

The impact of social features underlying inter-organizational networks on learning: insights from Brazilian evidence

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Abstract

Purpose – This paper aims to investigate the impact of social features of an inter-organizational network on organizational learning and, in turn, on its performance. Specifically, this paper focuses on the following social features: proximity among members, trust among members, trust in network management, commitment among members, members' engagement and exchange of information.

Design/methodology/approach – This paper is based on evidence from a survey involving 101 organizations that integrate the Cooperation Networks established in Rio Grande do Sul, Brazil. The authors analyze data by using exploratory factor analysis, confirmatory factor analysis and structural equation modeling. Furthermore, they advance to also measuring "subjective" variables to business excellence.

Findings – The authors find that trust in network management and information exchange is positively associated with organizational learning. In turn, organizational learning appears to impact network members' performance positively. Arguably, no results about the impact of proximity among members, trust among members and commitment among members are interesting to activate a discussion on the role of region cultural dimensions in shaping the impact of social features underlying the inter-organizational networks on organizational learning.

Research limitations/implications – This study can be enriched by considering moderating variables in the relationships between the social conditions underlying inter-organizational network and learning.

Practical implications – The authors critically discuss the social features underlying the inter-organizational networks that impact learning among network members and how these aspects may be addressed to improve performance.

Originality/value – Given the focus of this empirical analysis, the authors advance the idea that regional culture is the layer of culture that most powerfully inspires the social features of networks, and shapes organizational learning.

Keywords Organizational learning, Trust, Engagement, Commitment, Proximity, Interorganizational network

Paper type Research paper

Introduction

Over the past two decades, strategic management studies and industrial marketing and purchasing literature have mainly discussed inter-organizational networks as they are channels for sharing resources (Håkansson *et al.*, 2009; Baddar-Alhussan *et al.*, 2017) and loci of innovation (La Rocca and Snehota, 2014; Powell *et al.*, 1996; Westerlund and Rajala, 2010). Extant literature has acknowledged a link between the novel competitive landscapes (D'Aveni *et al.*, 2010) and the formation of inter-organizational networks as a strategic resource (Bergenholtz and Waldstrøm, 2011; Borgatti and Foster, 2003; Håkansson and Snehota, 2017; Lavie, 2006;

Provan *et al.*, 2007). Organizations enter a network to speed up products to market (Cuypers *et al.*, 2020) and pool complementary resources and capabilities (Hagedoorn and Duysters, 2002).

Dagnino *et al.* (2015, p. 370) have argued that "it is important to identify how and under which conditions network affiliation may be a strategic resource, and how executives can potentially create these conditions." More recently, Alhussan *et al.* (2019) have echoed such an idea and called for studies on "how [organizations] can sustain their development and manage their network relationships within such changing environment." In this regard, technological development and interconnections among the economies of multiple countries lead to a knowledge-based competition and, in dynamic industries, exploratory inter-organizational networks, namely with a focus on knowledge sharing and learning, have a higher

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impact on performance than exploitative networks focused on scale economies (Hagedoorn and Duysters, 2002).

Overall, existing literature has examined the differences in learning within inter-organizational networks. Specifically, studies consider how firms use network ties to combine the knowledge they share (Ahuja, 2000; Mariotti, 2011), the types of knowledge that firms exchange and combine in innovation networks (Sammorra and Biggiero, 2008), the impact of technological diversity and absorptive capability on exploratory innovation (Phelps, 2010), and the role of institutional support (Schott and Jensen, 2016).

Quite surprisingly, while theoretical and empirical advancements have shown the relevance of the *social features* underlining inter-organizational networks, the literature that explores the impact of social features of inter-organizational network on learning is at an early stage of maturity (Das and Teng, 2002; Gulati and Gargiulo, 1999). From an empirical perspective, there is evidence of the relationship between trust and learning (Kale et al., 2000) and between information exchange and organization learning (Hartley and Benington, 2006), and limited understanding about the proximity and commitment among members. From a conceptual perspective, one might suppose that, on the one hand, social features improve inter-organizational interaction and support knowledge flows among organizations (Mu et al., 2008). On the other hand, exceeding in social features such as trust or engagement – may lead firms to mistakenly take a “leap of faith” on the partner’s innovation capability.

In light of these arguments, we test a set of hypotheses on the impact of the social features of the inter-organizational network on learning at the organizational level. We focus on the Brazilian context for our empirical analysis. Brazilian culture is characterized by the “personalist” and “social” dimension of the Latin organization (Amado and Vinagre Brasil, 1991). However, Hofstede’s cultural dimensions that may shape managers’ preference for certain *social features* of inter-organizational networks among regions are different. Specifically, we select the inter-organizational networks situated in Brazilian State Rio Grande do Sul. South Brazil is suitable for this kind of research because its regional culture is simultaneously hierarchical and quite informal (Hofstede et al., 2010). Furthermore, the culture of South Brazil is quite individualistic and achievement-oriented (Hofstede et al., 2010).

Literature background

Inter-organizational networks

In the past two decades, studies on inter-organizational networks have emerged and evolved significantly in the management realm (Provan et al., 2007). Literature on inter-organizational network has followed four main paths. First, studies have investigated the drivers underlying organizational decision to enter into an inter-organizational network, namely:

- getting access to new markets and technologies (Powell, 1987);
- combining firms’ knowledge (La Rocca and Snehota, 2011; La Rocca, 2013; Phelps et al., 2012; Sammarra and Biggiero, 2008);
- sharing risks (Mariotti and Delbridge, 2012); and

- saving marketing and commercial costs (Provan and Sydow, 2009).

Second, previous studies have inspected the drivers of performance of inter-organizational networks, from the perspective of the network itself (Bayne et al., 2017), and from the perspective of the focal firms’ ego-network (Lavie et al., 2011). Third, extant literature has also examined the management structure (Gulati, 2007; Sydow and Windeler, 1998; Zaheer and Bell, 2005; Zaheer and Soda, 2009), the types of governance (Howard et al., 2016), the advantages of collaborative arrangements (Powell, 1987), the ways that networking organizations adopt to share knowledge (Mu et al., 2008). Fourth, scholars have explored the effects of the interplay between network’s architecture and institutions in the growth of emerging markets (McDermott and Corredoira, 2010).

In this past decade, studies on inter-organizational networks have shown interest in exploring the social features of networks and their impact on performance. Specifically, existing literature focused on the *proximity among members* (Huggins and Johnston, 2010), *trust among member* and *trust in network on management* (Thorgren and Wincent, 2011), *commitment among members* (Cook and Emerson, 1978), *members’ engagement* (Howard et al., 2016) and *information exchange* (Howard et al., 2016). This approach provides a conceptualization of inter-organizational networks that shows the potential for social and relationship development. From such perspective, Sorenson et al. (2006, p. 996) call attention to “social connections as an important channel through which “insiders” gain superior access to knowledge.” Specifically, to access these different resources, it is often necessary to establish conditions of reciprocity and coordination (Provan and Sydow, 2009). However, relationships can limit the development of associated organizations through their social norms and obligations (Zaheer and Soda, 2009).

Inter-organizational learning

While inter-organizational networks may occur for several reasons, knowledge combination is the most common among the declared drivers (Bergenholtz and Waldstrøm, 2011; Provan et al., 2007). Furthermore, firms are also interested in being part of the inter-organizational network because being embedded in a network structure may enhance organizational learning and, in turn, influence their performance. However, knowledge transfer is a necessary, but insufficient condition for inter-organizational learning. To accomplish the goal of inter-organizational learning, “collaborating partners need to behave cooperatively towards each other in order to allow knowledge to flow between organizational boundaries” (Janowicz-Panjaitan and Noorderhaven, 2009, p. 1022). This allows firms to enhance their absorptive capacity (Phelps, 2010) and the sources and types of knowledge (Sammorra and Biggiero, 2008). Nonetheless, cooperation has both advantages and downsides (Kogut, 1988; Muthusamy and White, 2005).

This short review on inter-organizational learning shows the relevance for scholars to investigate the impact that the social features underlying an inter-organizational network have on learning. This idea is rooted in the contribution of Borgatti and Cross (2003). Specifically, inter-organizational

learning requires that firms develop close and multiple interactions that – as our set of hypotheses advance – are based on social features, such as proximity among members, commitment among members, members' engagement and information exchange.

Hypothesis development

A *fil rouge* in network literature is that the learning emerging within any inter-organizational network are affected by the proximity among the members of the network (Granovetter, 1983).

The concept of proximity in inter-organizational relationships reflects the confidentiality of the information and the daily practices that emerge among the closest members of the network (Geldes *et al.*, 2015). This aspect considerably enhances the number of chances that organizations have in learning from the network itself (Heanue and Jacobson, 2001; Huggins and Johnston, 2010). It happens, especially for relational proximity, because the proximity among members affects common beliefs and attitudes and common basic knowledge (Schmitt and Van Biesebroeck, 2013). Specifically, this proximity allows organizations within network to understand and appreciate the different partners' knowledge, as well as to interpret the informal learning and experience that they assimilate through the interaction (La Rocca *et al.*, 2015). Additionally, also regional proximity among network members enhances, at least potentially, the amount of knowledge flows and exchanges. Two physically closed firms have high probability of interact (Huggins and Johnston, 2010).

Hung *et al.* (2014) corroborate that, the closer the interactive bonds of the organizations in a network, the more business opportunities can emerge among them. It happens because the proximity allows partners to “accumulate experience through repeated communications, decision-making processes, and also obtain basic information from other people easily” (Hung *et al.*, 2014, p. 192). Similarly, Janowicz-Panjaitan and Noorderhaven (2009) emphasize that learning occurring between partners that cooperate with each other and share tacit knowledge can be understood according to two conflicting viewpoints: a former based on calculative considerations and the latter based on trust-based considerations. In both cases, it is important that organizations interact so that tacit knowledge can be disseminated beyond organizational borders (Wo and Choi, 2004). Drawing on these premises, we advance the following hypothesis:

H1. Proximity among members of an inter-organizational network is positively associated with their learning.

Hagen and Choe (1998, p. 589) define trust as “the promise of another can be relied on and that, in unforeseen circumstances, the other will act in a spirit of cooperation with the trustor.” Then, trust encompasses the expectation that an agent calls to fulfill their obligations, behave and negotiate fairly, even when there is a possibility that the actors act opportunistically (Newell and Swan, 2000).

Trust emerges as a significant element for human social interaction and the outcome of cultural drivers in the conduction of interactions and expectations of social actors (Lumineau, 2017). Trust is often associated with social control and supports the exchange relationships (Gulati, 1995; Yakimova *et al.*, 2019). If there is trust among members, they

implicitly “accept vulnerability based upon positive expectations of the intentions or behavior of another” (Rousseau *et al.*, 1998, p. 395). This mainly occurs since trust instills the belief that the agents involved in the transaction are competent, responsible, honest, and fair (Morgan and Hunt, 1994). Indeed, the interactions and knowledge overflows emerge because a set of informal values and rules established by the network creates a precondition for learning.

Drawing on Bachmann (2001), we argue that, without a minimum of trust, it is difficult to create and preserve successful organizational relationships in the long run based on knowledge sharing and combination. Trust implies that the actors expect to be reliable in the fulfillment of the requested obligations and actions to develop, compared with the case in which they may behave opportunistically (Zaheer and Soda, 2009). As Mayer *et al.* (1995) argue, the willingness of an actor to be exposed to the partners' actions based on the beliefs and expectations that the other actor will complete leads to the fact that partners easily leverage on the “stock” of knowledge within the network to trigger learning.

We expect that trust plays a crucial role in promoting an effective exchange of knowledge and, by means its integration, the inter-organizational learning. Accordingly, the positive expectations and beliefs about the trustworthy behavior of agents involved in a relationship will make partners more (or) interested in sharing knowledge and facilitating the learning emerging in the network connections (Welter, 2012). Florén and Tell (2004) stipulate that trust emerges in fair giving and taking, as well as in honesty with others to foster knowledge combination among members. In other words, the inter-organizational learning frequently comprises the “interdependency and consequently vulnerability” (De Wever *et al.*, 2005, p. 1528). Therefore:

H2a. Trust among the members of an inter-organizational network is positively associated with their learning.

Over time, frequent and reiterated positive interactions develop a confidence orientation towards the intentions of goodwill and reliability that end up creating learning spaces. In this regard, Putnam (1995) describes organizational social capital features namely networks norms and social trust that support cooperation among members. The establishment of trust among members of an inter-organizational network in the formation and maintenance of the relationships may reduce the coordination costs and the requirement for hierarchical controls. At this regard, by investigating the Japanese supplier networks, Hagen and Choe (1998) argue that the institutionalized industry practices support the emergence of cooperation, because they build, preserve and promote mutual trust among the network members.

Within a relational context, trust considers the expectation that both parties will behave in a mutually acceptable and reliable manner, and neither party will exploit the other's vulnerabilities (Kale *et al.*, 2000). From such perspective, an interesting point for instigation is the confidence that associate members have in those who are in the direction or management of the network.

Trust building between network members and the network management team is essential while the network receives and shares a lot of information. Thus, network members need to

rely on network management information in order to establish learning from it. From this point of view, we argue that trust represents the basis of social exchanges and governance mechanism that strengthens the learning (Granovetter, 1985; Uzzi, 1997; Popp *et al.*, 2014). Therefore:

H2b. Trust of the members in network management is positively associated with their learning.

The concept of commitment that occurs among the organizations within a network emerges when the members of a network are cognitively tied to, and they identify themselves with the overall activity of the inter-organizational network (Lee and Kim, 2011). Commitment among the organizations “helps realize the full value of interfirm collaboration” (Wu and Cavusgil, 2006, p. 84) and epitomizes the members’ desire to provide support and effort to the network, even if this implies short-term sacrifices to maintain such a relationship (Holm *et al.*, 1999; Moorman *et al.*, 1992). Commitment translates into a means to bond the organizations so that this may propitiate longevity to the relationships (Gundlach *et al.*, 1995). Indeed, Andréßen *et al.* (2012) argue the necessity for commitment encourages the network members to implement new processes and activities in networks, including the learning of the partners. Wu and Cavusgil (2006) found that organizational commitment supports the emergence of higher rents by exploiting the synergies among resources, knowledge, and capabilities.

Drawing on Anderson and Weitz (1992), we posit that the desire to develop stable relations constitutes the commitment in network relationships, as well as the dedication in making short-term sacrifices that may maintain the relational stability. The commitment of the network members generates a multiplicative gain stemming from the reciprocity of the members (Shane and Venkataraman, 2000). We believe that such multiplicative factors are also related to learning because they shape the condition to transfer knowledge and combine and recombine it. Therefore:

H3. The commitment of members of an inter-organizational network is positively associated with their learning.

Organizations within a network do not take benefits *per se* from the affiliation but based on organization interactions that combine and recombine resources and capacities (Howard *et al.*, 2016; Lavie *et al.*, 2012). Accordingly, learning in an inter-organizational network is contingent with the members’ engagement. Actually, for the members of the network to absorb knowledge, it is necessary that firms maintain a high level of interactions based on the continuous flows of knowledge that, in turn, generate their learning. Following Howard *et al.* (2016), we label this effect as “social engagement.”

Social interactions occurring within the inter-organizational network are crucial for supporting learning among organizations (Howard *et al.*, 2016) because the unremitting amounts of interactions that emerge among the network participants increase the flow of tacit and explicit knowledge (Howard *et al.*, 2016; Reagans and McEvily, 2003). Therefore, organizations in the network with a low level of social interactions may struggle to acquire knowledge and develop

new routines. Conversely, the organizations with greater interactions would continue learning (Howard *et al.*, 2016). Therefore:

H4. The engagement of members of an inter-organizational network is positively associated with their learning.

The formation of relations among network members allows them to increase the “stock” of information and knowledge obtained in the network and, in turn, their learning. Previous research studies describe that the relations in inter-organizational networks enable discussion forums for new practices and facilitate the transmission of information and knowledge, as well as learning (Muthusamy and White, 2005). In this vein, Koka and Prescott (2002) empirically found that the information exchange between firms (that is, in turn, composed by information volume and information diversity) is positively related to organizational learning and performance.

In the inter-organizational context, Janowicz-Panjaitan and Noorderhaven (2009) stated that learning is both formal and informal. In this line of understanding, authors emphasized that to have learning among partners, it is necessary to have collaboration and information exchanges among them; this way, knowledge is to effectively disseminate among the organizational borders.

Overall, scholars (Knight, 2002; Phelps *et al.*, 2012) acknowledge the relevance of integrating other attributes to dig deeper into the investigation of knowledge exchange and learning within the network. Among them, we find that Hartley and Benington (2006) advance the idea that, in addressing the knowledge exchange and learning among the members of a network, it is important to encompass the different perspectives that network members may adopt, and the conflicts of interests that may emerge among them. Additionally, it is worthy to also consider how knowledge is shared and applied by network members, and to what extent and under which condition they may benefit from it. Therefore:

H5. Information exchange among members of an inter-organizational network is positively associated with their learning.

Knowledge flows and exchanges lead to learning from firms’ interactions, and generate efficient gains that stem from the fact that the interactions among the network members are reciprocal. Therefore, it is easy to explore and exploit novel knowledge opportunities with lower opportunity costs (Shane and Venkataraman, 2000).

Muthusamy and White (2005) argue that the reasons underlying the success of collective learning draw on the social interactions and the information generated cooperatively, and the amount of exchanges occurring among partner organizations. Moreover, within a network, organizations likely have a higher degree of supplementary knowledge and learning. In turn, learning supports the innovation process and, consequently, high performance (Koka and Prescott, 2002). Learning allows organizations to increase their capabilities and enhance the development of joint problem-solving activities (McEvily and Marcus, 2005). Such intellectual exchange provides opportunities for the members of the network to reduce bounded rationality and the risk of opportunism; i.e.

lower transaction cost (Barringer and Harrison, 2000). This aspect enhances the overall performance of the network members compared with the performance of the organizations that are not included in the collaborative environment. Therefore:

H6. The learning of the members of an inter-organizational network impacts positively on their performance.

Research method

Why use country based-evidence

Since culture is the “collective programming of the mind, which distinguishes the members of one category of people from another” (Hofstede, 1994, p. 1), we argue that *cultural dimensions* may explain both the evolution of network relationships and the types of relationships occurring within the inter-organizational network (Ahuja *et al.*, 2012). In linking culture and network social features, we observe that Doney *et al.* (1998) show that national culture and values shape the application of the trust-building processes. Similarly, commitment among members is likely shaped by collectivism that pushes to interact in an interdependent and cooperative mode *vis-à-vis* the individualism that encompasses the value of competition (Axelrod, 1984). More specifically, in linking culture, inter-organizational learning, and network social features, we argue that a deeper consideration of country culture and cultural differences among network members would shed new light on inter-organizational learning. Accordingly, “inter-organizational learning is subject to firms’ backgrounds and histories” (Vasudeva *et al.*, 2015, p. 831) that lead to idiosyncratic relationships. Since those routines may shape the ways through which firms will develop relationships, the question of whether the country culture of the participating network firms strengthens the impact of some social features on inter-organizational learning turns out to be particularly relevant to our understanding of it.

Research setting and sample

To develop this study, we carry out a study with organizations that join horizontal inter-organizational networks, albeit they still remain legally independent. According to Baker (2001), the survey conducted among the main organizations supports discovering facts, attitudes, and opinions by means of a set of questions that are helpful to understand their conviction and future behavior. We focus our empirical analysis on inter-organizational networks members situated in Brazilian State Rio Grande do Sul. Specifically, South Brazil is considered a regional culture that is “European and prosperous” and “more hierarchical, less formal, more individualist, and more achievement-oriented”, compared to other regions of the country (Hofstede *et al.*, 2010), which fosters the development of inter-organizational relationships.

In addition to the cultural traits, it is worth highlighting two more justifications for our choice. First, we chose to search networks created through the Cooperation Networks Program. The Cooperation Networks Program was created through a state public policy in 2000 with the aim of promoting cooperation between small businesses. Since the Cooperation Networks Program has stimulated the participation of the

networks, the emergence of social features is not taken for granted and the networks evolution is not easy to predict. Second, the study of these networks is relevant due to their social impact. Surveys commissioned by the Department of Support to Microenterprise and Small Business indicate an average increase in the revenues of companies (26.51%) participants, average increase in the number of employees (36.73%), average increase in company investments (30.95%), and average cost reduction (13.38%).

To reach network members, we contacted inter-organizational networks by phone to explain the research and its objective. For those networks that agreed to participate in the survey, we asked them to send us a list with the e-mails of the member organizations. In total, we received around 1500 e-mails from organizations. Then, we sent the questionnaire to all these organizations. Thus, data collection proceeded online and we got a valid sample of 101 respondents.

Research instrument and operationalization of the variables

To develop our research instrument, first, we conducted a search in strategic management studies and industrial marketing and purchasing literature. Drawing from the developed knowledge, we found theoretical support about the measures of social features. Second, we created measurement items to capture information about the cooperation networks program characteristics. Third, following the recommendations of Forza (2002), we performed the validation of the questionnaire content with the application of this instrument to business people in networks of the study. Those businesspeople made specific remarks about certain aspects of the questionnaire, which were altered or replaced in order to increase the overall understanding of the questions. The answers of these respondents (5 in total) were incorporated into the final sample because one of the researchers was present at the time of validation. Therefore, we understand that the collection performed for validation of the questionnaire is also valid for our analysis. The questionnaire consists of 34 (thirty-four) questions, the answer to each question is measured through a Likert-type scale ranging from 1 (low agreement with the sentence content) to 10 (high agreement with the sentence content).

The operationalization of the variables carries out as follows. *Proximity of relations*: measured from four questions involving credibility, harmony, friendship, and reciprocity. Such questions evaluate the closeness of the members for the execution of the activities in the network. Specifically, in the literature on the subject, the measures of strong and weak bonds are made by indicators of closeness and intensity of relations (Marsden and Campbell, 1984) and software, such as Ucinet. Hence, the measurements of this variable are made based on the description of characteristic elements of strong bonds.

Trust among members: measured with five questions that are elaborated from the “Integrity-based Partner Trust” conceptualized by Muthusamy and White (2005).

Trust in network management: measured from five questions regarding the way in which decisions were made in the network, the development of the (technical and managerial) activities of the managers, and the information sent by network managers.

Such questions are not elaborated from a previous article, but developed and discussed among the members of the research group of one of the authors of this article.

Commitment among members: six items elaborated based on the study by Muthusamy and White (2005). In their research, the “inter-organizational reciprocity” construct maps the conceptualization of commitment, involving issues of commitment and perception about loyalty, time, efforts, and resources committed by their network partners.

Members' engagement: two items developed through a literature review that seek to understand themselves as associated organizations making efforts, in terms of time and money, with the aim of investing in the network and whether the organization is faithful to the agreements signed by the network with third parties. This approach recalls the studies proposed from Howard and colleagues (2016).

Information exchange: five items developed through a literature review and are consistent with the study by Li and Lin (2006).

Organizational learning: drawing on Muthusamy and White (2005), we consider five items to measure the learning stemming from the organization participation to the network. We elaborated questions related to new techniques, ideas, competencies, or technologies.

Organizational performance: we use seven questions that measured, specifically, the increase in product supply, market share, cost-benefit relation of network participation, growth in the organization's sales and profits, and innovations. The questions are consistent with Muthusamy and White (2006).

Operational and data analysis procedures

The data process started online and the responses became automatically available in a Google Forms spreadsheet. Then, we transferred the answers to a Microsoft Excel 2010 spreadsheet for subsequent analysis in the Statistical Package for the Social Sciences (SPSS) version 18.1 and Amos™ software.

As data analysis procedures, we initially conducted a descriptive analysis of the sample. Next, we sought to explore the data through an exploratory factor analysis (EFA). Following Hair *et al.* (2009), in the beginning, we verified the possibility of applying the EFA with Bartlett's sphericity test and the calculation of the Kaiser–Meyer–Olkin (KMO) index.

Next, we evaluated the commonalities of the variables excluding variables with values lower than 0.5. To specify the number of factors, we adopted the eigenvalue as the estimation criterion and used the varimax rotation as the rotational method. Then, we used Cronbach's alpha internal consistency indicator to establish the reliability of the factors. In this step, we eliminated the observed variables that decreased the construct reliability of the constructs, seeking to obtain values over 0.7 for each one (Hair *et al.*, 2009).

Next, we applied the confirmatory factor analysis (CFA) that consists of a model for measuring the relationships between latent and observable variables, enabling the assessment of the reliability and validity of the constructs (Hair *et al.*, 2009). To validate each factor (construct) separately, we used the CFA, through the verification of the convergent validity, following Hair *et al.* (2009). To do this, we analyzed the statistical magnitude and meaningfulness of the standardized coefficients of each construct variables and the absolute fit indices summarized in Table 1.

Each construct required adjustments for its validation according to the indices shown in Table 1. After that, we built the integrated model and performed the analysis by means of Structural Equation Modeling (SEM). To test our hypotheses, we evaluated the statistical significance of the resulted coefficients of regressions and verified the adjustment indices of the model, the same ones used to validate the measurement of each construct showed in Table 1. Both CFA and SEM were estimated through the method of Maximum Likelihood. They allow us to obtain estimates for the parameters of the regression weights, based on the assumptions of multivariate normal distribution and that data was obtained on a continuous scale (Byrne, 2010).

Findings

Descriptive analysis of the sample

A significant amount of the answers obtained is from organizations that are part of networks with over fifty members (37.60%). This is understandable when analyzing the time of existence of the inter-organizational networks: over 66% of them have existed for more than ten years. These were networks established with few businesses, but that structured themselves and grew with the entry of new organizations. The horizontal cooperation by inter-organizational networks

Table 1 Description of the adjustment indices

Ajustment (fit) indices	Explanation	Limits
χ^2 (value)	Significance of the differences between the observed and the estimated matrix	–
χ^2 (probability)		>0.05
χ^2 /degrees of freedom	Is an alternative indice to χ^2 (probability), testing Chi-square/Degrees of freedom	<3
GFI – goodness of fit	Represents the degree of adjustment, without degrees of freedom	>0.95
CFI – comparative fit index	A global comparative measure between the estimated and null models	>0.95
NFI – normed fit index	Proportion in which the adjustment of the proposed model is better than the adjustment of the null model	>0.95
TLI – Tucker–Lewis Index	Is an adjustment measure for the complexity of the model	>0.95
RMSR – root mean square residual	Compares the fit of two different models made from the same database	<0.06
RMSEA – R. M. S Error of Approximation	Discrepancy between the covariance matrix observed and estimated by the degree of freedom	<0.08

Source: Elaborated by the authors based on Byrne (2010), Hair *et al.* (2009); Kline (2011)

business model allows the entry of new members. This action aims to maintain competitiveness and growth of the bargaining power of the network. Such question shows that 67.10% of the organizations have not participated in the network ever since its foundation. Regarding the networks, we also point out that most of the answers obtained are from the retail furniture, clothing, pharmaceutical, and construction materials segments.

About the organizations, one may verify that most in the study sample have from eleven to twenty employees (29.70%), followed by businesses with up to ten employees (31.50%). Regarding the time of participation of the organizations in the networks, the results show that most organizations have been in their respective networks for a short time: 37.60% have been in their networks for five years or less.

Exploratory analysis of the factors

For the investigation of the social factors of organization relations in networks, we applied the EFA. The first step consisted in performing calculations regarding the suitability of using the factorial analysis. For this purpose, we conducted Bartlett's sphericity test and KMO, characterized as statistical procedures that allow identifying the quality of the correlations among the variables, so to proceed with the factorial analysis. As indicated by such tests, we obtained the values of 0.8232 for the KMO and a sig value of 0.000 (approximate Chi-Square = 3464.336) for Bartlett's sphericity test. These results attest the factorability of the data for the questions used in this research.

After verifying the suitability of the factorial analysis, we conducted the identification of the commonalities presented in each of the questions that constitute the research instrument. According to the understanding of Hair *et al.* (2009), the variables that present values lower than 0.5 for this measure must be removed from the instruments. However, we verified that all variables presented commonalities higher than 0.5 and, thus, we removed none from the factorial.

Specifically, in the factor extraction step, we obtained eight factors with eigenvalues above 1.0, which explain, jointly, 78.14% of the data variation. Table 2 shows the resulting factors of the factorial analysis and their respective variables, along with the Cronbach's Alpha value of each one.

The factor *Trust in Network Management* is composed of five questions that encompass the managerial aspects of the network and how much the other members trust this management. The elements investigated in this construct are in line with relational governance, given that the relational norms and those of trust are often considered as the two most significant dimensions of relational governance (Griffith and Myers, 2005).

The factor *Performance of Associated Organizations* assesses elements related to the performance of the organizations that are network members. The aspects evaluated refer to the market, sales and profits, network cost and, size of the organizations. Some of such elements are explored in the studies by Laihonen *et al.* (2014), and Pekkola and Ukko (2016).

The factor *Information Exchange* remained with the same five questions defined for data collection and aligned with the study by Li and Lin (2006). In this construct, we examined questions related to the sharing of diverse information by members and

how much they believe they receive information from their network peers.

The factor *Learning* remained with the four original questions stipulated from the study by Muthusamy and White (2005), added by one question about innovation. Such questions involve the knowledge acquired by the organizations and the improvement in some elements, such as technologies, marketing actions, organizational processes, and new knowledge.

Trust among members of the network is another factor resulted from the factorial analysis. This factor consists of five questions that assess how much the members have confidence in each other. Items such as confidentiality, acting fairly, keeping the word, and behavior are evaluated in the issues.

The factor *Proximity* is formed by four questions that assess the closeness and frequency of the relations, besides aspects such as harmony, credibility, and friendship in the relationships. Cao and Lumineau (2015) explored relational aspects and argued that they jointly improve the satisfaction and performance of the relationship.

The factor *Commitment* is composed of three questions that summarize the efforts and time for the implementation of the activities agreed in the network. These are elements that form commitment and are deemed essential in cooperative relationships such as inter-organizational networks.

The factor *Members' engagement* is composed by two issues that address how much network member organizations spend time, efforts, and money to maintain the network, and how loyal they are to the activities and agreements established jointly within the network (Howard *et al.*, 2016).

Validation of the factors

Based on the results obtained on the EFA, we performed CFA to provide a better emphasis on theory testing and, also to offer robustness to the analysis set of analytic procedures, which are not provided by the EFA (Brown, 2006). We evaluated this necessary procedure because some scales and variables of the instrument of this study were selected from other scales and studies.

For all the constructs, the models proposed are set according to all the variables of the EFA factors scale. The results indicate that almost all proposed models are inadequate once they fail to meet the limits of acceptability of the adjustment indices (Table 1). Therefore, to get adequate final models, we implemented two main steps: the removal of non-significant variables or/and insertion of correlations between variables errors (as indicated by the software AmosTM and that would have theoretical explanation). Table 3 shows the adjustment indices of the construct models.

Almost all models were adjusted by inserting covariance arrows between the errors of the measures of the observed variables that made up each construct. The exceptions are the constructs "TNM" and "CNM". In the first, it was necessary to exclude a variable from the model proposed to obtain validity; in the second, it was necessary to stipulate equal covariance parameters between the errors of the observed variable 3 and the latent variable "CNM".

We note that the CFA is not carried out for the factor named "Members' engagement (ME)" from the EFA. The reason is that the CFA cannot be performed for constructs with only two

Table 2 Factorial analysis

Description of the factors	Factor loadings
FACTOR 1 – Trust in Network Management (TNM) – Cronbach's Alpha (0.908)	
I trust the managerial competency of the network's management	0.798
I trust the technical competency of the network's management	0.770
I trust how the network and its activities are managed	0.638
I trust the integrity of the network's management	0.610
I trust that the associates or executives share all the relevant information	0.602
FACTOR 2 – Performance of Associated Organizations (PAO) - Cronbach's Alpha (0.890)	
My company increased its sales	0.883
My company increased its profits	0.847
The size of my company increased	0.786
The overall results that my company is obtaining justify the costs of being part of the network	0.612
My company increased its market share	0.489
FACTOR 3 – Information Exchange (IE) - Cronbach's Alpha (0.920)	
I share information about businesses, opportunities, and the market with my closest partners	0.883
I share confidential information with my closest partners	0.865
My closest partners share information about businesses, opportunities, and the market in general with me	0.839
My closest partners share confidential information with me	0.766
The information exchange I keep with my partners is opportune	0.717
FACTOR 4 – Learning of Associated Organizations (LAO) - Cronbach's Alpha (0.944)	
I have been learning new things through the exchange of abilities, knowledge, or technologies	0.865
I have learned to improve marketing, organizational processes, or daily operations	0.780
I have been gaining new techniques, competencies, or technologies	0.759
I have been developing new ideas due to its participation in the network	0.731
From its entry into the network, my company performed more innovations	0.696
FACTOR 5 – Trust Among Network Members (TANM)- Cronbach's Alpha (0.918)	
I believe that the network partners act justly with me	0.826
My partners in the network respect the confidentiality of the information	0.826
The partners in the network keep their words	0.752
The behaviors of the other network partners strengthen the trust I have in them	0.728
In general, my network partners behave openly with me	0.651
FACTOR 6 – Proximity Among Network Members (PANM) - Cronbach's Alpha (0.843)	
I have relations with which I feel at ease to discuss diverse problems	0.857
I have a group of 'closer' partners with which I exchange information more frequently	0.810
My company established relations of credibility with some network members	0.766
I have friendship relationships characterized by mutual respect and high reciprocity	0.495
FACTOR 7 – Commitment of the network members (CNM) - Cronbach's Alpha (0.796)	
There commitment to the activities and deals performed in the network	0.858
The other companies spend time, efforts, and resources for joint network activities	0.696
My partners also make private sacrifices to maintain the network	0.670
FACTOR 8 – Members' engagement (ME) - Cronbach's Alpha (0.711)	
My company demonstrates a willingness to invest in the development of the network	0.781
My company is faithful to joint networking activities and agreements	0.669

Source: Research data

observed variables because it does not have the necessary degrees of freedom for computing parameters and adjustment indices.

Analysis of learning and performance

To investigate the influence of the social factors on learning and performance, we performed SEM. Based on the validated constructs of the CFA, we develop an initial integrate model, which groups the measurement models and the structural model. To assess the model we used the same fit indices of the CFA.

The initial model proposed presented inadequate fit indices. To fix this, the literature about SEM suggests some strategies, and between them, we opted to disregard the non-significant relationships and include correlations between variable errors. Then, some of the most important changes was the exclusion of three constructs that do not had significant statistical scores (i.e. *p value* higher than 0.05), which are: TANM ($p = 0.861$), CANM ($p = 0.690$), ME ($p = 0.610$) and PANM ($p = 0.334$). The exclusion was separate; in other words, one construct at a

Table 3 Adjustment indices for each factor (construct) - Initial model (IM) and final model (FM)

Adjustment indices	TNM		PAO		IE*		LAO		TANM		PANM		CNM	
	IM	FM	IM	FM	IM	FM	IM	FM	IM	FM	IM	FM	IM	FM
χ^2 (value)	20,061	1,826	34,957	0.869	10,891		28,896	5,040	32,152	1,699	13,376	1,193	0.000	0.051
χ^2 (probability)	0.001	0.177	0.000	0.833	0.054		0.000	0.169	0.000	0.428	0.001	0.275	–	0.821
Degrees of freedom	5	1	5	3	5		5	3	5	2	2	1	0	1
χ^2 /degrees of freedom	4,012	1,826	6,991	0.290	2,178		5,779	1,68	6,430	0.849	6,688	1,193	0	0.051
GFI	0.918	0.991	0.885	0.997	0.961		0.907	0.981	0.895	1,000	0.932	0.994	1,000	1,000
CFI	0.959	0.997	0.911	1,000	0.985		0.953	0.996	0.930	0.994	0.942	0.999	1,000	1,000
NFI	0.947	0.994	0.899	0.998	0.974		0.944	0.990	0.919	0.996	0.934	0.994	1,000	1,000
TLI	0.918	0.984	0.823	1,021	0.971		0.905	0.987	0.859	1,004	0.826	0.994	–	1,026
RMSR	0.135	0.033	0.189	0.044	0.089		0.063	0.042	0.120	0.029	0.246	0.057	0.000	0.032
RMSEA	0.174	0.091	0.245	0.000	0.019		0.219	0.082	0.233	0.000	0.238	0.044	0.603	0.000

Note: *No adjustments were needed

Source: Elaborated by the authors

time, in descending order (from the largest to the smallest p value). After each exclusion, a new model was estimated to see if the scores of the constructs became significant. In addition, correlations between the variable errors were inserted as suggested by the software and observing theoretical sense.

The results of the final model are the following: χ^2 (value) = 148.980; χ^2 (probability) = 0.110; Degrees of freedom = 129; χ^2 /degrees of freedom = 1,155; GFI = 0.912; CFI = 0.989; NFI = 0.954; TLI = 0.985; RMSR = 0.171; RMSEA = 0.039. The final model presented adequate adjustment, except for GFI and RMSR, which were only marginally adequate. The establishment of new covariances between the errors of the variables could be made to adjust these two values, but we decided to establish only the relationships minimally supported by the literature. Figure 1 illustrates the final integrate model with standardized coefficients. It is important to note that all regressions are significant.

Figure 1 shows that trust in network management (TNM) is found to have a significant positive association to the learning of associated organizations (LAO), $B = 0.484$, which support H2b. Further, our study postulates that information exchange (IE) also has a positive association to LAO, $B = 0.346$, which supports H5. The SEM analysis also suggests the positive impact of LAO on the performance of associated organizations (PAO), $B = 0.552$, which supports H6. Therefore, members' learning is relevant to their own organizations in terms of performance improvement. It should be noted that all regressions weight were significant at 1% ($p = 0.001$). Additionally, elements of social capital also exercise in this relationship. Therefore, our findings are coherent with the postulates of Felício *et al.* (2014), Lawson *et al.* (2008), Lee *et al.* (2001) and Maurer and Ebers (2006).

Discussion

As Pham and Hoang (2019) argue, the topic of organizational learning is receiving considerable attention in the management realm. Similarly, as Provan and Sydow (2009) argue, while learning happens between organizations within network, its strategic role can make it at the core of the relationship. This aspect justifies the relevance for organizations to be part of broader networks and reciprocally learn from the other

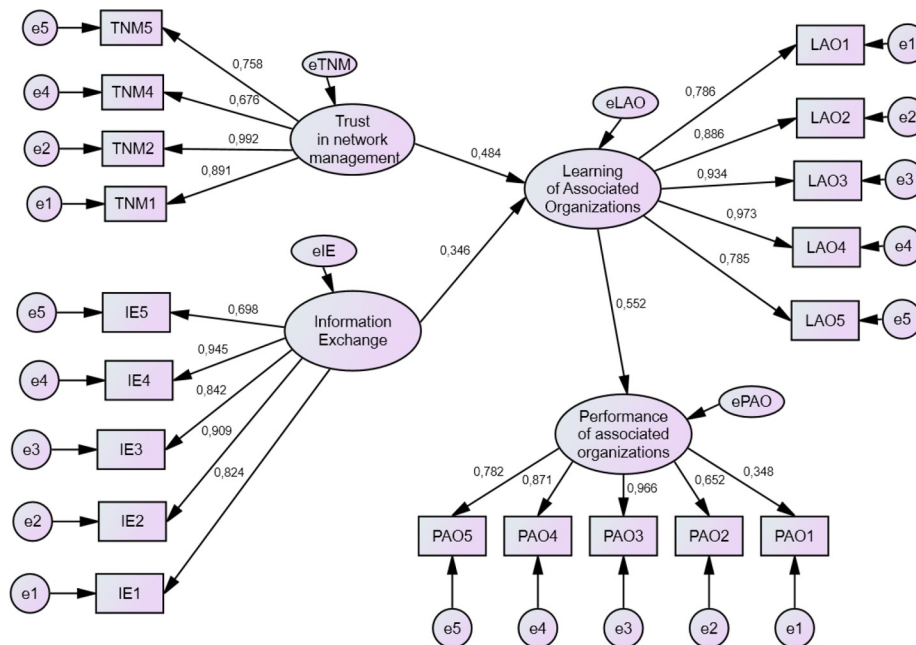
members to acquire new knowledge arising from such interactions. This article empirically investigates how social characteristics among members of the inter-organizational network generate learning, and hence, enhance network performance. First, our empirical study does not find evidence about the relationship between proximity among network members and learning of the organizations within the network. This no result appears consistent with South Brazil's cultural dimensions. In a cultural context quite individualist and achievement-oriented (Hofstede *et al.*, 2010), while the values of harmony and friendship are important, they do not directly impact on inter-organizational learning.

Second, we found a positive relationship between trust in network management and members learning. Given that the way in which organizational networks are constituted in the Brazilian context is quite hierarchical (Hofstede *et al.*, 2010), it is common to see the management group to obtain essential information in their management activities. By transferring these types of information to the network members, the management team acquires confidence from their members and they tend to learn. We infer that – in contexts characterized by an individualist and achievement-oriented dimension of culture as the South Brazil – trust plays a crucial role in maintaining inter-organizational networks, as it promotes cooperation among organizations within the network (Axelrod, 1984).

Trust in the network may be understood as the relative reputation that a given network management group has by managing the relationships. Therefore, the directions given by the network and structural factors are essential for the members, like a committee configuration, compatible corporate culture and shared norms. Drawing from Hofstede *et al.* (2010, p. 347), we sustain that, this contextual element facilitates the involvement of network members and their commitment and efforts to network grow and learning.

However, trust in the management network team does not mean that there is necessarily trust among all its members. A member may have total confidence in the actions and proposals carried out by the network's management team, but little confidence in other members of the network. Having trust among network members is not a conditional factor for learning and better results and performance, as we show with the results of this study.

Figure 1 Integrate final model



We attribute this result to the peculiarity of our Brazilian context that is rather hierarchical (Hofstede et al., 2010).

In addition, we found empirical evidence that information exchange is positively associated with organizational learning. Popp et al. (2014) explain that learning is not promoted in isolation, on the contrary, it is the result of the communication and knowledge exchange available through the experiences of the member organizations and the management team. Information exchange increases the amount of learning and, indirectly, the performance of members' firms. Then, we can stress the peculiarities of our context of analysis.

Finally, our study shows that learning on coexistence of information exchange and trust on network management team support the relational partners to increase their capacities and improve performance. This facilitates the joint problem-solving activities and promoting opportunities of knowledge sharing and experiences (McEvily and Marcus, 2005). In general, extant literature argues that the learning activity and capability is directly related to the individual performance of the members network (Jerez-Gomez et al., 2005). We extend such literature by analyzing this relationship in horizontal organizational networks.

Conclusion

Conceptual implications

Our paper contributes to extant literature in three ways. First, we show that trust in network management and information exchange are positively associated with organization learning. Social capital is highly advantageous for an organization to have access to knowledge and combine and recombine it to innovate and take competitive actions. Second, we extend the literature on social mechanisms underlining network evolution (Lawson et al., 2008; Felício et al., 2014) as a key element to improve the

maintenance of organized actions with a specific focus on inter-organizational learning. Arguably, we extend the model of relationships between social exchanges and inter-organizational learning proposed by Muthusamy and White (2005) by shifting the focus from single strategic alliance – as investigated by Muthusamy and White (2005) – to inter-organizational network. Consequently, Muthusamy and White (2005) consider reciprocal commitment, trust (declined in ability-based, benevolence-based and integrity-based), and mutual power between two parties, while we translate the analysis to social mechanisms at network level. Third, given the focus of our empirical analysis and comparing it with previous studies, we advance the idea that country culture is the layer of culture that most powerfully inspires social features of networks, and shapes network members' learning.

Practical implications

Since inter-organizational learning is frequently used to reduce market and technological uncertainties (Galbraith, 1977), our paper is of interest for managers and entrepreneurs that face technological changes and globalization processes. We infer that organizations take advantage from the networks, "if such networks are to be effective in coordinating the work of a diverse range of partners. Importantly, they are required for the development of trust" (Newell and Swan, 2000, p. 1287). Similarly, since the relations among organizations hinge on members' engagement, it is essential for developing successful relationships (Morgan and Hunt, 1994). In sum, our paper highlights the insightful suggestion that managers should strengthen their understanding of social features and develop a confident perception of the network benefits (Donati et al., 2020).

Limitations and future directions of research

As any paper, this study presents some limitations that may fruitfully be addressed in the future. First, as a limitation, we acknowledge that there exists a range of other aspects moderating the relationship between the social conditions underlying inter-organizational network and learning. For instance, the young network ties may be slow to promote relationship conditions that lead to learning *vis-à-vis* old network ties. Similarly, we might suppose that different drivers to participate at network affect how firms actively cultivate the relationship ties and, in turn, performance.

Second, though we showed the social features of networks as drivers of inter-organizational learning, we overlooked the organizational learning from relations outside it. However, the knowledge that organizations acquired through the network supports learning from relations outside the networks. From such viewpoint, a future line of research may address the issue of organizational learning by broadening the focus of analysis and simultaneously consider relations that are both inside and outside the network.

Third, our paper identifies the social features of networks that drive inter-organizational learning. To date, most studies in the strategic management have emphasized the benefits of inter-organizational learning in terms of radical or incremental levels of innovation. We call for studies that explore social features of networks, and grasp which link they may have with radical or incremental innovation, and if it is mediated by inter-organizational learning.

Fourth, our paper considers the role of commitment as a social condition for inter-organizational learning. Building on Owens *et al.* (2018), we argue that high operational interdependence and shared decision-making are both elements that support frequent communication exchanges. Thus, they enhance inter-organizational learning. Unfortunately, our empirical data does not support the distinction between calculative commitment and affective commitment [1].

Note

- 1 We thank reviewer 2 to suggest the first and the fourth research line.

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