

## Tracing the evolution of the literature on knowledge management in inter-organizational contexts: a bibliometric analysis

By: Lara Agostini, Anna Nosella, [Riikka Sarala](#), J.-C. Spender, and Douglas Wegner

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### **Abstract:**

**Purpose:** Based on the growing interest devoted to knowledge management (KM) in inter-organizational contexts, the purpose of this paper is to systematize existing literature and understand how it developed over time, thus tracing its roots and evolution to unveil gaps and suggest new promising areas for future research. **Design/methodology/approach:** This study used bibliographic techniques to analyze a sample of 85 studies along three main periods (1998-2010, 2011-2014 and 2015-2019). In particular, this study focused on co-occurrences of keywords to identify the most dominant themes, as well as connections among these themes. **Findings:** Overall, the review shows the main outlets that have published papers on the topic of KM in inter-organizational contexts, as well as the theoretical background this research builds on. The temporal analysis exhibits the core topics that have persisted and grown consistently over time as the links between KM, innovation and networks. In addition, the review highlights new emerging themes, such as the human and social side of KM, and new interesting contexts of study (e.g. coopetition and open/user innovation), which opens exciting avenues for new research opportunities. **Originality/value:** This study illustrates the conceptual structure of the field in three distinct periods and contributes to a more nuanced understanding of the key topics and their interrelatedness within the area of KM in inter-organizational contexts. Both researchers and practitioners can profit from the study because it reveals consolidated topics while identifying areas that still need to be investigated to foster KM in inter-organizational settings.

**Keywords:** knowledge management | inter-organizational relationships | networks | alliances | literature review

### **Article:**

#### **1. Introduction**

Over the past two decades, plenty of studies have highlighted that firm-specific knowledge constitutes the most strategically important source of competitive advantage (Spender and Grant, 1996) and that firms are platforms where processes of creation and applications of knowledge occur (Spender, 1996). Moreover, as firms began to open their boundaries to seek and establish inter-organizational relationships with partners, scholars have also directed their interest to the increasingly important role played by such relations as sources of knowledge to fill internal knowledge gaps and respond to competitive and innovation challenges (Bojica *et al.*, 2018). However, to successfully benefit from external knowledge deriving from this kind of open innovation approach, a firm requires management capabilities to align inbound knowledge flows with the firm's in-house innovation activities (Brunswicker and Vanhaverbeke, 2015). Therefore, knowledge management (KM) in inter-organizational contexts has become increasingly relevant.

Accordingly, a consistent body of knowledge examining KM in inter-organizational contexts has developed rapidly in the past two decades. However, this has led to a proliferation of multiple themes and merging of streams that is characteristic to subjects at the intersection of different overlapping domains with blurred boundaries (Martini *et al.*, 2013). Therefore, the time has come for a literature review article to play a fundamental role in systematizing existing literature on KM to understand how the literature has developed over time by tracing its roots and evolution, which also unveils gaps and suggests new promising areas for future research.

Although previous studies have reviewed KM in inter-organizational settings, the focus has been narrow, such as an emphasis on specific types of inter-organizational relationships, (Meier, 2011; Battistella *et al.*, 2016; Milagres and Burcharth, 2019), on antecedents and consequences of knowledge transfer among organizations (van Wijk *et al.*, 2008) and on knowledge protection in inter-organizational settings (Manhart and Thalmann, 2015). Despite these prior efforts to comprehend KM in inter-organizational contexts, we need to know more about how this field of research has evolved over time to envision avenues for future research. A broad assessment of this field is particularly important for two reasons: first, it highlights the theoretical bases along which the streams have developed over time; and second, it offers insights to scholars about the directions they may follow to contribute to the theory and the practice of KM in inter-organizational contexts. This is particularly relevant because facilitating KM in alliances and networks is one of the most complex challenges managers face when involved with partners (Mazloomi Khamseh and Jolly, 2008).

Based on this research gap, the specific aim of this article is to examine the evolution of the literature on KM in inter-organizational contexts, so that scholars may benefit from our review through insights about theoretical gaps and future research avenues. To reach this goal, we performed a thorough literature review using bibliometric analysis to illustrate the conceptual structure of the field in three distinct periods, thus contributing to a more nuanced understanding of the key topics in inter-organizational KM and their interrelatedness over time. Both researchers and practitioners can profit from the study because it reveals consolidated topics while identifying areas that still need to be investigated to foster KM in inter-organizational settings.

The article is organized as follows. In the next section, we discuss the topic of KM in inter-organizational contexts. The subsequent section explains the methodology of the study, including

the criteria for articles selection and the bibliographic techniques used to analyze the sample. We then proceed to present and discuss the results of our bibliographic analyses. In addition to an overview of the sampled articles, we trace the evolution of the literature on KM in inter-organizational contexts in three time periods and discuss how different themes have evolved over time. We conclude with a discussion of the theoretical and practical implications of the study, reflect on limitations of our analysis and propose avenues for future ground-breaking research on KM.

## **2. The interplay between knowledge management and inter-organizational relationships**

The role of KM to foster value creation and organizational competitiveness has been stressed for decades in the organizational literature (Spender and Grant, 1996). Accessing and absorbing knowledge is an essential capability for any organization in a dynamic environment characterized by agile new entrants with state-of-the-art technological and knowledge bases (Cohen and Levinthal, 1990). From a theoretical standpoint, the relevance of knowledge to organizations and the ability to manage it led to the development of the knowledge-based theory of the firm (Grant, 1996). This approach extended previous resource-based perspectives and argued that the success of firms strongly depends on their knowledge-based resources and how they use and develop them (Grant, 1996; Spender and Grant, 1996).

The early studies on KM emphasized the intra-organizational level. Prominent pioneer studies initially discussed how knowledge is created and managed within the organizational boundaries (Nonaka, 1994; Nonaka and Takeuchi, 1995; Grant, 1996). Such perspectives offered relevant insights not only to researchers but also to practitioners about the strategies and practices organizations may implement to increase and change their knowledge bases.

Nevertheless, over the past 30 years, organizations have increasingly recognized the importance of working with external partners through networks, alliances and partnerships to access knowledge and innovate in fast changing environments (Larsson *et al.*, 1998). Accordingly, inter-organizational relationships have become particularly relevant for organizations for accessing and combining knowledge of external partners (Dyer and Nobeoka, 2000; Buckley *et al.*, 2009) into the firm's routines, processes and products. As organizations recognized the value of external connections as an important source of knowledge, the field of research in KM expanded to examine different inter-organizational contexts to explain how organizations use their relationships to access knowledge (Powell *et al.*, 1996; Du Plessis, 2007) and accelerate innovation (Faccin *et al.*, 2019). A large volume of studies has been published regarding KM in different inter-organizational forms (Del Giudice and Maggioni, 2014; Rathi *et al.*, 2014; Cheng *et al.*, 2014).

While these efforts have contributed to our understanding of the interplay of KM and inter-organizational relations, studies have highlighted that facilitating KM in alliances and networks is still among the most complex managerial challenges when involved with partners (Khamseh and Jolly, 2008). Indeed, profiting from partnerships requires significant resources and efforts to develop routines that foster interaction (Milagres and Burcharth, 2019), especially when cooperative relations are in play (Fang *et al.*, 2013) because the collaboration partners are simultaneously competitors. Cooperative relations may impose significant difficulties in sharing

relevant knowledge to avoid the spillover of knowledge that may be appropriated by a competitor (Larsson *et al.*, 1998; Gast *et al.*, 2019). Another challenge of KM in inter-organizational contexts relates to the great variety of partnership forms, such as alliances, mergers and acquisitions, franchising, networks and ecosystems (Todeva and Knoke, 2005; Cricelli and Grimaldi, 2010; Link and Sarala, 2019; Sarala and Vaara, 2010). The type of inter-organizational relationship, its goals and the profile of participant organizations significantly impact the knowledge flows and their management. For instance, KM in open innovation partnerships (Bican *et al.*, 2017; Natalicchio *et al.*, 2017; Matricano *et al.*, 2019) considerably differs from KM in franchising systems (Iddy and Alon, 2019), mergers and acquisitions (Liu *et al.*, 2017) and supply chains (Attia and Eldin, 2018). The relationships among the participants, as well as their power asymmetries (Junni *et al.*, 2018), may imply the need for different KM mechanisms and processes.

Despite the increasing volume of research focusing on KM and inter-organizational relationships, there have been scarce efforts to understand how this field of research has evolved over time. The exceptions in this direction are the studies of Meier (2011), Battistella *et al.* (2016) and Milagres and Burcharth (2019). Meier (2011) offered a review of the literature on KM in a specific form of inter-organizational relationship. He analyzed how the KM outcomes in strategic alliances are determined by knowledge characteristics, partner characteristics, partner interaction and active KM. Battistella *et al.* (2016) reviewed the literature on technology/knowledge transfer from an inter-organizational perspective and offered a reference framework that considers the actors involved, the relationship between them, the object of the transfer, the channels and mechanisms and the reference context. Finally, Milagres and Burcharth (2019) reviewed the literature on knowledge transfer in inter-organizational partnerships and proposed a theoretical framework that links antecedents, process and outcomes of knowledge transfer in such settings. However, although these studies contributed to deepening the understanding of KM in inter-organizational relationships, they assessed specific sub-fields of research. Thus, a broader integrative view about the topic is missing. Our study goes a step further by analyzing how the field of KM in inter-organizational settings has evolved and which directions for future research it offers. Unveiling how the literature on KM in inter-organizational relationships has evolved contributes to consolidate this field and offers directions for future research.

### **3. Methodology**

#### **3.1 Sample selection**

To identify the articles focused on the theme under investigation, we performed a search in ISI Web of Science (WoS) using keywords related to KM in inter-organizational contexts. More specifically, we combined the search of the terms “knowledge manag\*” or “manag\* knowledge” in the title, following the approach by Liao (2003) and Durst and Runar Edvardsson (2012), with the terms alliance\* or network\* or “inter-organi\* relationship\*” or partnership\* in the topic (Agostini *et al.*, 2019). The data collection took place in the end of October 2019. This choice allowed us to better target those articles in which KM in an inter-organizational context is the primary focus. Moreover, we opted for this approach to be able to enter into more details about the articles, which would have not been possible, and could even have been misleading, if we

had a much higher number of articles including those that treat KM as a lateral topic. We obtained 1,040 results, that were then reduced to 422 after filtering on *WoS categories* (management and business), according to the scope of the study, and further to 201 after filtering on *document type* (article, review and editorial) and *language* (English).

Based on the reading of the abstracts of these articles, we excluded those that did not fit with the topic of our review. Articles focusing on physical networks (e.g. telecommunication networks) or network only as a methodology (e.g. network analysis) were excluded. Also, articles with an intra-organizational perspective and articles where inter-organizational-related terms were only mentioned, but not really the focus of the article, were excluded. Moreover, we excluded articles centered on not-for-profit organizations. After applying these exclusion criteria, 97 articles remained, which, after full paper reading, were reduced to 85 relevant articles that constitute the final sample considered for the subsequent analyses.

### 3.2 Bibliographic techniques

We chose bibliometric analysis as our analytical technique to trace the state-of-the-art of the field of KM in inter-organizational contexts and identify its evolution. Pritchard (1969) defined bibliometric analysis as “the mathematical and statistical analysis of bibliographic records.” This method is often used in literature reviews to unveil the underlying structure of a research field through an objective analysis, thus avoiding the results to be biased by the researcher’s perspective (Tranfield *et al.*, 2003). The advantage of a bibliometric analysis is establishing intellectual linkages among different units of analysis (e.g. citations, keywords and authors) and documents, thus allowing the structural mapping of a scientific field.

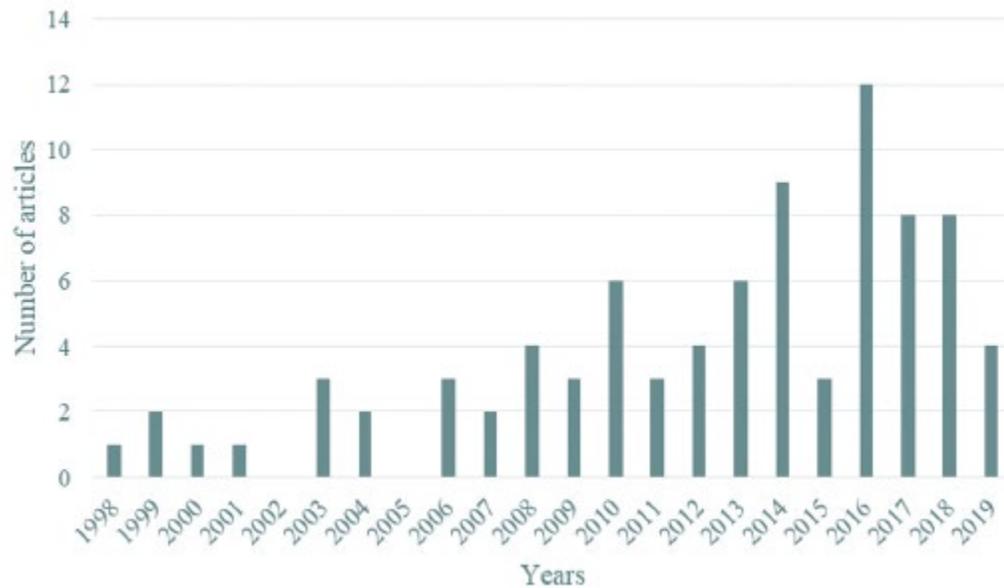
After identifying the articles that contributed to the field under investigation, we applied several bibliographic techniques. First, we conducted a co-citation of cited references and sources (i.e. articles and journals cited by our sampled articles) to discover the theoretical backgrounds of our sampled articles. This was done by counting how many times two references or sources were cited in the same document. Second, we analyzed the co-occurrence of keywords to reveal the most relevant research topics and the underlying conceptual structure of the field (Callon *et al.*, 1983). This was done by counting the number of articles in which two keywords appear together. We first ran the analysis with the whole sample and then in three temporal subgroups. Our longitudinal approach allowed us to examine the evolution of the conceptual structure in the inter-organizational KM field. Therefore, the focus of investigation of the first part is on the articles cited by our sampled ones, whereas the focus of the second part is directly on the sampled articles.

## 4. Results

### 4.1 Overview of sampled articles on knowledge management in inter-organizational contexts

Figure 1 shows the evolution of articles on KM in inter-organizational contexts over time. We can clearly observe a strong recent growth in this body of literature. This could be related to the increasing significance of KM in organizations not only within but also outside the firm boundaries (Mowery *et al.*, 1996) as well as to the growing number of inter-organizational

relationships established by firms (Lumineau and Oliveira, 2018) also in cross-cultural contexts (Filatotchev *et al.*, 2019).



**Figure 1.** Temporal evolution of sampled articles

It is also interesting to note that, among the ten most cited articles (based on citations per year), many articles are quite recent (Table I). Three of these are literature reviews that look at KM in a specific inter-organizational context, namely inter-firm networks (Del Giudice and Maggioni, 2014), strategic alliances (Meier, 2011) and open innovation (Lichtenthaler and Ernst, 2006). This evidence corroborates the intense and increasing academic attention devoted to the field of KM by authors having different backgrounds and the subsequent usefulness of understanding the current state of KM in inter-organizational contexts, which lays the basis for further research in this domain.

To trace the roots of literature on KM, we applied co-citation analysis to both cited sources (Figure 2) and references (Figure 3). The size of a node denotes the frequency with which an article or a journal is cited by our sampled articles, whereas the thickness of the lines indicates the co-occurrence frequency of pairs. Moreover, the position of a node provides information on the network of connections of that node.

The co-citation of cited sources gives rise to three groups of journals, identified with three different colors in Figure 2. Two of these groups revolve around *Strategic Management Journal (SMJ)* and *Journal of Knowledge Management (JKM)* and include mostly general management and international business journals focused on strategic/managerial issues (in red) and KM and operational issues (in green), respectively. *SMJ* and *JKM* represent two journal “poles” that serve as the main reference as they are more frequently cited by our sampled articles and have a wide network of connections. Finally, the third group (in blue), although it does not have one main reference journal, comprises mostly innovation- and practitioner-oriented outlets.

**Table I.** Most cited articles in the sample (based on citations)

No.	Authors	Title	Journal	Publication year	Citations	Citations per year
1	Ferraris, A., Santoro, G., Dezi, L.	How MNC's subsidiaries may improve their innovative performance? The role of external sources and knowledge management capabilities	<i>JKM</i>	2017	44	22.0
2	Inkpen, A.C., Dinur, A.	Knowledge management processes and international joint ventures	<i>Organization Science</i>	1998	415	19.8
3	Bjorkman, I., Barner-Rasmussen, W., Li, L.	Managing knowledge transfer in MNCs: the impact of headquarters control mechanisms	<i>Journal of International Business Studies</i>	2004	270	18.0
4	Del Giudice, M., Maggioni, V.	Managerial practices and operative directions of knowledge management within inter-firm networks: a global view	<i>JKM</i>	2014	71	14.2
5	Martinez-Conesa, I., Soto-Acosta, P., Carayannis, E.G.	On the path towards open innovation: assessing the role of knowledge management capability and environmental dynamism in SMEs	<i>JKM</i>	2017	28	14.0
6	Chua, A.Y.K., Banerjee, S.	Customer knowledge management via social media: the case of Starbucks	<i>JKM</i>	2013	71	11.8
7	Meier, M.	Knowledge management in strategic alliances: a review of empirical evidence	<i>International Journal of Management Reviews</i>	2011	78	9.8
8	Lai, Y.L., Hsu, M.S., Lin, F.J., Chen, Y.M., Lin, Y.H.	The effects of industry cluster knowledge management on innovation performance	<i>Journal of Business Research</i>	2014	47	9.4
9	Lichtenthaler, U., Ernst, H.	Attitudes to externally organising knowledge management tasks: a review, reconsideration and extension of the NIH syndrome	<i>R&amp;D Management</i>	2006	112	8.6
10	Jiang, X., Li, Y.	An empirical investigation of knowledge management and innovative performance: The case of alliances	<i>Research Policy</i>	2009	76	7.6

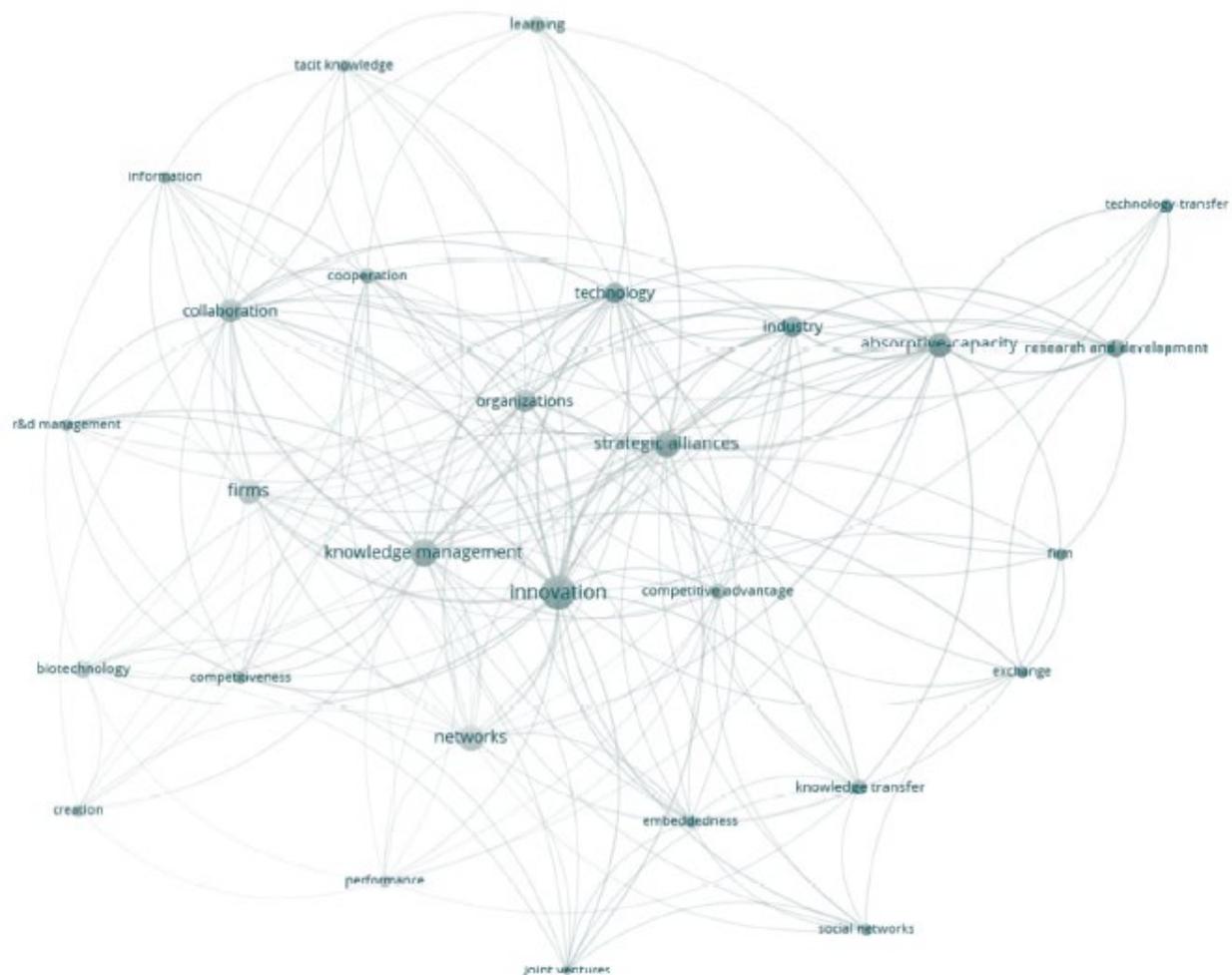
Results of the co-citation of cited references are displayed in Figure 3. At the center of the graph, there are articles that represent the theoretical pillars in the domain of KM. These include the articles by Grant (1996) on the knowledge-based theory of the firm and by Nonaka and Takeuchi (1995) on the knowledge-creating company, which are the most cited. Also the articles of Barney (1991) and Kogut and Zander (1992) – considered as the forefathers of the resource-based and knowledge-based views. On the right-up side in green, we find pioneer articles on integrating the KM with the inter-organizational domain (Hamel, 1991; Mowery *et al.*, 1996; Inkpen and Dinur, 1998; Simonin, 1999), whereas on the left-up side in red, there are articles centered on innovation, with a particular focus on the concept of absorptive capacity (Cohen and Levinthal, 1990; Powell *et al.*, 1996; Lane and Lubatkin, 1998; Tsai, 2001; Zahra and George, 2002). On the right-down side in green we find some methodological articles (Fornell and Bookstein, 1982; Podsakoff *et al.*, 2003) and on the left-down side in red we find some articles that also







of *industry*, *technology* and *absorptive capacity*. The graph also shows a third cluster of keywords connected to the previous ones that includes *firms*, *networks* and *biotechnology*.



**Figure 6.** Co-occurrences of keywords in sampled articles published in Period 1 between 1998 and 2009 (minimum number of co-occurrence of a keyword 2)

**Notes:** The larger the node and the keyword, the greater the weight (i.e. the number of articles a keyword appears in). Thicker lines mean more frequent co-occurrence (i.e. the number of articles in which the keyword appears in together with another keyword). The smaller the distance between the nodes, the stronger their relationship (in terms of how many papers these two keywords appear in together, and relatively comparing co-occurrence with other keywords). The same colour of the nodes and keywords means that they belong to the same cluster of related keywords

A more thorough examination of the articles published between 1998 and 2009 allows us to understand the dynamics of the field of KM in inter-organizational contexts during the first period. The core articles introduce the topic of KM in alliances focused on innovation, which explains the tight connection among the keywords *strategic alliances*, *innovation* and *knowledge management*. The most cited article in the sample, Inkpen and Dinur (1998), analyzes how knowledge is managed in the alliance context. Other studies focus on inter-unit knowledge transfer in multinational companies (Bjorkman *et al.*, 2004) and the difficulties faced by firms to transfer deeply embedded KM practices in an alliance context (Collinson, 1999). The thick lines

that connect *firms*, *networks* and *innovation* suggest that studies concentrate on the role of networks in fostering innovation through inter-organizational collaboration. Several studies analyze the field of biotechnology (Liyanage *et al.*, 1999; Audretsch, 2003; Standing *et al.*, 2008) because of its well-known characteristic of collaboration for innovation (Powell *et al.*, 1996). More specifically, these articles address the KM practices used by biotechnology and pharmaceutical research groups (Liyanage *et al.*, 1999) as well as the type of knowledge effective in developing inter-organizational networks in the biotechnology sector (Standing *et al.*, 2008).

Moreover, the figure also shows that *performance* only plays a marginal role in the studies of the first period. The *performance* keyword is connected to *networks*, *innovation* and *absorptive capacity*, but the size of its node shows that it has not yet captured large attention of scholars. More emphasis is dedicated to the understanding the functioning of KM in the novel inter-organizational context (Gao, 2006; Lichtenthaler and Ernst, 2006; Revilla *et al.*, 2006) than on how KM fostered firms' performance, except for the study by Jiang and Li (2009) that examines firm-level innovation performance implications of using KM practices in strategic alliances.

Another important finding is that the keyword *absorptive capacity* is frequently mentioned in combination with *industry*, *technology* and *R&D* because of its key role in fostering knowledge transfer and adoption between partners (Cohen and Levinthal, 1990). However, despite the relevance of *absorptive capacity* in its cluster of keywords, the concept is not used as a central variable by the authors in other clusters. Rather, it is considered as an additional variable to understand the effective management of knowledge transfer processes among firms (Soosay and Hyland, 2008) and the development of complex products and systems (Ngai *et al.*, 2008).

Finally, *collaboration* and *cooperation* between *organizations* (the green group in Figure 6) were also a focus of research in the first period. Especially the keyword *collaboration* is strongly connected to *knowledge management* and *innovation*. The associated articles highlight that different types of inter-firm collaborative networks are established to fulfill specific KM requirements (Ding and Peters, 2000) and that KM in collaborative settings requires also the management of social processes (Frederiksen *et al.*, 2004).

Overall, we can assert that the origins of the topic under investigation are focused on moving the concept of KM from an intra-organizational to various inter-organizational settings, such as alliances, networks or collaboration/cooperation around innovation.

#### 4.2.2 Period 2: 2010-2014.

Figure 7 exhibits the analysis of co-occurrences of keywords in sampled articles published between 2010 and 2014. The most evident development is the emergence and increase in relevance of new keywords. For example, *performance*, along with *impact* in the same red subgroup, and *capabilities* show increased prevalence. *Knowledge management* and *innovation* continue to play a major role, as indicated by the size of their nodes, with *knowledge management* further increasing the frequency of occurrence among keywords. Moreover, looking at the thickness of lines that represents the frequency of co-occurrences of two keywords, *knowledge management* is cited most frequently with *innovation*, which is also the closest



(2012), Jiang *et al.* (2013) and Martin-Rios (2014) investigate the role of formal vs informal control mechanisms or relationships on inter-organizational knowledge flows, but without finding shared results. The fourth trend is the integration of different perspectives, theories and concepts (note the emergence of the keywords *perspective* and *integration*) to interpret the complex and multi-faceted nature of KM in inter-organizational contexts. For example, the resource-based view is combined with the concepts of KM and supply chain management to suggest interesting areas for future research (Halley *et al.*, 2010). As another example, total quality management and KM concepts are merged to study supply chain learning among firms (Loke *et al.*, 2012). Quite close to this yellow group of keywords, we can see also the keyword *social network*, which depicts the beginning of applying social network perspective to study KM in inter-organizational contexts (Gubbins and Dooley, 2014; Jiao *et al.*, 2014). Also, keywords such as *information and communication technologies* (ICTs) (Gressgard *et al.*, 2014) and *social media* (Chua and Banerjee, 2013) appear on the map, mainly as tools to acquire external knowledge.

Finally, studies on supply chains and multinational corporations, seen as network structures, become predominant, which explains the more central position occupied by the keyword *network* with respect to the keyword *strategic alliance*, contrary to the previous period.

#### 4.2.3 Period 3: 2015-2019.

Regarding the third and most recent period, 2015-2019, examining the co-occurrences of keywords reveals another set of novel keywords. Interestingly, we are starting to see the “human side” of KM more and more represented, as reflected in the new keywords such as *human capital* and *intellectual capital*. We can also note the emergence of new phenomena as demonstrated with the new keywords such as *open innovation*, *communities* and *clusters* that link to the increased social interconnectedness of KM. It is also noteworthy that new entrepreneurial keywords emerge, including *entrepreneurship* and *small- and medium-sized companies (SMEs)*, which suggests growing interest in KM in entrepreneurial contexts.

In terms of the importance of the themes, judged by the size of the nodes, *knowledge management* and *performance* are the most prominent, reflecting continuing growth of the former theme and the increased importance of the latter. *Innovation* and *networks* also continued their growth. Concerning the co-occurrences of themes, as reflected in the thickness of lines, *knowledge management*, *performance*, *innovation* and *networks* co-occur strongly with each other. In contrast, compared with the prior period, the connection between KM and *absorptive capacity* appears weaker and the size of the *absorptive capacity* node is definitely smaller.

We can also observe the following new trends. First, on the right-down side of the graph, we notice green and yellow clusters that focus on the knowledge and capability perspective in which topics such as *knowledge creation* and *knowledge transfer* particularly in contexts as strategic alliances and international joint ventures consolidate. Here new relevant issues come into play, such as the role of KM processes in international settings characterized by cultural differences (Pauluzzo and Cagnina, 2019). Thus, the role of capabilities (Claver-Cortes *et al.*, 2018) and their connectedness to strategy and firm performance (Lee and Song, 2018) is an important



## 5. Discussion and avenues for future research

Our purpose in this article was to examine the evolution of the literature on KM in inter-organizational contexts. Applying bibliographic techniques, we focused on analyzing and tracing the evolution of the conceptual structure of the field over time by examining three temporal periods.

Our results illustrate a strong growth of the literature on inter-organizational KM in recent years, with *JKM* and *SMJ* emerging as main reference outlets for the topic. The conversations on KM in inter-organizational contexts have centered around three theoretical poles: strategic issues (especially in the context of strategic alliances), knowledge-based view and innovation (with special attention on absorptive capacity). In terms of connectedness between different theoretical themes, the concepts of KM, innovation, performance and networks emerge as interconnected central topics within the inter-organizational KM literature.

We illustrate how Period 1 (1998-2009) focused on establishing KM in the inter-organizational context. The emphasis was less on performance implications and more on the functioning of KM in this novel context. We also noted the key influence of absorptive capacity during this early period, especially in connection to technology and research and development (R&D) contexts. During Period 2 (2010-2014), we observed the growth in studies that focused on explaining the links between KM and performance. KM capabilities and practices also received increased attention. A notable trend was the focus on antecedents while KM was increasingly seen as an important outcome. We observed the beginning of applications of social network perspective to the inter-organizational KM literature and the first studies on social media. Period 3 (2015-2019) was characterized by the increase in themes related to the “human side” of KM, including the role of human capital and intellectual capital, and its “social connectedness” as illustrated by keywords such as social media, open innovation, communities and clusters. Also, inter-organizational KM was increasingly examined in the context of *SMEs* with unique entrepreneurial dynamics. Furthermore, connecting KM to performance remained a key focus. Although the focus on absorptive capacity started to wane, more generally the KM research continued to build strongly on knowledge- and capability-based perspectives.

Based on our review, we propose an overview of interesting paths for future research that emerge from our study. First, the literature mainly focuses on KM in collaborations created for innovation purposes. Indeed, keywords related to innovation are abundant whereas keywords featuring internationalization, marketing or partnerships along the value chain are not as prevalent in our analysis. Therefore, extending on Bhosale and Kant (2016), we call for investigating KM in the inter-organizational relationships established for other purposes, such as international growth, marketing and commercialization purposes.

Second, most research has focused on a few specific inter-organizational forms, namely strategic alliances, joint ventures and networks. Extending KM research to other inter-organizational contexts could represent a fruitful area of research. These could include, for instance, cooperative modes (Chevallier *et al.*, 2016), mergers and acquisition (Sarala and Vaara, 2010), R&D contracts and outsourcing. This is in line with recent research that shows that the requirements,

problems and constraints differ across inter-organizational relationships (Agostini and Nosella, 2017).

Third, in the last period analyzed, *SMEs* appeared as a central keyword in the bibliometric analysis, reflecting the recent attention that authors have started dedicating to SMEs. However, the studies in the SME context so far have a very general nature, which is in line with an emerging perspective, but nevertheless calls for finer-grained investigations of KM tools and practices (Cerchione *et al.*, 2016; O'Connor and Kelly, 2017) in inter-organizational contexts involving SMEs. The dynamics of KM in this context deserves further attention in future studies because SMEs and large firms have different networking patterns, which prevents generalizing findings of studies focusing on larger firms to SMEs (Colombo *et al.*, 2012). For example, comparative studies contrasting large and small firms could be valuable for theory development on inter-organizational KM (Vayrynen *et al.*, 2017). Also, the role of entrepreneurs in small firms' inter-organizational KM deserves more attention because entrepreneurs may embody the whole firm, so that inter-organizational relationships at the personal and firm level co-exist and sometimes even converge (Agostini and Nosella, 2019).

Fourth, there is a need to move from examining KM in distinct inter-organizational relationships [e.g. a single alliance or a single joint venture (JV)] toward considering the inter-relatedness of KM across multiple inter-organizational relationships. A firm is likely to be involved simultaneously in more than one collaboration, or one inter-organizational relationship may follow another, such as mergers and acquisitions following a JV or R&D collaboration that culminates in JV (Sarala *et al.*, 2019). These kinds of dynamics bring with them different kinds of resource, path and temporal dependencies that can affect KM. Nevertheless, keywords related to multiple inter-organizational relationships – such as portfolios, programs or serial collaborations – do not feature prominently in our analysis. Accordingly, we posit KM in multiple inter-organizational relationships and networks as a gap in the current literature that requires bridging in future studies, in accordance with Martins (2016), so that the level of analysis moves from a single collaboration to inter-organizational networks, portfolios (Jiang *et al.*, 2010) and programs.

Fifth, the increasing attention toward the topic of KM in inter-organizational contexts has led to an increased specialization of topics over time. While the contributions within the first period had a more general nature, the second and third periods feature investigations of increasingly specific issues. On the positive side, this has generated some very important contributions, such as those on ICT and social media tools supporting KM in inter-organizational contexts, and these streams still have plenty of room for further contributions (Soto-Acosta *et al.*, 2018; Archer-Brown and Kietzmann, 2018; Qing and Niu, 2018). The same holds true for the role of orchestrating, championing and gatekeeping for KM in inter-organizational contexts (Gastaldi and Corso, 2016; Wilhelm and Dolfsma, 2018). However, this specialization calls for reviews such as ours to establish common ground across studies that integrate different disciplinary perspectives to prevent fragmentation of the field. On the other hand, KM has benefited from theoretical cross-fertilization and concepts as strategy and innovation theories have been successfully applied to KM, including theories and concepts such as absorptive capacity, intellectual capital (Martin-de Castro, 2015; Jordao and Novas, 2017) and dynamic capabilities theory (Sharma *et al.*, 2016). We expect this trend to continue and develop further in the future,

but we also call for phenomenon-based and indigenous KM theorizing that takes the inter-organizational KM as a starting point and aims to develop theory that addresses the specifics of this particular phenomenon.

Sixth, many of the articles examined adopt positivist methods and ontology, yet multi-layered topics such as social interactions and networks, may not be completely captured by such approaches. The promise of early KM research was escaping the constraints of positivist science by introducing deeper level constructs, such as tacit knowledge, and emphasizing the complex related processes through which such knowledge can be managed. KM also had unique managerial relevance, as illustrated by the Nonaka and Takeuchi's book that created language that managers continue to find relevant to their practice (Nonaka and Takeuchi, 1995). In line with the important concept of complementarity in the KM literature, we call for inter-organizational KM research that uses approaches and methods that complement and extend narrow analyses based on mainstream positivist methods. These include, for instance, detailed case analyses, interpretive studies, critical approaches and even rich ethnographies of observing the actual practices that actors construct and use in their daily activities around inter-organizational KM (Sarala *et al.*, 2019).

Being at the cutting edge implies development of new language that captures something about the phenomena that the previous language did not while integrating the advances discovered in prior research. The process stops when knowledge becomes perfect, which is a contradiction of terms because the very meaning of knowledge is rooted in the human experience of "not knowing" and the desire to discover. Until then KM researchers will continue to explore new territory and terminology, as our paper illustrates.

## **6. Conclusions, implications and limitations**

This article aimed to trace the evolution of the literature on KM in inter-organizational contexts with the purpose of identifying the bases and core topics upon which this body of literature developed, as well as the emerging issues that have entered this field of research over time and those that still deserve further investigation.

We contribute by creating a more nuanced theoretical understanding of the key topics in inter-organizational KM and their interrelatedness by illustrating the conceptual structure of the field. We illustrate core topics that have persisted and consistently grown over time – such as examining the links between KM, innovation, performance and network. We also bring forth new emerging core topics, such as the "human side" of KM and entrepreneurial dynamics. We also propose how we can address new areas of interest in future research. Furthermore, the study contributes by revealing the underlying theoretical perspectives in inter-organizational KM research, mostly focused around knowledge- and capability-based perspectives, but also increasingly incorporating network and social network perspectives. Our article reveals the interconnectedness of older foundational themes with newer contemporary topics.

For practitioners, our results show the importance of KM in terms of demonstrating its central role in innovation processes and firm performance. In addition, our analyses show the importance of social processes and connectedness of inter-organizational KM. Such "softer"

issues often times do not receive enough attention in managerial practice as the managerial attention tends to focus on more operational aspects at the expense of the crucial socio-cultural side. Finally, our study offers insights regarding the contexts in which inter-organizational KM is likely to be particularly important, including joint ventures and alliances, but also cross-cultural and entrepreneurial contexts.

Our article has limitations that should be taken into account when interpreting the results. We included studies based on key words in the title. This allowed us to focus on studies in which inter-organizational KM is a central aspect but may have excluded studies in which KM played a less central, yet intriguing role. In addition, while the bibliographic techniques allowed us to uncover the underlying structure of the inter-organizational KM field and provided an overview of the field and its development over time, it did not allow us to examine in great depth the underlying aspects of each study or to engage in detailed discussion of the composition of specific measures. However, for a broad topic such as inter-organizational KM, we believe that systematic analyses such as ours are helpful in bringing together different streams of literature and showing their connectedness to prevent theoretical fragmentation of the inter-organizational KM literature as the literature grows. We acknowledge that qualitative and critical review approaches are needed to complement quantitative approaches to obtain a full understanding of complex phenomena such as inter-organizational KM. Finally, as we focused on published research studies, our findings may be affected by a publication bias. The most novel findings may have appeared in conference papers, but not yet in academic journal outlets. Nevertheless, we maintain that a focus on published articles represents a way of controlling for the high quality and rigor of the articles included and we have extended the time period of published articles as close to the present date as possible.

In conclusion, our study shows the vibrancy of inter-organizational KM as a research topic and the variety of associated theoretical concepts, including their inter-linkages and development over time. We hope that our study will help not only to map the field, but also to generate innovative ideas and thereby guide research into fascinating, emerging themes that provide potential for significant theoretical and empirical contributions to the field of KM and beyond.

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