Interorganizational learning in networks of micro and small enterprises: an integrative look at the literature

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Abstract

The main objective of this article is to systematize the knowledge produced on inter-organizational learning in networks of micro and small enterprises, contributing to the field of studies by presenting paths not yet explored in literature. The research adopted the integrative review, a bibliometric procedure that uses network analysis based on graphs and descriptive statistical analyses. The main results show that European authors developed most of the few existing publications on the subject, and their focus was on companies learning when participating in a cluster type network. The quotes used are anchored in studies of individual or organizational learning, which indicates the lack of specific studies on learning in networks.

Keywords: Interorganizational learning. Networks of micro and small enterprises. Integrative review.

Aprendizagem interorganizacional em redes de micro e pequenas empresas: um olhar integrativo da literatura

Resumo

Este artigo tem como objetivo central sistematizar o conhecimento produzido sobre a aprendizagem interorganizacional em redes de micro e pequenas empresas, bem como colaborar para o crescimento de estudos sobre esse tema, apresentando caminhos ainda não explorados pela literatura revisada. Utilizou-se a revisão integrativa, procedimento no campo da bibliometria que utiliza a análise de rede com base em grafos e, posteriormente, em análises estatísticas descritivas. Os principais resultados demonstram que, das poucas publicações existentes sobre o tema, a maior parte foi desenvolvida por autores europeus e as pesquisas têm como objeto central a aprendizagem entre empresas que participam de uma rede do tipo *cluster*. As citações utilizadas estão ancoradas em estudos de aprendizagem individual ou organizacional, o que demonstra ausência de publicações próprias.

Palavras-chave: Aprendizagem interorganizacional. Redes de micro e pequenas empresas. Revisão integrativa.

Aprendizaje interorganizacional en redes de micro y pequeñas empresas: una visión integradora de la literatura

Resumen

Este artículo tuvo como objetivo central sistematizar el conocimiento producido sobre el aprendizaje interorganizacional en redes de micro y pequeñas empresas, y colaborar al aumento de estudios sobre ese tema, presentando caminos aún no explorados por la literatura revisada. Se utilizó la revisión integradora, procedimiento en el campo de la bibliometría, que utiliza el análisis de red basado en grafos, y posteriormente en análisis estadísticos descriptivos. Los principales resultados demuestran que de las pocas publicaciones existentes sobre el tema, la mayor parte fue desarrollada por autores europeos y que el foco de las investigaciones está en el aprendizaje entre empresas que participan en una red del tipo *cluster*. Las citas utilizadas están ancladas en estudios sobre aprendizaje individual u organizacional, lo que demuestra la ausencia de publicaciones propias.

Palabras clave: Aprendizaje interorganizacional. Redes de micro y pequeñas empresas. Revisión integradora.

INTRODUCTION

The literature on micro and small enterprises (MSEs) shows that these types of organizations typically have limited resources (BOUNCKEN, PESCH and KRAUS, 2015). MSEs face needs and challenges in adopting mechanisms such as networks between companies, which enable them to share knowledge and other resources (NONAKA and TAKEUCHI, 1995; YLI-RENKO, AUTIO and SAPIENZA, 2001).

Knowledge sharing may be an excellent form of obtaining sustainable competitive advantages for companies, through contact with non-redundant business knowledge and behavior. Firms organized in a network learn by subjectively acquiring, building, and processing each other's knowledge and behavior (GRANT and BADEN-FULLER, 2004; OKHUYSEN and EISENHARDT, 2002).

Interorganizational learning, therefore, involves the creation of new knowledge or a substantial transformation of the company's preexisting knowledge (SUDOLSKA and LIS, 2014), which takes place in the interaction between formal and informal network members, to create opportunities for the development of sustainable competitive advantages. This can only occur in an environment of synergy and encouragement, in which knowledge, emotions, experiences, feelings, behaviors, and mental images are shared beyond organizational boundaries (BALESTRIN, VARGAS and FAYARD, 2008).

It should be noted that MSE networks incorporate divergent actors and, consequently, the learning between them can take different forms, such as collaboration in research and development, joint research projects, and training. Mutual learning may be vertical (value chain) or horizontal (firms operating in the same sector) (MALMBERG and MASKELL, 2006). Among the benefits of participating in networks, companies may find it easier to create new concepts, reduce risks, and explore new lines of research. However, networks are environments where players expect sharing assumptions and explore mental models, and where some behavioral guidelines may be different from the regular experience of individual organizations (BESSANT, ALEXANDER, TSEKOURAS et al., 2012).

According to Prashantham (2008) and Chong, Chong and Gan (2011), research on knowledge transfer has gained attention. Despite the increase in the number of studies, the subject needs to be better explored through further research on how learning occurs within networks (WANG and CHUGH, 2014). Also, the multilevel nature of interorganizational learning is still not well known (MARIOTTI, 2012; MOZZATO, 2012), deserving the attention of new studies.

This article aims to systematize the knowledge produced on interorganizational learning and collaborate to increase the number of studies on this topic by presenting paths that have not yet been explored in the literature. A literature review was carried out using the central question: how is interorganizational learning in MSE networks addressed in the literature?

Interorganizational Learning and the Networks of Micro and Small Enterprises

Organizational learning is a complex topic since it entails several levels: individual learning (IL), group learning (GL), organizational learning (OL), and interorganizational learning (IOL). In IL, the subjects are the workers of a firm, who can learn informally or formally, in person or online, triggering different learning strategies and achieving different results, which are not uniform among individuals (BORGES-ANDRADE, 2015). Group learning is a social process of accumulative knowledge, based on a set of rules and shared procedures that allow individuals to coordinate their actions in the search for solutions to problems (CAPELLO, 1999).

As for, OL it may mean IL within organizations (NONAKA and TAKEUCHI, 1995); in the first and last instance, the individuals are the ones who learn. Alternatively, OL is a type of dependent learning, but unlike IL (SIMON, 1996), the organization is the entity that learns (CROSSAN, LANE and WHITE, 1999). Finally, there is no direct and straightforward way to identify IOL. It can be conceptualized as the network's learning, and it is characterized when the entire network of companies learns (KNIGHT, 2002).

This study focuses on two levels of organizational learning, the OL, per se, and IOL, since the latter can be seen as the OL that occurs within a network (KNIGHT, 2002).

According to the literature, the four levels are related and overlap, as observed by the 4I framework proposed by Crossan, Lane and White (1999), which is widespread in the field of learning. It encompasses learning at the individual, group, and organizational levels. Mozzato, Bitencourt and Grzybovski (2015) expand the original levels of the 4I framework and add the interorganizational level, represented by the cooperation process (Figure 1). The authors consider IOL as learning between companies and other agents through interorganizational relationships, as conceptualized by Crossan, Lane, White et al. (1999).

Figure 1

individual, group, organizational, and interorganizational learning
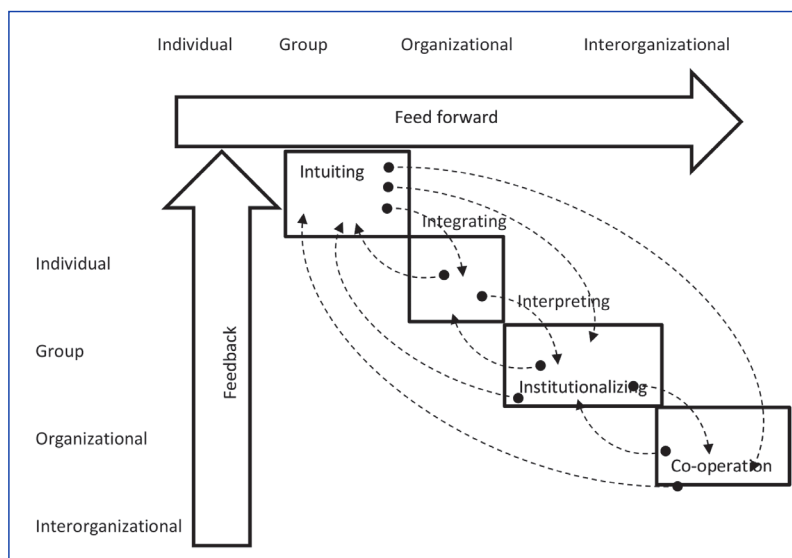
Source: Mozzato, Bitencourt and Grzbovski (2015, p. 99).

In the expanded 4I framework, Mozzato, Bitencourt and Grzybovski (2015) propose the fourth level of learning, which occurs through cooperative relationships between firms and may take place in structured spaces. According to the authors, cooperation (fourth process) affects institutionalization and, consequently, influences also interpretation, integration, and intuition. Cooperation is also influenced, and this flow does not need to go through all processes linearly (as seen in Figure 1), which shows the relationship between IOL and the other levels of learning.

Mozzato, Bitencourt and Grzybovski (2015) report that, in addition to cooperation, absorption capacity, culture, trust, and interaction are constructs for analysis of IOL. It is worth mentioning that the authors did not incorporate governance (IACONO and NAGANO, 2007), government agents (WEGNER and PADULA, 2008), or opportunistic behavior (PARK and UNGSON, 2001) in their model. These factors can influence the network's cooperation. It is not clear in this framework what is the difference between OL and IOL from the perspective of companies, nor how an organization learns from another organization.

According to Greve (2005), some studies postulate that IOL is also a process by which companies learn from the experiences of others without having to go through the same experience themselves. It is also a process of acquisition, dissemination, interpretation, and use and storage of information that leads to the creation of knowledge and affects the company's ability to innovate and compete in different markets (SUDOLSKA and LIS, 2014).

From another perspective, IOL allows the internalization of difficult-to-codify skills, which, in turn, changes the behavior of the organization (CLARYSSE, WRIGHT and MUSTAR, 2009). For the authors, IOL consists of the transfer of different forms of knowledge, from different partners to the receiving organization, emphasizing that the partners can be companies, collectives, or individuals.

In addition to the expanded 4I framework by Mozzato, Bitencourt and Grzybovski (2015), Mariotti (2012) presents a model specifically for IOL. The author argues that learning occurs dynamically, based on interaction, and the existence of three learning processes: collaborating, sharing knowledge, and creating knowledge. They also highlight that these processes coincide and overlap.

The three processes are related, which demonstrates the dynamism of learning in a network of firms. Learning to collaborate, according to Mariotti (2012), is the learning process that aims to identify participants, resources, and capacities of each member and how to benefit from these elements through cooperation.

As for learning to share knowledge, Mariotti (2012) argues that companies need to develop processes for that. Therefore, they must learn to leverage external relations. The third process consists of learning to create knowledge. It is the process by which companies interact together with the explicit purpose of learning together through interaction.

Seeking to relate the exchange of knowledge between MSE and performance, Flatten, Greve and Brettel (2011) report that MSE networks have a strong effect on the enterprise's performance. Cohen and Levinthal (1990) discuss the absorptive capacity, argue that it directly influences the company's performance and the success of strategic alliances. The authors used a multidimensional scale, observing the acquisition, assimilation, transformation, and exploration of the knowledge about the absorptive capacity, as well as its influence on performance.

The study by Mozzato (2012) demonstrates how IOL occurs in networks of companies engaged in Local Productive Arrangements (LPA). The author conducted a case study in an LPA of gems and precious stones in Soledade, a municipality in the Brazilian state of Rio Grande do Sul, using semi-structured interviews, participant observation, focus groups, and secondary data. Based on the framework elaborated, the author showed that IOL is based on trust and cooperation between actors in the network, and their proximity, social interactions, and interdependencies. In the framework, it is possible to observe that the intensity of bonds is also part of the set of conditions of the IOL process (Figure 2).

The framework in Figure 2 demonstrates the dynamics between the actors and the conditions needed for the IOL to occur. It is important to mention that the framework addresses the interrelationships each company - and not the network - establishes to learn. Also, it does not highlight the entrepreneur's learning; consequently, the levels of learning are not considered, neither the impact of learning on the performance of companies or the network.

Figure 2
Interorganizational learning in LPAs
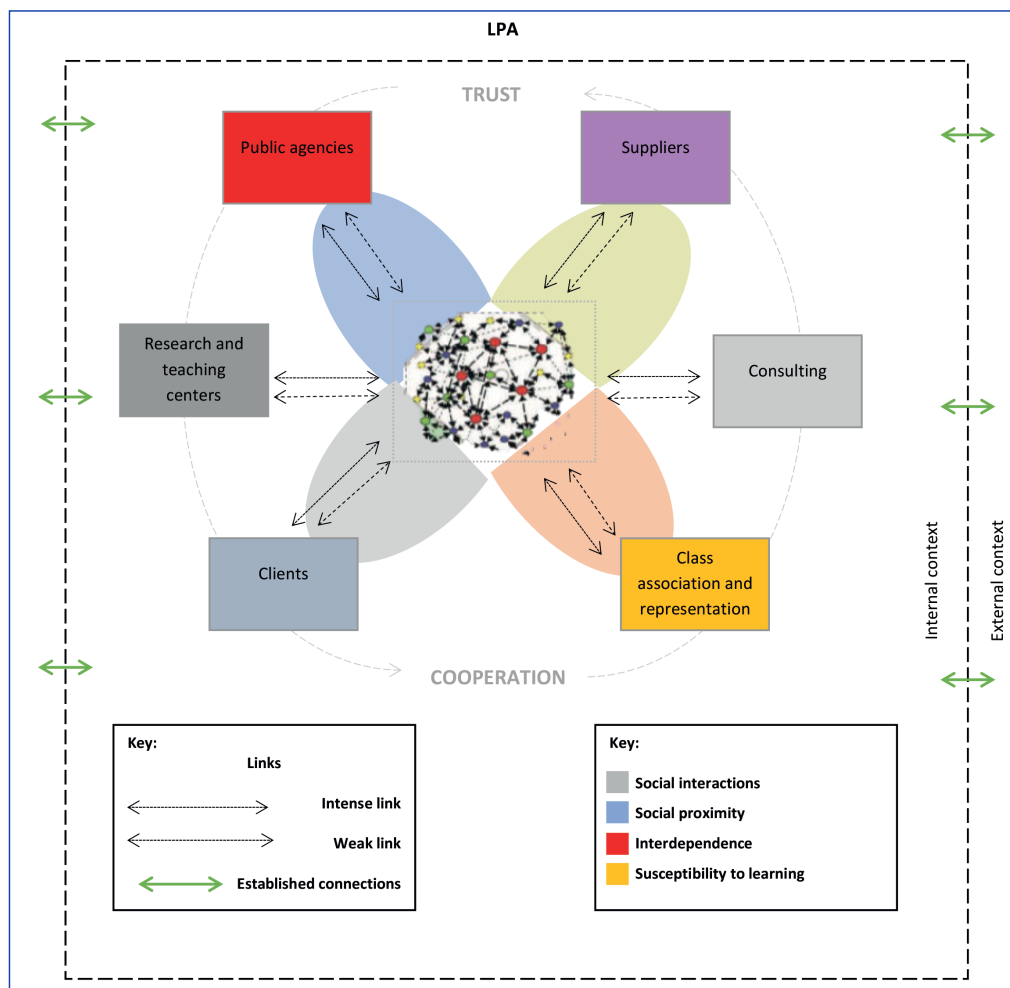
Source: Mozzato (2012, p. 95).

The next section presents the methodological procedures used in the research.

METHODOLOGY

This research is based on a systematic review, which is a procedure in the field of bibliometric research characterized by an iterative and strategic review. This type of approach seeks existing research bias, implementing a comprehensive structure to search for articles in a given field. The database used in this study was formed adopting previously agreed exclusion criteria (DENECKERE, EUWEMA, VAN HERCK et al., 2012).

According to Pittaway, Robertson, Munir et al. (2004), the systematic review follows a series of steps designed to give credibility and transparency to the method, guiding the literature review. Sousa and Ribeiro (2009) characterized the systematic review as exploratory research that shows reliable results. The systematic review can be an "umbrella" method, incorporating different techniques, among them the integrative review, which seeks to analyze previous theoretical and empirical research on a given topic, allowing to reach to general conclusions (BOTELHO, CUNHA and MACEDO, 2011).

This study aims to systematize the knowledge produced on interorganizational learning, contributing to increasing the number of studies on the topic by presenting paths that have not yet been explored in the literature. The review may be divided into six stages: identification of the theme, the establishment of inclusion and exclusion criteria, identification of pre-selected and selected studies, categorization of selected studies, analysis and interpretation of data, and presentation of the review/synthesis of knowledge. The strategies and database selected are explained in the following subsection.

Research protocol

The study conducted parallel searches in the CAPES, Web of Science, and Wiley Online Library databases, using the terms "interorganizational learning and SME," "AIO and PMEs" (acronyms in Portuguese for interorganizational learning and SME); "inter-firm learning and SME," and "aprendizagem entre empresas e PME" (inter-firm learning and SME, in Portuguese). Data collection was carried out between May and July 2017. The search was conducted with the delimited terms, and 2,709 studies were found. Of this total, 1,890 peer-reviewed studies were pre-selected.

Four filters were applied to select the research works to be analyzed. The first, temporal, selected 1,503 works published between the years 2007 and 2017. The second filter aimed to select only 'articles,' totaling 1,475. The third filter consisted of reading the titles to verify if they were related to the core of the research, which reduced the set to 181 articles. Finally, the abstracts and conclusions were read, considering the duplicity of articles, separating a body of data of 83 articles for full analysis.

DATA ANALYSIS

Social network analysis (SNA) based on graphs was used for text analysis. According to Ferguson and Lovell (2014), the main focus of text analysis is on word repetition, using the concept of networks that incorporates probabilistic analyses based on the repetition of a word in its relative position and its relationship with keywords, developing a graph with the word network. This type of quantitative analysis of texts allows an exploratory approach to the meanings, contexts, and changes in time of a large group of texts (HE, 1999).

The abstracts were analyzed in English, using the textexture system (http://textexture.com). However, before using the system, some previous adjustments to the texts were necessary. Paranyushkin (2011) reports that it is important to remove words that are repeated excessively and have no relation to the context of the abstracts (such as conjunctions, auxiliary verbs, articles, and other words). The second step is to review the words, turning them into the correct morphemes for the research. The third and final step is to standardize the letters of the words in lower case, as well as remove unnecessary spaces, symbols, punctuation, and numbers (which do not affect the context).

After the texts were prepared, the textexture system was used to transform them into data to form a network. Textexture uses the study by Paranyushkin (2011) as the basis for this transformation. According to the author, to transform the text

into graphic data, the system scans two words and then five words, as if each word were a unit. Each time a word appears for the first time, a node is made; when two words are scanned, and there is still no edge between these two words, a network is formed between them, the first word is the source and the second the target, but with equal weights. If this pair already exists, a weight of '1' is added. Then, it is possible to draw a narrative, creating a grade for the text based on the proximity between words and the frequency of the combinations. When the scan ends one paragraph, it starts the next without relating the last word to the first of the following paragraph.

The second step is to use the list of five words. This is a similar procedure and allows to intensify the groups of meanings overlapping the structure that was previously created. Textexture generates a database in GEXF format, which can be opened using the open-source GEPHI system.

The metrics used were: betweenness centrality, degree centrality, and modularity. Betweenness centrality was used to measure the number of pairs of nodes whose shortest connection path passes through the target node (BRANDES, 2001), indicating the word with the greatest influence on the network. Degree centrality is the metric to identify the number of connections in which the node is involved (WILLIAMS, BREWE, ZWOLAK et al., 2015), meaning that the bigger the node, the more times the word was cited.

Modularity identifies groups of nodes whose mutual connections are denser than the connections to the rest of the network (PARANYUSHKIN, 2011), with 0 being the maximum of interconnectivity and the minimum being the value of nodes divided by 4 (PARANYUSHKIN, 2011). The lower this indicator, the higher the connectivity of the word group.

Each group received random colors. The size of the nodes shows the number of contexts in which each term appears, while the color and grouping show the most significant contexts in which each term appears. The edge thickness was determined by the weight of the word pairs frequency, represented by each node. The GEPHI system was also used to ascertain the networks of authors and whether they existed.

After analyzing the graphs, descriptive statistical analyzes were performed to understand the data better, as carried out by Du, Li, Brown et al. (2015). The authors defend and indicate that bibliometric research uses statistics and mathematical methods in architecture to explore the literature on a specific topic.

RESULTS

General network

Co-word analysis forms a network of themes and their relationships representing the conceptual map of a field, being applied to titles, keywords, abstracts, or full texts (ZUPIC and CATER, 2015). This study used the abstracts of the articles, using the methodology developed by Paranyushkin (2011). Figure 3 represents the words' general network based on the abstracts of the selected articles. The graph that represents this network gathers 142 nodes (i.e., keywords), and 1,869 connections.

The modularity test allows identification of nodes that are densely connected with others forming a network (PARANYUSHKIN, 2011). The abstracts showed 9 (nine) 'communities' with interconnectivity of 0.226. This interconnectivity is considered high as it approaches zero. This means that the abstracts are cohesive and interconnected, so they focus on the same theme. The general network is divided into communities formed by a central node, which are the words most cited in the texts with their respective links (Figure 3).

Figure 3
Degree of centrality of words
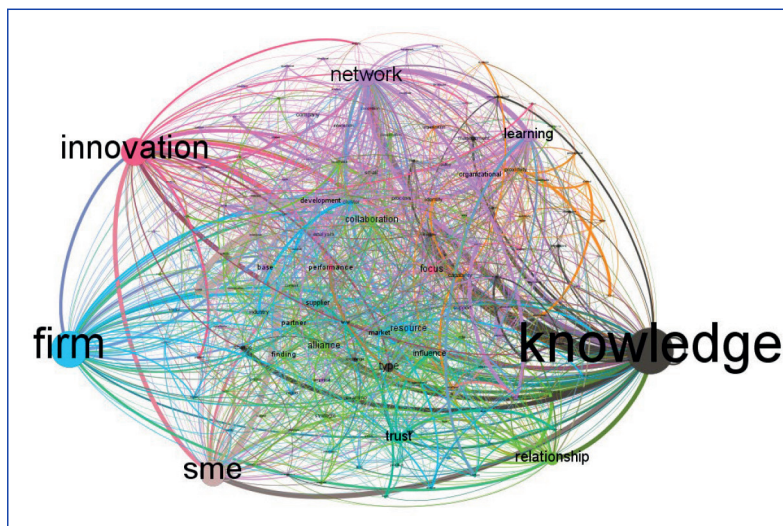
Source: Elaborated by the authors.

Figure 3 demonstrates the words that stand out: knowledge, firm, innovation, SME, network, relationship, and learning. When analyzing the metrics of these words, it is possible to identify the highest degrees of centrality and betweenness centrality, as observed in Table 1.

Table 1
Degree of 'centrality of words' in abstracts and methodology of selected articles, 2007-2017

Words	Degree	Betweenness centrality
knowledge	116	1.181
network	99	719
firm	93	563
innovation	90	36
sme	88	543
learning	80	425
relationship	73	373

Source: Elaborated by the authors.

Community of words

The six communities of selected words represent 80.97% of all word links that constitute the abstracts. The community of words is formed by 'knowledge,' 'firm,' 'innovation,' 'SME,' 'network,' and 'relationship.' The emergence of these communities is justified because this study focuses on IOL in MSEs. However, two biases of research in the field of knowledge also emerge 1) innovation, mainly as a measure of performance (BOUNCKEN, PESCH and KRAUS, 2015; PRESUTTI, BOARI and MAJOCCHI, 2011; SUDOLSKA and LIS, 2014; ZENG, XIE and TAM, 2010), and 2) knowledge as a synonym for learning.

The word 'knowledge' has the highest betweenness centrality, that is, the shortest path between the connections of the entire network of words. The word is the one that most connects and influences other words (PARANYUSHKIN, 2011), thus showing that the database of articles is configured according to the research objective: mapping the learning field (knowledge) between companies.

It is a community formed by type, transfer, external, management, interorganizational, sharing, exchange, and creation. The selected studies, therefore, mainly address sharing, management, exchange, and external creation of knowledge between

organizations, without considering their influence on the performance of companies, which is similar to the learning model presented by Mariotti (2012).

The analysis of the selected articles connects the grouping of the network with that of knowledge, showing a strong relationship between knowledge – notably the exchange of knowledge – and learning.

It is noteworthy that knowledge is being treated directly at the organizational level since this grouping does not contain the words "individual" or "group," as highlighted in the work of Knight (2002), in which the IOL is seen in the perspective of the network or companies. This result suggests that studies have neglected a relationship between the IOL and firm's performance, which was discussed by Mozzato, Bitencourt and Grzybovski (2015).

Network of authors

Zupic and Cater (2015) present another bibliometric measure: the co-authorship analysis. This analysis reflects social ties that are stronger than other related measures, and more suitable for examining social networks in comparison with other intellectual structures in research fields. This makes it more suitable for examining social networks than intellectual structures in research fields. According to Zupic and Cater (2015), co-authorship can also relate the institutional affiliations of the authors and their geographic location, which allows examining the issues of collaboration at the institution and country level.

Figure 4
Network of Authors, 2007-2017
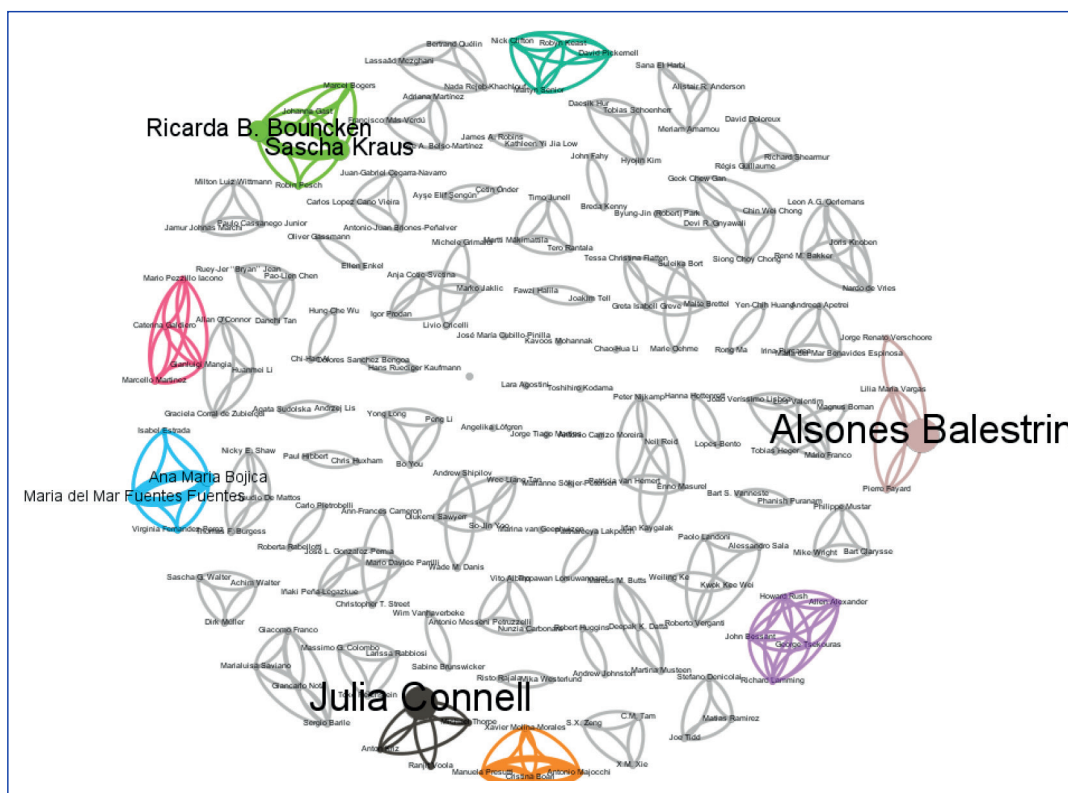
Source: Elaborated by the authors.

Few networks of authors were found in the articles since most authors published only one article. However, 186 authors were identified, and nine of them stand out: Balestrin, Connell, Bouncken, Kraus, Bojica, Fuentes-Fuentes, Presuti, Boari, and Majocchi. According to the indicators of betweenness centrality and modularity, these authors stand out in the network and as nodes of communities, as shown in Figure 4.

Balestrin and Connel were the authors who published the most, in different co-authorships. It is important to emphasize two pairs of authors regarding publications: Bouncken and Kraus, and Bojica and Fuentes-Fuentes.

Authors per country

The data demonstrate that this field of research is dominated by European authors, who represent more than 60% of authors in published articles. Italy ranks first in terms of publications because it is characterized as a country with many SME networks. This feature seems to be a vector for the development of localities, especially in the region known worldwide as Third Italy (AMATO NETO, 2009).

The group formed by the United States and Canada is also noteworthy, with 8.4%, followed by China with 6.9%. Brazil appears among the 10 countries with the most authors publishing on the topic, but it is still underrepresented, with only 3.55% of the total articles found.

This is a surprising result concerning Brazil since a recent a bibliometric study by Balestrin, Verschoore and Reyes Junior (2010) accounted for the publication of 116 articles on networks in Brazil from 2000 to 2006, which suggests a greater number of articles on IOL than the three found. The comparison of these data indicates that, although the phenomenon of organizational networks is sufficiently studied in Brazil, the same does not occur with the phenomenon of networked or interorganizational learning.

Analysis of citation

Co-citation analysis was also explored. According to Zupic and Cater (2015), co-citation is the most widely used and validated bibliometric method, which connects documents, authors, or journals when they appear together. It is a reliable method as it uses citations to measure influence, making it possible to view the most important works on a given topic.

Co-citation connects authors, according to how these same authors use co-citation. It is a rigorous principle of grouping, used continuously by specialists when citing what they consider valuable or seminal publications in thematic areas. Since the publication process reflects a specific period, the citation image shows the state of the field at one particular moment and not as it appears in the present or the future (ZUPIC and CATER, 2015).

Thus, the authors of the articles reviewed in this study were gathered, in order, based on the number of times they were cited. After this selection, the articles were incorporated into the GEPHI and subjected to the betweenness centrality test to identify their connectivity in the network. The modularity test was performed to identify the groups of authors cited together, shown in Figure 5.

Figure 5
**Network of cited authors, 2007-2017**
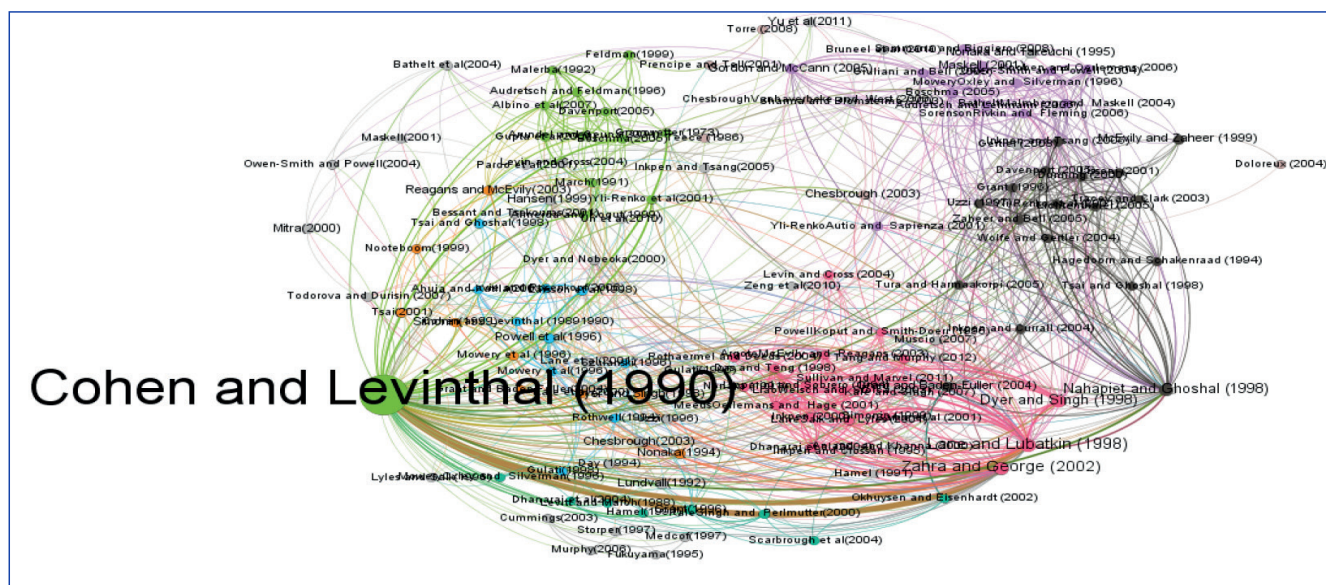
Source: Elaborated by the authors.

Figure 5 shows the authors who had the highest betweenness centrality values – from these 131 nodes (citations) were extracted. In this network, the study by Cohen and Levinthal (1990) is the most cited, then others such as Dyer and Singh (1998), Lane and Lubatkin (1998), Zahra and George (2002), Nahapiet and Ghoshal (1998), among others.

The most relevant observation in this calculation is how the authors are grouped in the articles. Then, the groups of citations were identified, showing the adjacent themes grouped with the IOL. Therefore, the objectives of the studies cited in each group were analyzed. Finally, eight clusters were identified, among which three clusters stand out as the most relevant.

The focus of grouping citations in Figure 6 is the networks of companies considered as a cluster. These type of networks is considered the most used tool by governments for regional economic development to occur (LI, ZUBIELQUI and O'CONNOR, 2015).

Figure 6

**Grouping citations about clusters, 2007-2017**
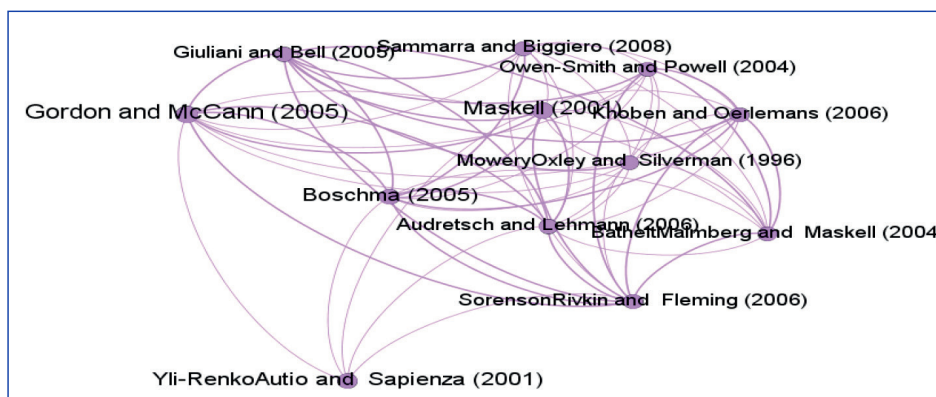
Source: Elaborated by the authors.

The cluster can be defined as a geographic group of economically and socially interconnected companies and institutions (LI, ZUBIELQUI and O'CONNOR, 2015; PRESUTTI, BOARI and MAJOCCHI, 2011). In this case, the probability of sharing uncertainty and market risks is higher (BOUNCKEN and KRAUS, 2013). The proximity between companies enables the exchange of information and facilitates the exchange of knowledge (GORDON and MCCANN, 2005). Thus, cooperating SMEs benefit and access knowledge from their partners (BOUNCKEN and KRAUS, 2013).

The exchange of knowledge occurs not only between companies horizontally, but also between companies and customers in a vertical exchange of knowledge (YLI-RENKO, AUTIO and SAPIENZA, 2001). In this context, the selected studies use the cluster as an object of study to analyze IOL as a strategic resource. According to Greve (2005), IOL in the network leads to a competitive advantage.

It is worth mentioning that the literature does not show a cluster only as a positive arrangement. Clusters are also portrayed considering the high risk of network proximity, indicating entropic deterioration (GIULIANI and BELL, 2005). This is because close social relationships can lead to an underestimation of opportunism, weakening a company's ability to exploit external knowledge (GORDON and MCCANN, 2005).

Figure 7
Grouping citation about types of proximity, 2007-17
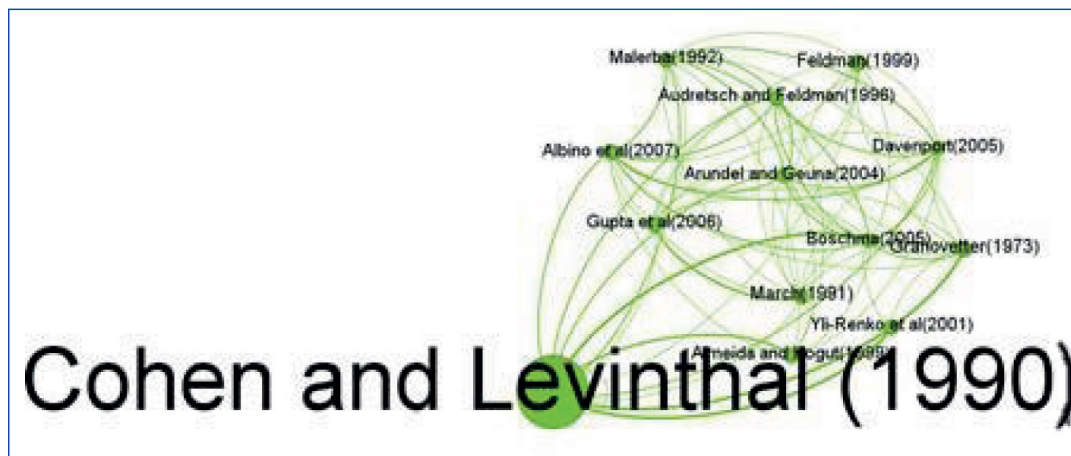
Source: Elaborated by the authors.

Regarding the grouping of Figure 7, the work of Cohen and Levinthal (1990) stands out as the most cited in the selected articles. The authors present the concept of "absorptive capacity," which can be defined as the ability to recognize, assimilate, and apply new information in the firm. Absorptive capacity plays a critical role in the learning processes and innovative capabilities of companies (COHEN and LEVINTHAL, 1990).

This ability varies from company to company. The higher the organization's absorptive capacity, the better the understanding of the knowledge received and transferred in the relationship with another company (MOZZATO, BITENCOURT and GRZYBOVSKI, 2015).

Likewise, companies with a high absorptive capacity find it easier to adopt and implement new information concerning those with less capacity (CLARYSSE, WRIGHT and MUSTAR, 2009).

This grouping relates the absorptive capacity with the IOL, which refers to the exploration of new external knowledge through experimental refinement, selection, and reuse of existing routines, reinforcing the existing technological trajectories (GUPTA, SMITH and SHALLEY, 2006).

The intersection between these topics occurs through the relationship and interaction node, used several times in research as the part where companies learn within the network (e.g., FLATTEN, GREVE and BRETTEL, 2011). In this network environment of cooperation, IOL is more effective for firms that have similar absorptive capacities (GNYAWALI and PARK, 2011).

For greater effectiveness in the use of absorptive capacity in IOL, the authors of this group highlight the proximity and the importance of the vertical relationship. Several studies demonstrate the importance of geographical proximity between partners for knowledge acquisition and exploration processes, which simplifies the exchange of knowledge between the companies forming the network (AUDRETSCH and FELDMAN, 1996).

Regarding the vertical relationships, several studies have empirically highlighted the importance of a customer to reinforce both the creation of new products and the technological distinction of the supplier (YLI-RENKO, AUTIO and SAPIENZA, 2001).

The next cluster (Figure 8) presents authors Powell, Koput and Smith-Doerr (1996) with the highest betweenness centrality. This grouping converges around the work of these authors.

Figure 8

Grouping citations about strategic alliances, 2007-2017
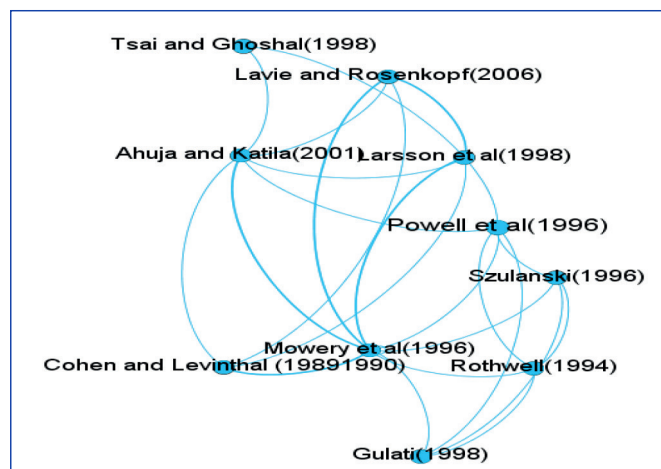
Source: Elaborated by the authors.

The selected articles use co-citations (Figure 8) to highlight the networks of enterprises and the IOL. In this context, these studies report that increasing competitiveness has forced firms to organize themselves in networks (ROTHWELL, 1994). However, the simple constitution of a network of enterprises does not automatically mean competitive advantage, since companies need cooperation to discover, develop, and commercialize new products (POWELL, KOPUT and SMITH-DOERR, 1996).

According to the authors, these networks gain importance as technology and industries become complex, and in this situation, IOL is a key element for innovation. It is known that IOL occurs through collaboration between formal organizational boundaries, thus allowing the acquisition or increase of the internal knowledge of these companies (MOWERY, OXLEY and SILVERMAN, 1996).

In addition, the bonds built over time in a network can become a solid basis for exchanging information, increasing the trust that allows companies to learn from each other about new opportunities (POWELL, KOPUT and SMITH-DOERR, 1996).

The studies in this group also highlight factors necessary for the IOL to occur effectively. The most important factor, in this sense, is trust (TSAI and GHOSHAL, 1998). The importance of intensity, frequency (COHEN and LEVINTHAL, 1990), and diversity of interactions between companies (TSAI and GHOSHAL, 1998) are elements that deserve attention. Another relevant point is governance, which is fundamental for the control and monitoring of networks of firms (LARSSON, BENGTSSON, HENRIKSSON et al., 1998), and for the companies to facilitate their ability to share updated information (COHEN and LEVINTHAL, 1990).

According to Cohen and Levinthal (1990), absorptive capacity is also pointed out in this group. The authors report that the lack of this capacity is one of the main barriers for IOL (AHUJA and KATILA, 2001). In addition, absorptive capacity requires some prior knowledge in order to identify the value of new resources, assimilate them, and apply them to commercial purposes (COHEN and LEVINTHAL, 1990). Some similarity between the knowledge of the partner companies is also needed, as well as similarity of knowledge processing systems so that the organizations can learn from each other (MOWERY, OXLEY and SILVERMAN, 1996).

The academic community has focused on IOL and its contribution to the innovative results of companies (POWELL, KOPUT and SMITH-DOERR, 1996). However, most research on IOL is focused on large companies (MOWERY, OXLEY and SILVERMAN, 1996).

In this study, eight citation groups were identified in the articles analyzed. Of these, three were considered the most important, grouped based on the following themes: 1 – cluster; 2 – absorptive capacity; and 3 – networks of firms and IOL.

Analysis of publications

During the period analyzed, the number of publications was not constant over the years. The years 2011, 2015, and 2016 stand out positively, with 11, 12, and 13 publications respectively, whereas in 2007, 2009, and 2013, there were only 5, 4, 5, publications, respectively. In 2017, only two publications were selected, considering that the data collection for this research considered the articles published before the end of July of that year. In general, it was possible to observe a low quantitative in this field.

Overall, 55 journals were found with publications on the subject, with emphasis on the Journal of Small Business Management and the Journal of Knowledge Management. These journals published 9 and 7 articles, respectively. Most journals are international, except for the Brazilian RAC and RAUSP, each with one published article. It was verified, therefore, a low number of publications on interorganizational learning by Brazilian journals.

Most of the research was configured as quantitative (53%). Then there are qualitative studies (22.9%) and studies that use the two approaches together (13.3%). This result demonstrates that 80% of the studies were empirical, seeking to investigate the problems in the field.

Theoretical studies and literature reviews account for 10.8%. This fact may be related to the use of organization learning approaches, such as the absorptive capacity, by Cohen and Levinthal (1990), as mentioned in the previous section. Regarding the methods used in the field, a great variety was obtained (Table 2), with a predominance of research using surveys (60.3%) and, in second place, simple or multiple case studies (26.5%).

Table 2

Methods used in the articles, 2007-17

Methods	N	%
Survey	41	60.3
Multiple case study	10	14.7
Case study	8	11.8
Systematic review	2	2.9
Action research and case study	2	2.9
Case study and survey	1	1.5
Qualitative	1	1.5
Survey (longitudinal)	1	1.5
Longitudinal study of analytical history	1	1.5
Action-research	1	1.5

Source: Elaborated by the authors.

Table 2 shows that few studies (only three) used two methods together. There is also a low presence of longitudinal studies (only two). The focus of studies that used systematic review was on competition and networks of MSEs, and they were selected because the analysis showed they also discuss the IOL. Consistent with the most adopted type of research (quantitative), the main instrument for collecting information was questionnaires (59%), followed by interviews (34.9%). Both methods were the source of data for 93.9% of the studies.

Table 3

Evidence source, 2007-17

Sources	N	%
Questionnaire	49	59.0
Interviews	29	34.9
Database	7	8.4
Documents	7	8.4
Observation	3	3.6
Focus group	1	1.2
Field notes	1	1.2
Participant observation	1	1.2

Source: Elaborated by the authors.

As seen in Table 3, the studies use a few alternative sources, mainly qualitative sources such as observation and field notes. This indicates low use of sources and instruments that allow a more in-depth analysis of the phenomenon, with the prevalence of sources and instruments that allow only extensive readings of the "IOL" phenomenon.

Regarding the methods and techniques used, it is interesting to observe the different forms of data analysis, in addition to the commonly used descriptive statistics. The research found 33 different statistical tests such as correlation test, Cronbach's alpha, regression, SEM, factor analysis, the t-test.

The studies that applied qualitative approaches used a theoretical framework to understand the data collected. Studies with more than one data collection technique used triangulation. No articles were based on ground theory or ethnography. This emphasis on the use of quantitative techniques may be related to the use of theories from other levels of learning and, at the same time, the lack of theories for IOL.

FINAL CONSIDERATIONS

The study showed that most of the selected articles focused on network learning, especially on learning between companies that form clusters. In addition, studies have only used innovation as a measure of performance.

The analysis of social networks showed that there are few networks of authors who research the topic, as well as few publications in the field. In the descriptive analysis conducted with the SNA, it was found that the largest number of authors is in Italy. Regarding citations, the SNA indicated several groups of citations used to understand the field. The authors, however, are mainly focused on individual and organizational learning. The groups of citations can be summarized in topics such as cluster, absorptive capacity, networks of firms, and interorganizational learning.

The findings indicate a limited number of publications, with most of the studies published internationally (not in Brazil). Most publications are found in the *Journal of Small Business Management* and the *Journal of Knowledge Management*.

Regarding the most used methodologies, it was possible to observe the frequent adoption of quantitative approaches such as surveys, collecting data through questionnaires, and analyzing them statistically.

The absence of other levels of learning within the networks and in general – when considering the network as an organization – stood out in the systematic review. The findings suggest that researchers should pay attention to other types of networks, such as local productive arrangements and cooperatives, which have a different context from analyses in international studies.

Suggestions for future research include investigating the levels of learning within the network and adopting other performance measures rather than innovation alone, particularly economic measurements that allow a reliable assessment of the economic and financial gains associated with IOL. It is important to mention the low number of studies in Brazil. Also, the field would benefit from theoretical studies and research using qualitative approaches to expand the understanding of the topic.

Some limitations of this study may be overcome in future research. First, this work assessed articles only in Portuguese and English, so it is crucial to include articles written in other languages in the subsequent studies. In addition, the research was carried using three databases (CAPES, Web of Science, and Wiley Library), which, despite being significant in publications, do not cover all studies on the subject. Finally, the research did not carry out a qualitative analysis of the selected studies, which hinders the possibility of more in-depth analysis (such as discussions on the concept or theories adopted). Despite the limitations, this article contributed by presenting a panorama of the field of interorganizational learning in micro and small enterprises, based on a systematic literature review (ZUPIC and CATER, 2015).

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