in 1991, however, from then on, this index began to decline (Comptia, 2016). In Brazil, women occupied, in 2010, 18.5% of active positions in the sector (Nunes, 2016). Historically, IT occupations, in the 1950s and 1960s, were considered office tasks and, therefore, suitable for women, as they were a continuation of their higher education studies and could be reconciled with household chores. However, from the 1970s onwards, IT production began to be transformed through the technological development of microcomputers (Nunes, 2016).

Alongside the numerical disadvantage in the corporate IT world, there is another scenario that is not conducive to women's career development and growth. They face several barriers, which play an important role in this problem. The main social barrier is the lack of

participation in informal networks (Ahuja, 2002), which had already been recognized as being of fundamental importance for career advancement (Smithlovin & Mcpherson, 1993).

In addition, men and women achieve different values from electronic networks. Based on Aten *et al.* (2017), individuals with networks composed of a greater number of male contacts experience shorter job search durations and achieve higher wages when securing new employment.

Gallos (1989) observed that men's careers are related to greater autonomy and independence, while women's are more linked to attachments and relationships, which are important throughout their careers. In their studies of executive women and men, Van Velsor and Hughes (1990) found that women reported greater trust in work relationships as sources of development and learning.

Another fact to consider is that the relationship between social capital and work performance may differ in terms of gender. Male workers most strongly possess bridging social capital, through interaction with co-workers through online social networks, accumulating and disseminating information to increase their work performance. Women, on the other hand, are focused on bonding social capital, in which they connect with closer co-workers, which satisfies them at work and in relationships, consequently, also allowing for better performance (Yen, Chen, & Su, 2020).

For the authors referenced here (Yen, Chen, & Su, 2020), men, in general, have characteristics of independence and rationality, with a greater propensity to strengthen weak bonds of bridging social capital, while women, because they are more sensitive and emotional, tend to bond social capital by providing greater emotional support and help from people close to them.

## Methodology

This research uses the qualitative approach which considers people's perceptions and the real-life environment (Deslausiers & Kérisit, 2010; Yin, 2016) being suitable for the main objective of seeking to understand how IT professionals develop their social capital from the use of their online social networks.

To select the study participants, the following criteria were used: professionals working in the management of the IT area who used online social networks in their professional context, and who are willing to participate in the study. The organizational field chosen was the "S System", composed of the National Service for Industrial Learning (Senai), Social Service for



Commerce (Sesc), Social Service for Industry (Sesi), National Service for Commerce Learning (Senac), National Service for Rural Learning Service (Senar), National Service for Cooperative Learning (Sescoop), Social Transport Service (Sest), National Service for Transport Learning (Senat) and SEBRAE. The choice was made due to the diversification of the area of activity, because its entities are present throughout Brazil, and the possibility of having a wider range of IT managers.

The participant selection strategy was intentional, by accessibility and snowball, considering maintaining a balanced sample in terms of gender (Flick, 2009). As the researchers work in the state of Rio Grande do Norte (RN), all IT managers of the “S system” in that state were initially contacted. After the acceptance of five managers, who nominated colleagues from other states, it was possible to add two participants from Rio de Janeiro, two from São Paulo, one from Acre, one from Pará, and one from Bahia, totaling 12 participants. From November 2019 to March 2020, nine interviews were carried out in person and three through videoconferencing, when it was impossible to travel due to the advent of the new coronavirus pandemic. The interviews lasted seven hours and 42 minutes.

As the data analysis was carried out by constant comparison, theoretical saturation was observed in the 12th interview, a situation in which new codes no longer emerged, ending the data collection phase, as recommended by Gibbs (2009).

The method used for data collection was the semi-structured interview. The semi-structured interview starts from previously formulated questions, however, there is the possibility of exploring new questions during the conversation, as well as improvisations (Myers, 2013). Table 2 shows the methodological framework of the research objectives, the previous categories of analysis, the consulted sources, and the questions of the interview script. The questions related to the focus of understanding the gender issue were applied only to female managers.

Ethical issues were considered in this paper, such as signing an informed consent form, containing the research objectives and procedures, guarantees of anonymity, the possibility of withdrawing, and the clarification of possible doubts. For validation and improvement of the interview script, it was initially analyzed by two researchers from PPGA/UFRN; subsequently, two pilot interviews were conducted with IT managers from different companies to assess the prospects for responses. For analysis purposes, the interviewees started to be identified by codes (E1 to E12). At the end of data collection, all recordings were reliably transcribed.

**Table 2**

*Methodological binding of semi-structured interview questions*

Research objectives	Categories (Attributes)	Main sources	Main questions	Secondary questions
Identify how social capital is developed by IT professionals in the use of online social networks .	<p><b>Bonding social capital:</b></p> <ul style="list-style-type: none"> <li>- Emotional support</li> <li>- Access to scarce or limited resources</li> <li>- Ability to mobilize solidarity</li> <li>- Antagonism with people outside the group</li> </ul> <p><b>Bridging social capital:</b></p> <ul style="list-style-type: none"> <li>- Breadth of view</li> <li>- View of yourself as part of a larger group</li> <li>- Diffuse reciprocity with a larger community</li> <li>- Contact with many people</li> </ul>	Putnam (2000); Williams (2006); Steinfield (2009)	<i>How did you get help from others to solve the IT problems that you manage?</i>	<p>Tell me more about this help? Who are these contacts? How is contact made?</p> <p>Do you always ask her for help? Tell me what those relationships are like. Are they punctual? Enduring?</p> <p>You as a manager, if a colleague needs help, how do you deal with it? It's frequent? Do you use any tools for this contact? Which are?</p> <p>Do you have any groups formed? Which are? What content is shared? Who are the members?</p> <p>Is the group stable? Is there a feeling of trust? Friendship? How are groups organized? Is there any kind of action that the group does to maintain the formation or strengthen it?</p>
Understand the gender issue present in the use of online social networks in the IT work environment.	<ul style="list-style-type: none"> <li>- Male predominance</li> <li>- Lack of participation in informal networks</li> <li>- Social Support</li> <li>- Confidence</li> <li>- Proximity</li> <li>- Clustering</li> <li>- Cooperation</li> <li>- Information</li> <li>- Presence</li> <li>- Legitimation</li> <li>- Social Support</li> <li>- Visibility</li> <li>- Authority</li> <li>- Reputation</li> </ul>	Gallos (1989); Ragins and Cotton (1991); Ahuja (2002)	<i>During your career, how did you get help from someone or a group of people?</i>	<p>During your career, did you experience any difficulties as a woman? Tell me more about it.</p> <p>How did you try to face these barriers?</p>

Source: Survey data (2021).

As a method of qualitative data analysis, the five-phase cycle of Yin (2016) was used. To support the analysis, it was used the software Atlas.ti version 7 (Friese, 2014), providing support for coding and categorization, in addition to the schematic figures generated with this process. In phase 1 (Data compilation), the interviews were transcribed, organized, and named according to each interviewee in Word files and transferred to Atlas.ti, converted into 98 pages. In phase 2 (Data decomposition), a more in-depth reading was carried out, with a selection of excerpts and assignment of Level 1 codes, associated with the 11 previous categories of literature, as shown in Table 2. At the end of phase 2, they were coded 14 codes and 1 subcode, as new codes emerged in the analysis.

In phase 3 (Data recomposition), the codes that were related to each other were united, thus creating the Level 2 categories or codes. We sought to expand the meaning of the data, looking for patterns, such as how they could inform the original study questions. After coding and categorization, the information collected was interpreted (Phase 4 – Interpretation of data), in which the results were placed in order, described, and shown the meaning of the research. Finally, phase 5 constituted the conclusions of the study, its inferences, and implications.

## Results

In this section, the results of the qualitative analysis of the interviews carried out with the IT managers of the “S” System will be presented, based on their coding and categorization. It starts with the characterization of the study participants and the most cited online social networks. Next, the main categories that aim to respond to the objectives of this paper are addressed, such as Social Capital and Gender, Online Social Networks, and IT Work.

### *Profile of respondents*

The managers interviewed are mostly female (seven women and five men), participating in seven different federation states. “S” System managers are assigned to the following entities, listed in alphabetical order: FIEAC, FIEPA, FIERN, FIERN, FIERN, FIESP, FIRJAN, SENAC, SENAI, SENAR, SESC, and SESI.

Regarding the age factor, the interviewees are on average 46 years old. The period of experience in the management position has an average of 13 years. Table 3 presents this profile.

**Table 3**

*Interviews carried out*

Interviewee identification	Channel used	Date of achievement	Duration	State	Gender	Age	Time in management	Organization	State
E1	Presential interview	11/25/2019	38'22"	SP	Fem.	59	20	FIESP	SP
E2	Presential interview	11/25/2019	54'34"	SP	Mal.	54	19	SENAI	SP
E3	Presential interview	11/25/2019	28'19"	RJ	Fem.	51	4	FIRJAN	RJ
E4	Presential interview	11/27/2019	63'35"	RJ	Mal.	40	20	SESC	RJ
E5	Presential interview	03/16/2020	25'54"	RN	Mal.	42	10	SENAR	RN
E6	Presential interview	03/17/2020	14'29"	RN	Mal.	37	7	FIERN	RN
E7	Presential interview	03/17/2020	34'36"	RN	Fem.	40	11	FIERN	RN
E8	Presential interview	03/18/2020	40'48"	RN	Mal.	39	7	SENAC	RN
E9	Presential interview	03/19/2020	36'04"	RN	Fem.	52	23	FIERN	RN
E10	Video conference	03/24/2020	29'28"	BH	Fem.	49	20	SESI	BH
E11	Video conference	03/24/2020	30'14"	AC	Fem.	47	16	FIEAC	AC
E12	Video conference	03/25/2020	54'48"	PA	Fem.	50	8	FIEPA	PA

Source: Survey data (2021).

*Online social networks*

Online social networks were divided into two types, public and institutional. The public networks cited by the participants were WhatsApp, LinkedIn, Skype, Instagram, Facebook, Twitter, and Telegram. The institutional ones received mentions from Microsoft Teams and Lan Messenger. The OSN most used by IT managers are WhatsApp, LinkedIn, Teams, and Skype. WhatsApp is unanimous among all respondents.

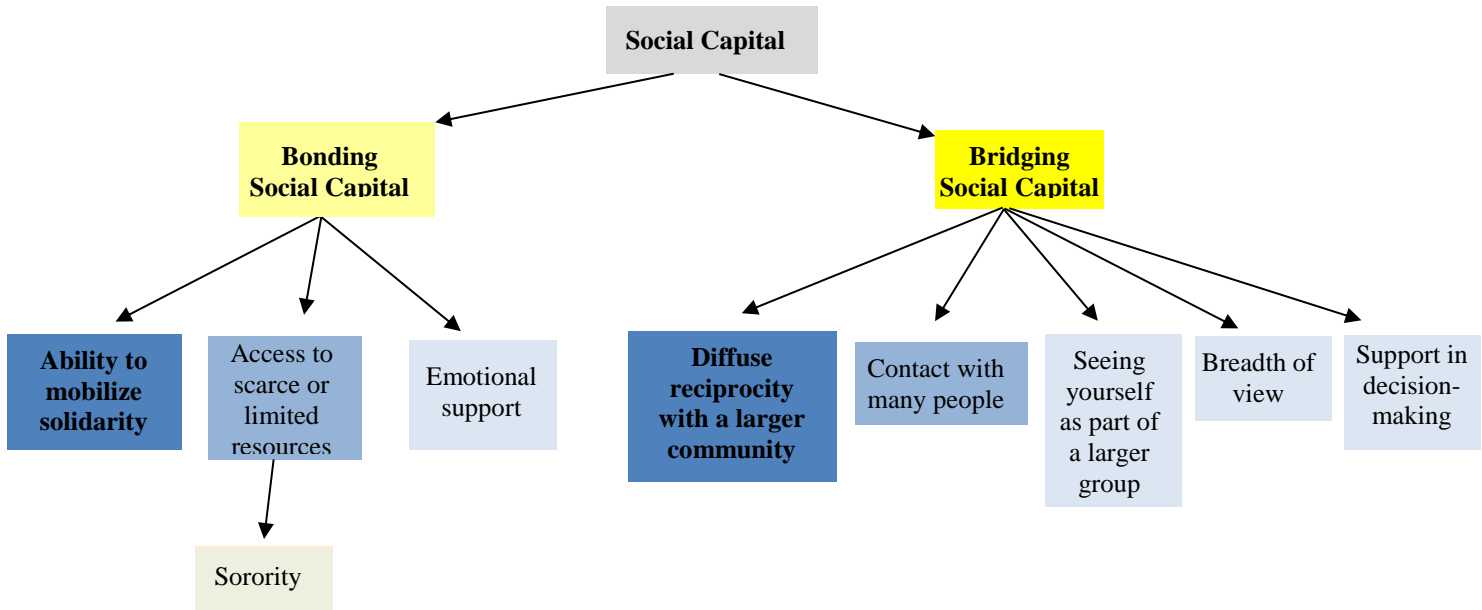
*Social capital*

Data analysis from the managers' statements generated a schematic representation of the social capital category, which can be seen in Figure 1. The bonding and bridging social capital correspond to subcategories and are represented in yellow, and the others are their respective codes in blue color. The green color represents the “sorority” subcode, related to the “capacity to mobilize solidarity” code. The code “Antagonism with people outside the group” was not

identified in the interviews, so it is not present in the schema. During the interviews, the code of “support in decision-making” emerged.

**Figure 1**

*Schematic representation of the Social Capital category*



Source: Survey data (2021).

In the configuration studied, the subcategory “bonding social capital” is composed of stronger ties, and little heterogeneity in the networks, i.e., its social network has closer connections that generate support and support more effectively (Putnam, 2000). There are four interviewees (E2, E4, E7, E11) who perceive that online social networks allow the construction of this social capital, since they emphasize, for some groups in which they are part, that there is mutual help, with a feeling of belonging, trust and proximity, in addition to sharing scarce and relevant information. For example, interviewee E4 says: “*We can even share information that gives us a competitive advantage*”. Social networks allow the exchange of valuable information that provides a competitive advantage. This fact dialogues with the “access to scarce and limited resources” of Williams (2006), generated using networks formed by strong ties. Still in the subcategory “bonding social capital”, the code that has the highest number of references (5) is “ability to mobilize solidarity”, being cited by interviewees E2, E7, and E10 (two women and one man), which indicates that groups formed by strong ties generate union among members and a willingness to help them, according to Williams (2006). Two statements illustrate this understanding: *Everyone walking hand in hand with each other, otherwise, we*

*won't leave the place. This is one of the secrets: trying to motivate the group to share problems and seek a solution together, asking for help. (E2); and "I feel a lot of confidence, a lot of friendship, a lot of commitment, a lot of mutual help." (E10).*

The subcode of "sorority" refers to solidarity, and mutual help, exclusively, made between women in search of strengthening in the face of difficulties faced about gender and profession. Thus, social relationships through online social networks allow these women to unite, strengthen themselves, contributing to their professional growth and struggle for gender equality. This gender aspect is found in the speeches of E3, E7, and E9:

*As it's only women, he ends up being a little softer than the other groups. [...] softer in the way of asking: "What's up?", "Wow! So cool!" [...] "Wow, what a nice prize! Congratulations on the achievement! You were beautiful." This never happens in other groups and in this one it happens. (E3)*

*We try to look for female interns. We try to bring more women to this area, although it is difficult because when we go to analyze the curriculum, there are only men who applied. But we try as much as possible to strengthen ourselves. (E7)*

*One supports the other even, for example, in personal things [...] one asks to another: how do you manage this? Are you feeling tired? Are you working harder? How is your production? So, they end up helping each other. (E9)*

The code "emotional support" was cited only by women (E9 and E11), which corresponds to Yen, Chen and Su (2020). As an example, interviewee E11 says: *"I meet people who understand what I'm saying, that we share the same afflictions, share the same problems and solutions, you know? So, there I got some support. (E11).* This demonstration is of trust and support among the members of the network, in which they share problems and solutions.

Despite being approached by five managers, totaling 11 references, the bonding social capital, when compared to the bridging social capital, was the least present, as shown in Table 4. Based on this, it is considered that managers have, in most of them, groups with work colleagues with weak ties or with professionals in the area, allowing contact with many people, forming the bridging social capital.

**Table 4**

*Relationships between codes, respondents, and references of the Social Capital category*

Category	Subcategory	Code	Subcode	E	E	E	E	E	E	E	E	E	E	E	E	Total per code	Total per Subcategory	
				1	2	3	4	5	6	7	8	9	10	11	12			
Social capital	Bonding Social Capital	Emotional support										1		1		2	19	
		Ability to mobilize solidarity.	-		2					2					1			5
			Sorority															
		Access to scarce resources					3						1					4
	Bridging Social Capital	Seeing yourself as part of a larger group				1									1		2	27
		Breadth of view						1					3				4	
		Diffuse reciprocity with a larger community				1	1					1	3	1		2	9	
		Contact with many people			1	2			1				1	1		1	7	
		Support in decision-making					1		2					1	1		5	
	<b>Total per interviewee</b>				0	3	9	5	1	3	3	1	11	3	3	4		

Source: Survey data (2021).

The bridging social capital generated by a network of weak ties connects different people and allows for a greater exchange of information and opportunities (Putnam, 2000). Being cited by 10 interviewees and with a total of 27 references, the subcategory “bridging social capital” was evidenced by the fact that managers have groups with large numbers of people and a feeling of reciprocity with this network, i.e., despite some sometimes not knowing everyone and not expecting something in return. This last code (diffuse reciprocity with a larger community) has a greater number of references (9) and is highlighted below by managers E9 and E12.

*We always have this collaboration, not only here in Natal, in the industry system, S system, Sebrae, and Sesc, but also in the industry system throughout Brazil, because we have a network of relationships, WhatsApp groups, we have emails, so they all collaborate. (E9)*

*You end up interacting directly and you're helping a person or asking something or asking for help from someone you've never seen in your life. (E12)*

The code “contact with many people” was cited by a greater number of respondents (6). Online social networks allow the formation of groups containing many people, from different places, religions, and races, which facilitates the dissemination and circulation of different

information and opportunities in the business (Corrêa & Vale, 2017). This can be illustrated, mainly, in the speeches of E3 and E10.

*Today I have a group that is very present daily, yes, I say that it is a second agenda that is the group of “CEOs RJ”. So, we have more than 100 companies there [...] (E3)*

*So, normally you do these networks not necessarily know the people. I think that's the great differential of LinkedIn, it's kind of brave, we keep adding and connecting people. [...] I make several invitations when I realize that they are interesting things. (E10)*

As for “breadth of vision”, two managers (E5 and E9) were open to interacting with new people, obtaining new information, and receiving help, as in the excerpts below.

*I don't know anyone there, I'm a customer of a store and he asked me, consulted me before if he could add me to the company's list and I said yes. And I even found it interesting because there are many... I keep getting a lot of new stuff there. (E5)*

*Every time technology advances you need to update yourself, so you can't update yourself just by staying in your world. You need to explore more, open more, and then you open up more horizons, so it always appears. So, we always need people's help. (E9)*

Social interactions through weak ties can also generate “decision-making support”. This code emerged during the interviews, mainly due to the focus being IT managers, who use online social networks to exchange information that contributes to decision-making and problem-solving, converging with Olmstead *et al.* (2016). The speeches of E4, E6, and E11 evidence this fact:

*Sometimes I need to decide, for example, about systems architecture. I form a small working group, it's a committee, I delegate this to it, and they do a study and vote. (E4)*

*This group also serves for us to make decisions within the scope of the Directors. (E6)*

*They make it easy for you to interact, it speeds up decision-making and communications. (E11)*

### *Gender, Online Social Network, and IT Work*

According to the goals of this research, we sought to better understand gender inequality in Information Technology area, identifying the main problems faced by women and the solutions proposed to overcome them. The questions in this category were directed only to female managers. Thus, the interviewees were asked if, during their career, there was any difficulty due to being a woman, if they received help from someone (building networks) and how they faced the barriers.

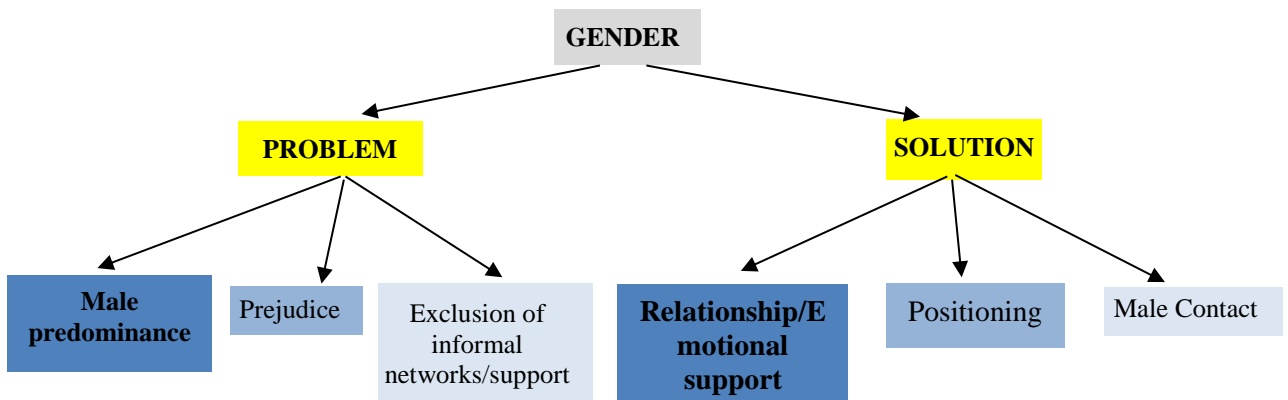
During the coding and categorization process, the gender category was divided into two subcategories (problems and solution) which, based on the theoretical framework, are related,



respectively, to male predominance and network exclusion codes, as well as relationships and male contacts as shown in figure 2.

**Figure 2**

*Schematic representation of the Gender category*



**Source:** Survey data, 2021.

From the statements of the interviewees, the codes “prejudice” emerged as a problem faced by women throughout their careers and “positioning” as an alternative solution to face barriers. According to data from previous studies (Nunes, 2016; Comptia, 2016), there is a male predominance in Information Technology area. This fact was highlighted in the speeches of interviewees E7 and E9.

*My area is still very much focused on men. I think there are few women professionals. [...] we try to bring more women into this area, although it is difficult because when we go to analyze the curriculum, there are only men who applied. (E7)*

*In the team today there are only me and her as women, the others are all men, right? [...] at first, I felt more, because it was much more restricted than today, it was, let's say, one woman for ten men in the area, because working in the computing area was very much for men... (E9)*

Given the above, five of the seven interviewees highlighted this inequality. As shown in Table 5, this is the code with the highest number of references. Therefore, the area is still predominantly male, despite having a greater aggravation at the beginning of their careers, and although women are increasingly assuming management positions.

**Table 5**

*Relationships between codes, respondents, and references of the Gender category*

Category	Subcategory	Code	E 1	E 2	E 3	E 4	E 5	E 6	E 7	E 8	E 9	E 10	E 11	E 12	Total per code	Total per Subcategory
Gender	Problems	Male predominance	1		2				2		2	2			9	19
		Exclusion of informal networks/support							1		1		2		4	
		Prejudice									1	2	2	1	6	
	Solution	Relationship / Social Support	1		2				1		3		1		8	15
		Male contacts	1		1						1				3	
		Positioning							1		1	2		1	5	
<b>Total per interviewee</b>			<b>3</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>9</b>	<b>6</b>	<b>5</b>	<b>2</b>		

Source: Survey data, 2021.

Another problem mentioned by three interviewees (E7, E9, and E11) was the “exclusion of informal networks”. These interviewees felt excluded by men because they were women, not receiving support, attention, and trust. This result agrees with Ahuja (2002), who argues that the main social barrier faced by women throughout their careers is the lack of participation in informal networks.

*Men had no desire to teach... It was that black box, even more so at that time. Those who worked with computers were all very closed, so I had a lot of difficulties. (E9)*

*The boys approach us, but I don't even know how to explain... It seems that when you get to a certain point you don't have access to certain things that are just theirs [...] Because when I had difficulty in IT area, I had no one to talk to. (E11)*

In addition to the problems mentioned, the code “prejudice” appeared, cited by managers E10 and E11. They reported that they were treated with inferiority, harassment, and male chauvinism and that many activities were considered masculine.

*I was harassed back there, right, and I was not heard, and I had the discredit of what I was saying... [...] but today I still feel a little more when the treatment is older people who are somewhat suspicious of what I was talking about what is the woman doing. (E10)*

*I found a lot of difficulty throughout my career because I'm managing the IT area, I felt a lot of male chauvinism from the boys. When I was younger it was even more difficult because it was like this: [...] "A young woman managing an IT area. How? Why is it not a man?" (E11)*

According to the reports, these problems occurred, mainly, at the beginning of the interviewees' careers, because as they have been working in the profession for a longer time, they have gained more space and respect in addition to the evolution of society itself regarding the issue of gender equality. However, the discomfort due to the male predominance remains, as shown by the interviewees.

As a solution to deal with gender difficulties, the codes "relationship/social support", "male contacts" and "positioning" were categorized. Of these codes, the one with the highest incidence among the interviewees and references was "relationship/social support" (Table 2). For example, managers E3 and E11 show the importance of the relationship for their career and facing barriers when they report:

*So, I think my trajectory is the result of the professional relationship of people who helped me in my career and team. (E3)*

*The biggest help I had was when this IT group was set up [...] and there I find some help, you know? I meet people who understand what I'm talking about, who share the same afflictions, share the same problems and solutions, you know? (E11)*

In the speech of all these interviewees, the fundamental role is highlighted, which is the support provided by some people, such as superintendents, giving support, guidance, and people who recognize, and help these IT professionals to stay at work or grow in their professional career. These findings corroborate previous studies and results, in which women seek to relate to closer co-workers, have greater trust in these relationships and, consequently, greater help when they need it (Gallos, 1989; Van Velsor & Hughes, 1990; Yen, Chen, & Su, 2020).

As it is an area with a greater number of men working, when compared to women, they end up having a "male contact" that helps their professional growth. This fact can be seen in the speech below.

*My staff on this committee that I mentioned are practically all men, so I call them my boys. But they know a lot, so this team also helps me in my professional career daily. (E3)*

These networks, mostly composed of men, contribute, according to Aten *et al.* (2017), to new job opportunities and higher wages. In the case of IT managers, the connections made mainly with men due to the male predominance in the sector and the support provided by them, that is, social capital, contribute to their personal and professional development.

Finally, interviewees E7 and E10 mentioned in the statements below the “positioning” solution as another way to combat prejudice and exclusion from networks.

*Showing my work [...] we were showing the importance of working together, in partnerships and the directors began to build trust in us and to call us to meetings. (E7)*

*I've always defended my position, so I think that made it possible for me to get past these people. [...] I've always had it in places with many men and I've never used it as a reason to say: “Oh, there's only me as a woman, so you can't do that...” I've always positioned myself at the same height. (E10)*

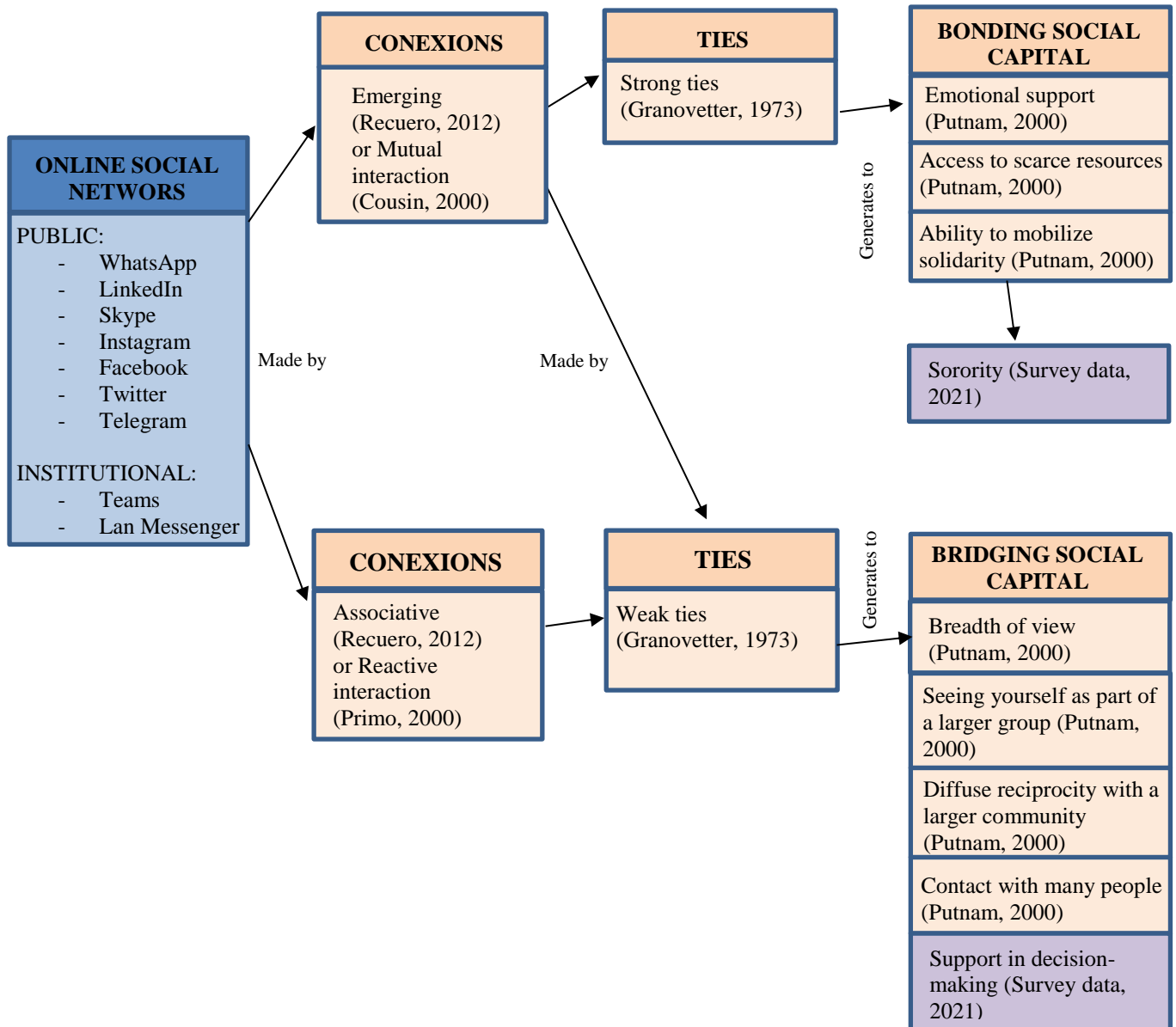
This “positioning” code appeared in the interviewees' speeches and was the second with the highest number of references. This finding shows that women also seek to position themselves regarding their point of view, their ability to perform tasks, with the ability to face difficulties without giving up on their purposes.

## Discussion

Figure 3 represents a general scheme that relates the findings of this qualitative research, with online social networks, social connections, social ties, and social capital. The blue rectangle represents the online social networks cited by respondents to this research. The yellow rectangles (sisterhood and support in decision-making) indicate the new codes generated because of this study, while the green elements are findings from previous studies.

**Figure 3**

*General scheme – online social networks, connections, ties, and social capital*



Source: Survey data, 2021.

When it analyzes how social capital is developed by IT professionals using online social networks, it is concluded that bridging social capital, present in the speech of 75% of respondents, reinforces the dissemination of information and unique opportunities through of a large network of contacts with different people, representing the “strength of weak ties” by Granovetter (1973). This condition can contribute to career success or the achievement, for example, of a new job opportunity (Adler & Kwon, 2002; Coleman, 1990; Seibert *et al.*, 2001). In addition, this subcategory was cited by all men in the research (5), corroborating again with

Yen, Chen and Su (2020), that men are more prone to the weak ties present in bridging social capital, as they are considered more “independent and rational”.

Based on the findings of this research and previous studies (Pontes, 1998; Putnam, 2000; Lin, 2001; Williams, 2000; Recuero, 2012), it is possible to conclude that online social networks are composed of emergent and associative connections, which in turn, are formed by ties (strong and weak). The associative connections, because there is no interaction/conversation, are only weak ties. These networks composed of ties generate the bonding and bridging social capital, and it was discovered in this study that they contribute to sorority and decision-making.

As for gender, women seek to relate to other people and have social support to face problems and advance in their careers. Therefore, online social networks make sorority possible, that is, a kind of sisterhood as a way for women to come together and exchange support.

## Conclusion

This paper aimed to understand how social capital is developed by IT professionals in the use of online social networks (OSN), considering the gender issue. The results show that the OSN impacts the daily life of the IT managers of the “S” System. These networks allow the creation of groups that, in turn, generate bonding and bridging social capital. According to the bridging social capital, it was possible to conclude that OSN streamlines communication, problem-solving and decision-making. In terms of bonding social capital, networks help managers to have access to scarce resources, emotional support, and the ability to mobilize solidarity, especially when it comes to women from IT, who come together to strengthen each other, in a spirit of sisterhood between women. Despite the difficulties faced, women seek, through electronic networks, to relate to other people in search of support, which also contributes to their professional growth.

From a theoretical point of view, this paper contributed to the enrichment of the field of social capital, identifying new benefits that are generated with the use of online social networks for the work of managers, such as support in decision-making and sorority. This latter, directly related to the issue of gender, is a topic that requires further studies.

It was possible to perceive managers are aware of the importance of online networks for carrying out their activities. As a practical application, the study infers managers should encourage and facilitate contact with many people through OSN, which will generate more inputs for decision-making. In the specific context of the “S” System, the recommendation is

that these networks be seen as a strategic resource so that both the organization and the employee benefit.

As research limitations, there is a smaller variety of federation states within the selected sample. It is suggested, for future studies, that this qualitative research can be extended to other organizations, as well as its continuity for quantitative research that develops a scale with items from the studied categories, mainly considering the categories that emerged from this qualitative research.

### Authors' contributions

Contribution	Oliveira, M. A.	Ramos, A. S. M.	Lucena, J.P.O.
Contextualization	X	X	---
Methodology	X	X	---
Software	X	---	---
Validation	X	X	---
Formal analysis	X	---	X
Investigation	X	---	---
Resources	X	---	---
Data curation	X	---	X
Original	X	X	X
Revision and editing	X	X	X
Viewing	X	X	X
Supervision	X	---	---
Project management	X	---	---
Obtaining funding	X	---	---

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