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Towards a Comprehensive Conceptualization of Relational Capabilities: an Innovation Management Perspective

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Abstract

Relational capabilities (RC) draw upon the relational view incorporated into different approaches in competing ways. To provide a clarification of concepts to identify trends, perspectives, and future research opportunities, we conducted a literature review through a bibliometric analysis from 1979 to 2021 publications. Additionally, we highlight the most influential papers that extensively discuss RC and its influences and variations to manage innovation. Findings identify some descriptive insights about publications and the turning point article in the literature that influenced the evolution of RC under the innovation management perspective. RC intertwines into various aspects of innovation management, such as knowledge-based co-creation, learning value, collaborative strategy, innovative ecosystems, strategic management, managing partners, and organizational growth. Therefore, the stream of innovation management leads us to conceptualize RC, highlighting opportunities for further research to solidify RC's significance. By reviewing and identifying the most influential papers and their authors and systematizing existing knowledge on RC, this research produces theoretical contributions for dynamic capabilities and innovation theory. From a practitioner standpoint, managers likely look at relational resources and strategies towards innovativeness from a new perspective understanding that relational rents exist.

Keywords: Relationship Assets; Relational Capabilities; Bibliometric; Dynamic Capabilities; Systematic Review.

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1 Introduction

Relational Capabilities (RC) materialize as one of the most important dynamic capabilities among different empirical research. Drawing upon the relational view, RC is a relevant intangible resource to innovation management. RC is pertinent in business challenges, such as relationships with suppliers (Blonska et al., 2013; Jääskeläinen et al., 2020; Roden and Lawson, 2014; Whipple et al., 2015); service orientation (Alves et al., 2020); digital servicing (Cenamor et al., 2017; Eloranta & Turunen, 2015; Kamalaldin et al., 2020); innovation management (Duodu & Rowlinson, 2019; Huang et al., 2021), and product innovation (Parmigiani et al., 2021).

From a theoretical perspective to study innovation management, the relational view (Donbesuur et al., 2021; Seepana et al., 2021) is an acceptable perspective because of mutually adapted

firm's relations and joint input of partners (Dyer & Singh, 1998; Lavie & Rosenkopf, 2006). This enables them to co-evolve and generate relational rents with successful innovations (Kamalaldin et al., 2020). We depart from the relational view to connect parties who are relationally embedded to innovate (Hansen, 1999), offering an assessment of the literature on how firms exchange fine-grained or tacit information (Uzzi, 2011, 1997) through relationships for processing complex innovations (Morgan & Hunt, 1994).

No consensus for RC definition exists in the literature and is present in many taxonomies for the construct. For example, relational embeddedness refers to the high-quality, cohesive social interaction between network members like a community of organizations (Gulati, 1998; Yli-Renko et al., 2002) or a firm's network of relations generating beneficial advantages through multiple members' interactions at and across levels (Andersson et al., 2002). Other definitions also appear in the literature, such as relational marketing referring to marketing activities (Morgan & Hunt, 1994); relational capital as interactions between alliance partners (Kale et al., 2000); relational governance underlying norms and dimensions (Poppo & Zenger, 2002); relational value chain in global perspective referring to complex interactions between buyers and sellers, and relational governance when product specifications cannot be codified, transactions are complex, and supplier capabilities are high (Gereffi et al., 2005).

Understanding the relevance of RC to innovation management, this study highlights the determinants of inter-organizational competitive advantage. These advantages are considered the focus of RC: (1) complementary resources and capabilities, (2) relation-specific assets, (3) knowledge-sharing routines, and (4) effective governance. Thus, we argue that these determinants hold significant explanatory potential for understanding how firms manage and explore innovations (Dyer et al., 2018).

Identifying opportunities in the literature to clarify RC impacts and their direct and indirect effects on firms' innovation management (Alves et al., 2020), we pose the research question, "what is the conceptualization of relational capabilities from the innovation management perspective?" Understanding RC in innovation management might reveal differences and commonalities that enhance innovations exhorting new research avenues to discuss nuances and applicability more precisely.

To establish the main aspects of RC that enhance innovation management, we adopt a literature review using bibliometric analysis of publications from 1997 to 2021. First, we demonstrate the literature evolution by identifying the most often cited papers and authors and the main journals developing the research field. Second, we seek to understand the connections between the researchers by co-citation analysis. This step identifies the main characteristics of the RC in innovation management by showing the articles that promoted a profound change in the research field. Third, we proposed a new conceptualization for analyzing trends of RC through the bibliographic coupling analysis. Finally, we propose a conceptualization for RC and offer new opportunities for future research.

2 Research Method

To perform this literature review through bibliometric analysis, standard stages such as study design, data collection, data analysis, and data visualization comprise the method.

2.1 Study Design

The bibliometric method for conducting a literature review avoids narrative reviews and provides a scientific approach (Linnenluecke et al., 2020) since it aims to identify literature trends, the

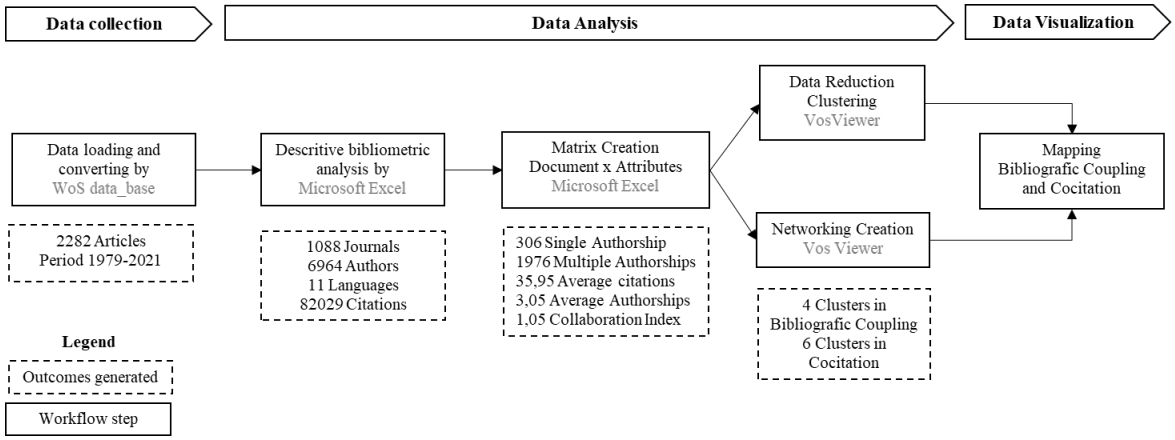

Figure 1. Study Design – Methodological model. Source: Adapted from Aria and Cuccurillo (2017)

most frequently discussed topics, fields, and gaps that may exist within a research field. The bibliometric analysis is based specifically on the "visualization of similarities" technique (van Eck & Waltman, 2010). Different from other methods such as systematic literature review, content analysis, and meta-analysis that focus on what have already written and found in a research field, the bibliometric method amplifies the analysis of past and present in a broader range of articles to predict new future trends. Following the methodological model recommended by Aria and Cuccurullo (2017), we designed this study to combine findings and theories to sustain our research question (Aria & Cuccurullo, 2017). Figure 1 presents the overall study design followed methodologically.

A bibliographic coupling, citation, and co-citation analysis answers our research question. Citation and Co-citation analysis focus on the history and evolution of the RC research field and studies the impact and roots of seminal authors in the citation and co-citation analysis. Conversely, bibliographic coupling focuses on the future orientation to identify the emergent topics and directions of RC (Vogel, 2012) and contains future implications.

2.2 Data Collection

We chose the Web of Science database by Thomson Reuters because it offers a feature that can collect a set of metadata, such as abstracts, authors, institutions, number of citations, references cited, and the journal impact factor, which is essential for conducting a bibliometric analysis. It represents more than 50% of the bibliographic production (Mongeon and Paul-Hus, 2016); therefore, it is significant in the quantity and quality of academic production. We considered a search criterion for the topic Relational Capabilities through the keywords "relational" AND "capabilit*". The quotation marks defined the research object and applied the asterisk (*) after "capabilit" to follow the research fundamentals based on Boolean algebra. Figure 1 displays the descriptive analysis of the sample. We filtered the research to "articles" as this type of document undergoes blind peer review and has the most complete set of metadata in the database. We collected the data in May 2022. This query generated a preliminary data set of 2,282 entries from 1979 to 2021 publications.

2.3 Data Analysis

Once we refined the sample results by an excel file, we analyzed a matrix of citations to obtain a list of the most cited articles cognitive of the premise that the more cited and link strength a publication has, the greater the influence it has on a given research field. The software VOSviewer

applied the aggregation mechanism among the publications (van Eck & Waltman, 2010) to provide the co-citation and bibliographic coupling networks considering the publications with the highest link strength without limitations of citations.

The co-citation network presented six clusters organized into a red cluster with 245 publications, a green cluster with 190, a light blue cluster with 162, a dark blue cluster with 150, a purple cluster with 147, and a yellow cluster with 106 publications. The bibliographic coupling network presented four clusters divided into cluster red with 295 publications, cluster blue with 278, cluster green with 235, and cluster yellow with 174 publications. After reading the abstracts of publications identified in each cluster, we used a criterion to identify the main publications that associate RC and innovation management.

First, we accepted publications where RC is associated with innovations. Meaning that through innovation, interconnected and interdependent actors collaborate and exchange information to promote innovativeness and competitive advantage for firms. Second, we pursued publications where RC was present in inter-organizational relationships to exchange knowledge, enhance complementary resources, and learn to reduce resistance to change. Third, publications in innovation management-related literature were identified as the primary criteria to answer the research question. After applying the criterion, 295 articles received a critical reading to obtain knowledge about the main aspects of RC that enhance innovation management. The separation of publications for criterion application was split among the researchers and reviewed in a group for consensus.

2.4 Data Visualization

The outputs of VOSviewer are networks of publications in which the items' distance indicates the relatedness among the studies. The more strongly the studies are associated, the smaller the distance between them. In addition, the network analysis illustrates the knowledge base diversity in an aggregate way. If the studies belong to the same cluster, they are strongly linked as a group based on their shared references. Thereby, a cluster in the network represents a stream of research fields based on similarities. In the network, the publications are organized to optimize their visualization; thus, the axes of the network do not have any meaning. Using the results of each cluster, we can analyze the most influential publications combined with our criterion to analyze the primary areas of focus where RC impacts innovation management.

3 Findings

3.1 Citation Analysis

The journal citation analysis revealed the ten most frequently cited journals, which are responsible for publishing approximately 13.54% of the total sample (Table 1). We found low representativeness among the journals in terms of percentage, and we understand that RC is associated with a vast number of subjects and areas of research.

Table 1. Distribution of articles per Journal

Source Title	Publications	Percentage
Industrial Marketing Management	66	2.89%
Journal of Business Research	43	1,88%
Journal of Business & Industrial Marketing	39	1.71%
Sustainability	36	1.58%

Source Title	Publications	Percentage
Int. Journal of Operations Production Management	27	1.18%
Supply Chain Management - An International Journal	22	0.96%
International Journal of Production Economics	20	0.88%
Journal of Intellectual Capital	19	0.83%
Strategic Management Journal	19	0.83%
International Journal of Logistics Management	18	0.79%
Total	309	13.54%

The evolution of the publications in the last decades indicates that RC has been impacted by others research fields and has not yet consolidated (Figure 2).

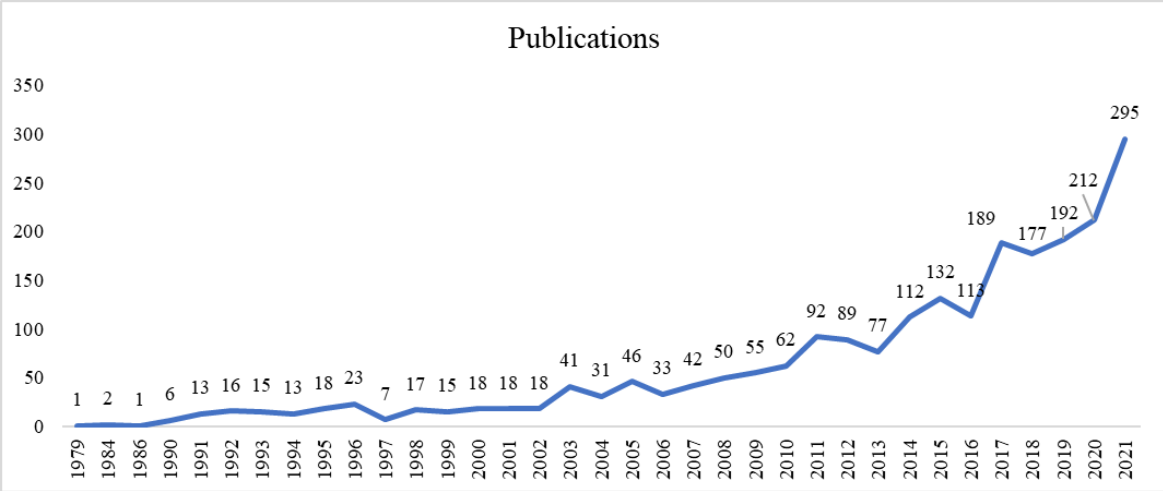

Figure 2. Evolution of publications from 1979 to 2021. (Source: elaborated by authors)

The citation analysis indicated that all cited articles use various methods to demonstrate their hypotheses and propositions. Table 2 displays a list of the ten most cited articles with more than 20,363 citations, representing 24.82% of the total citations in the full sample.

Table 2. List of the 10 most-cited articles in the sample

Authors	Title Source	Citation	Percentage
Dyer & Singh (1998)	Academy of Management Review	6117	7.46%
Gereffi, et al. (2005)	Review of Int. Political Economy	3088	3.76%
Reagans & McEvily (2003)	Administrative Science Quarterly	1958	2.39%
Zander & Kogut (1995)	Organization Science	1686	2.06%
Kale et al. (2000)	Strategic Management Journal	1625	1.98%
Levin & Cross (2004)	Management Science	1498	1.83%
Kostova & Roth, K (2002)	Academy of Management Journal	1443	1.76%
Kostova (1999)	Academy of Management Review	1210	1.48%
Todorova & Durisin (2007)	Academy of Management Review	915	1.12%
Bharadwaj et al. (2013)	MIS Quarterly	823	1.00%
Total Citations		20363	24,82%

The most-cited articles highlight different perspectives for the relational view, such as collaboration

as the core of RC. This perspective emphasizes that collaborative firms may generate relational rents, relation-specific assets, knowledge-sharing routines, complementary resource endowments, and effective governance to possess significant competitive advantage (Dyer & Singh, 1998). Furthermore, when firms are in a global value chain that demands a high level of governance, the relational aspects appear as complex collaborative interactions between buyers and sellers. This often creates mutual dependence and high levels of relation-specific assets (Gereffi et al., 2005), mainly when they practice innovativeness.

Networks appear as facilitators of knowledge sharing-routines and social cohesion around relationships that affect the willingness and motivation of individuals to invest time, energy, and effort in sharing knowledge with others (Gulati, 1998; Reagans & McEvily, 2003). Relational ties also potentially increase the individual ability to convey complex ideas to heterogeneous audiences for knowledge sharing and building relationships critical to knowledge creation (Levin & Cross, 2004).

Kale et al. (2000) explored relational exchange theory in economic sociology, discussing how personal relationships based on trust arise and exist between firms. They confirmed the essential role of personal connections and relationships between contracting firms (Kale et al., 2000). Kostova and Roth (2002) found that the institutionalization of practice is affected by external institutional contexts and internal relations. Thus, the level of institutionalization of the same practice will vary across countries and organizational units (Kostova & Roth, 2002).

These seminal authors' viewpoints highlighted the effects of the external contexts operating through the active RC since relational contexts are not specifically explained but they may produce effects across various other business practices evidenced. Todorova and Durisin (2007) reinforced RC by recognizing its value and transformational impact and introducing the absorptive capacity to elaborate the socialization mechanisms and investigate the power of relationships including the positive meaningfulness of feedback in a dynamic environment (Todorova & Durisin, 2007).

3.2 Co-citation Analysis

The co-citation network analysis of the highest link strength sources cited yielded a network of six clusters (Figure 3).

Cluster Red: Dynamic Capabilities to innovate

This cluster presented papers that support dynamic capabilities as processes and abilities to enhance innovations. Teece et al. (1997) propose dynamic capabilities micro-foundations to understand how certain firms build competitive advantage in regimes of rapid technological change (Teece et al., 1997). Dynamic capabilities enable business enterprises to create, deploy, and protect intangible assets to support superior innovation performance (Teece, 2007). The micro-foundations of dynamic capabilities recognized as the distinct skills, processes, procedures, organizational structures, relational aspects, decision rules, and disciplines, guide firm-level in sensing, seizing, and transforming resources difficult to develop or deploy. Firms that possess dynamic capabilities are intensely entrepreneurial (Helfat et al., 2009). They adapt into innovative ecosystems and shape them through collaboration with other enterprises, entities, and institutions. Helfat et al. (2009) highlight RC as dynamic capabilities for alliances and firms' mergers and acquisitions.

Cluster Green: Relational Assets and Resources Management

The seminal authors Dyer and Singh (1998), stated that relational advantage takes the idea of asset interconnectedness across organizational boundaries. Interfirm relational assets occur in cumulative increments on an existing stock of relationships held by a firm and its partners. These relationships may generate innovation. However, management of resources in reconfiguration demands additional challenges from partners when they intend to innovate because a firm in isolation, irrespective of its capabilities or resources, cannot enjoy relational rents (Dyer & Nobeoka, 2000). Thus, RC are not a sufficient condition for realizing innovations. The creation of relational rents is often contingent on a firm's ability to find a partner with complementary strategic resources and relational capability (i.e., a firm's willingness to partner). Morgan and Hunt (1994) asserted that relationship commitment and trust develop when firms attend to relationships by (1) providing resources, opportunities, and benefits superior to the offerings of alternative partners; (2) maintaining high standards of corporate values and allying oneself with exchange partners sharing similar values; (3) communicating valuable information, including expectations, market intelligence,

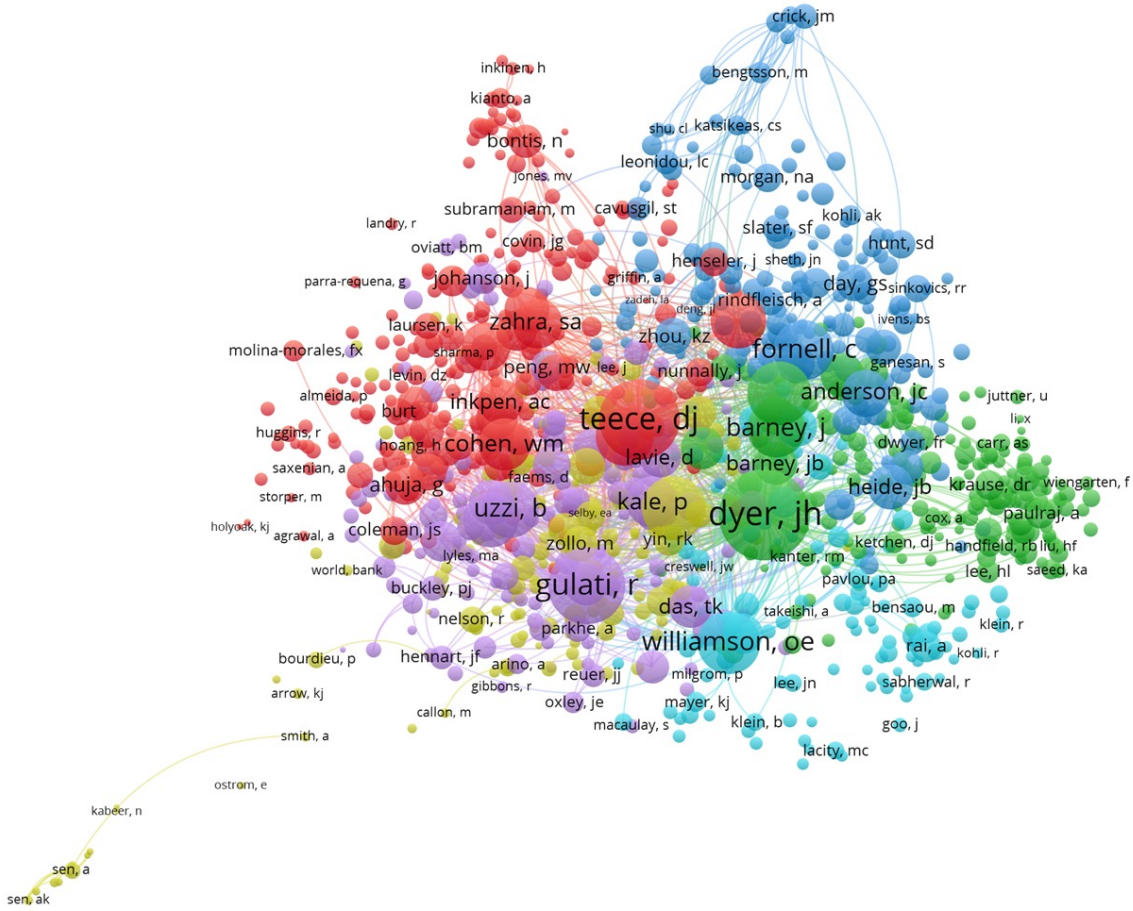

Figure 3. Co-citation network

and evaluations of the partner's performance; and (4) avoiding malevolently taking advantage of their exchange partners (Morgan & Hunt, 1994). In this cluster, the authors advance resources management as a pre-condition to innovate, and RC are capabilities to enable it.

Cluster Light Blue: Partner Trustfulness

This cluster emphasized particularities of partners more likely to invest in relation-specific assets when they crafted effective trust. Williamson (2007) identified human asset to refer to transaction-specific expertise accumulated by transactors through long-standing relationships (Williamson, 2007). These long-standing relationships among partners create a prominent level of trustfulness welcome to innovation management. Additionally, the uncertainty of the digital economy encourages the creation of institutional structures that assure exchange relationships among partners. Such specific institutional mechanisms build trust, stressing the ability of institution-based trust to build a trustworthy trading environment in the digital economy enhancing the power of innovativeness (Pavlou, 2002).

Cluster Dark Blue: Relationships identity

This cluster contains papers that evidence general relationships. For instance, Heide and John (1992) showed that norms play a significant role in structuring efficient relationships economically among firms (Heide & John, 1992). In the absence of supportive norms, it is not possible for parties whose specific assets are at risk to acquire vertical control as per the transaction cost prescription. Instead, those parties lose control because of their dependence. Fornell (1995) mentioned that it is increasingly important to understand the role of customer satisfaction and its relationship with economic measures (Fornell, 1995). The author first highlighted that the distribution of customer satisfaction is negatively skewed, and this is a

condition for a free market. Second, the association between market share and customer satisfaction is not positive in cross-sectional analysis. While challenging to firms that pursue both market share goals and increased customer satisfaction, the findings are consistent in using customers satisfaction and opinions for product and service innovations. The identity of this relationship between firms and customers is a strong mechanism used to transform business models incrementally or radically.

Cluster Purple – Alliances and Networks Management

Publications in cluster purple emphasized the social network perspective strategic alliances studies. It expands alliances as dual exchanges and concentrated less on the fact that key precursors, processes, and outcomes associated with alliances can be defined and shaped by social capital. Gulati (1998) identified five crucial issues for the study of alliances: (1) the formation of alliances, (2) the choice of governance structure, (3) the dynamic evolution of alliances, (4) the performance of alliances, and (5) the performance consequences for firms entering into alliances (Gulati, 1998). Uzzi (1997) developed links between social structure, micro-behavioral decision-making processes, and economic outcomes within organizational networks, emphasizing that cooperative norms in alliances increase the knowledge senders' confidence (Uzzi, 1997). Firms will be willing to assist alliances when they find themselves in a fragile position, even if it is not in their short-term interests. Networks and Alliances continue to be an object of interest in the literature considering the challenges still faced by innovators.

Cluster Yellow: Evolutionary Perspective of Firms

This cluster primarily incorporated evolutionary theory to identify that the diversity of firms is a key feature of innovation. The view of firms as complex organizations provides to other types of relationships and subsequent examination of the important distinctions to reach higher competitive advantages (Nelson and Winter, 2004). The evolutionary view emerges from the trap product prices and markets evolution trap and factors in social mechanisms to actively transmit information for institutional development due to innovation management. It is an incremental process in which the conditions of each day arise from the actual circumstances of the preceding day and in which uncertainty abounds. The evolutionary perspective addresses the role of (1) experience accumulation, (2) knowledge articulation, and (3) knowledge codification processes in the evolution of firms' operational dynamism (Zollo & Winter, 2002). At any time, firms adopt a mix of learning behaviors constituted by a semiautomatic accumulation of experience and by deliberate investments in knowledge articulation and codification activities to innovate. The co-evolution of these mechanisms is summarized in the tacit accumulation of experience, knowledge articulation, and knowledge codification processes as part of innovation management.

Turning point articles: influencers of relational capabilities conceptualization

We identify the main studies that influence RC intellectual structure. Figure 4 presents the co-citation network chronologically to follow the evolution of the knowledge domain under a time interval of 34 years between 1973 and 2007. It shows the works that deeply influence the discussion on RC in the literature.

80´s decade: The decade is marked by the general statement about growth strategy, which according to Wernerfelt (1984), involves striking a balance between the exploitation of existing resources and the development of new ones. This perspective influenced the process of developing RC as dynamic capabilities.

90´s decade: Most important decade for RC and is split into five influences:

1. Barney (1991) states that under sustained competitive advantage focused on valuable, rare, imperfectly imitable, and non-substitutable resources;
2. Kogut and Zander (1992) highlighted a dynamic view of how firms create new knowledge and learning skills by recombining existing capabilities;
3. Grant (1996) introduced the knowledge-based theory to explore organizational capabilities and organizational learning;
4. Uzzi (1997) argued about the embeddedness of exchanges within social structures economizing on time spent in costly contract renegotiations, and Teece et al. (1997) created dynamic capabilities micro-foundations for firms operating in environments of rapid technological change;
5. Nahapiet and Ghoshal (1998) discussed the interrelationship between social and intellectual capital. Dyer and Singh (1998) followed when they proposed determinants of inter-organizational competitive advantage such as relation-specific assets (duration of safeguards and volume of interfirm

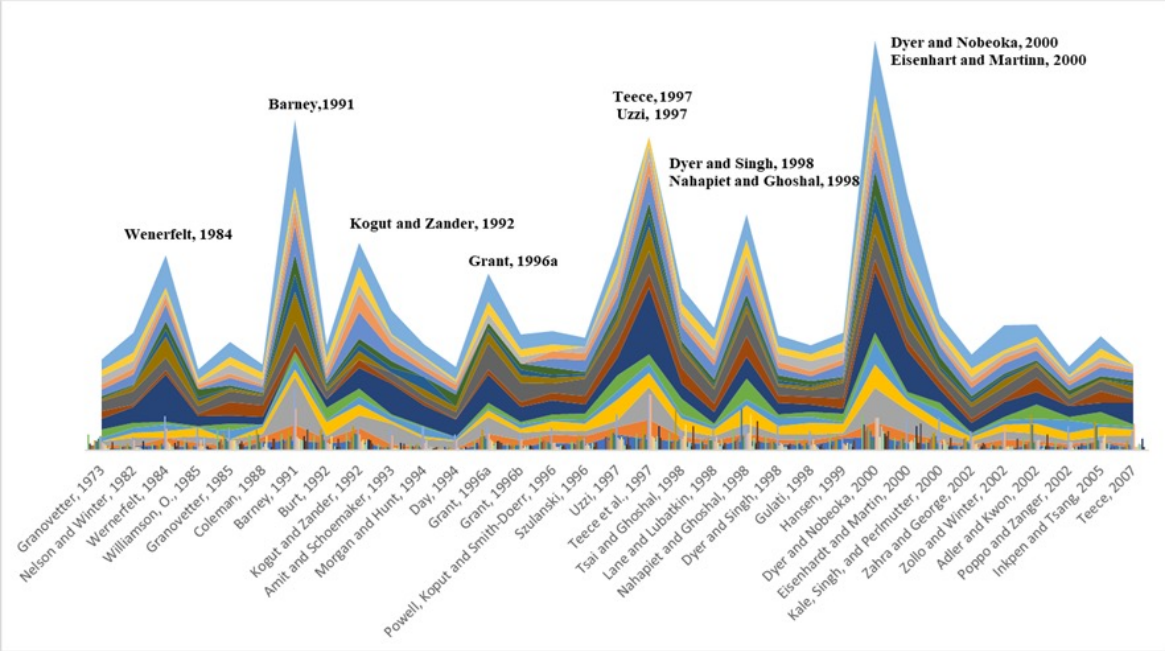

Figure 4. Turning points articles network (Year view)

transactions); knowledge-sharing routines (partner-specific absorptive capacity and incentives to encourage transparency and discourage free-riding); complementary resources and capabilities (ability to identify and evaluate potential complementarities to access benefits of strategic resources); effective governance (ability to employ self-enforcement rather than third-party enforcement and ability to employ informal versus formal self-enforcement of governance mechanisms).

2000's decade: Influenced by Dyer and Nobeoka (2000) who argued that the existence of trust and relational capital among partners encourages firms to set up idiosyncratic knowledge-sharing routines to further facilitate the learning of specified and agreed-upon information and the ability to innovate. Eisenhardt and Martin's (2000) advancement in dynamic capabilities included well-known organizational and strategic processes like alliances and product development as strategic values lie in the ability to reconfigure resources into value-creation for innovativeness.

The commonality highlighted from these perspectives over the decades is the employment of RC intertwined in different business spheres. The seminal authors were also a starting point to connect RC in innovation management through knowledge-sharing routines, organizational learning, relation-specific assets management, alliances formation, and relationship governance. In the next section, the perspective of RC appears as of the recent publications connected in the innovation management research field following the criteria presented in the research method section.

3.3 Bibliographic Coupling Analysis

The bibliographic coupling network of the top link strength sources cited yielded a network with four clusters (Figure 5).

Cluster Red: Supply Chain adaptability, Technologies, and Innovation

This cluster aggregates papers exploring the effects of RC on supply chain management, operational innovation, and firm performance. RC plays a pivotal role in supply chain management and environmental and operational performance (Lee, 2015). The RC role also affects collaboration toward sustainability (Parmigiani et al., 2021) and agility (Yang, 2014) in supply chain innovativeness. RC impacts sharing information with customers and suppliers (Thomé et al., 2014) or partners resources integration (Roh et al., 2014). Yang et al. (2016) highlighted that relational norms enhance satisfaction more effectively than contracts (Yang et al., 2016). These findings enrich the innovation management research field, especially in controlling mode selection in situations of uncertainty in business transactions. Reiterating the importance

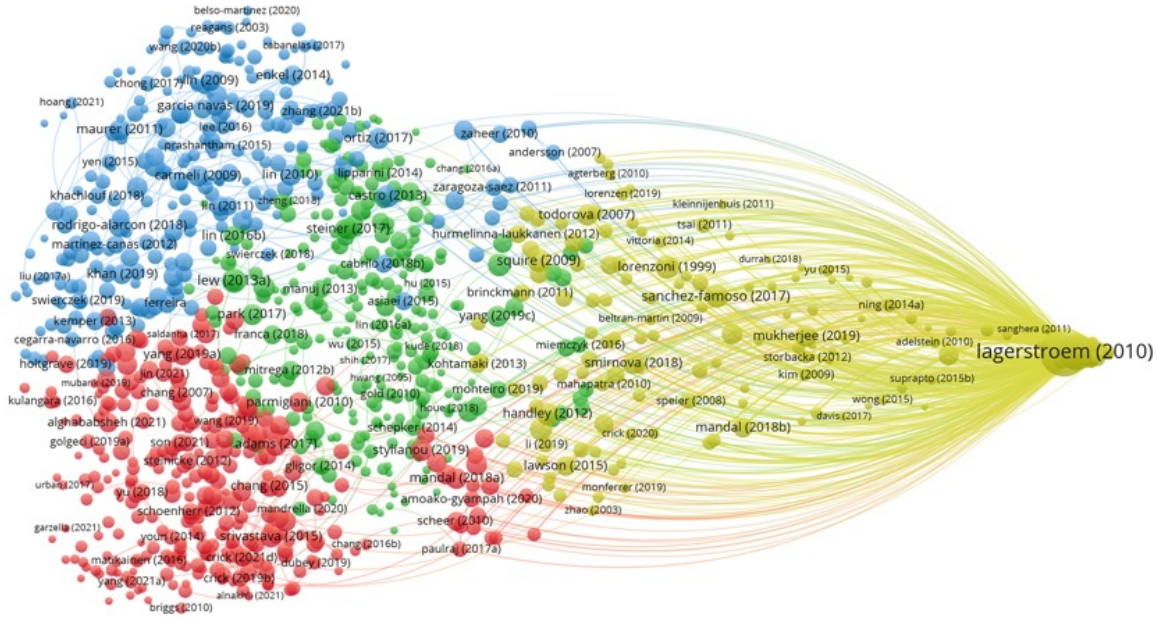

Figure 5. Bibliographic coupling network

of collaborative initiatives in the supply chain for operational benefits and prominent levels of customer service, Srivastava et al. (2015) suggested that complementary resources like RC facilitate partner activities coordination, mainly under highly technological impacts (Srivastava et al., 2015). Supply Chain adaptability and technologies are challenges in innovation management. Therefore, Wang et al. (2020) analyzed that technological turbulence and dysfunctional competition influence the relationships between relational ties and supply chain adaptability (Wang et al., 2020). They show that service ties play a more crucial role than business ties in enhancing innovation performance directly. In addition, technological turbulence positively moderates the relationships between business/service ties and supply chain adaptability. Garzella et al. (2021) show how boundary management, specifically its technological and relational aspects, directly impact business management innovation and mediates the relationship between boundary management sizes (Garzella et al., 2021). IT investments also appear in this cluster to improve the joint performance of partners in a relational setting, which increases the partnership value to innovate (Chang et al., 2015). In other words, with a higher partnership value, the joint performance of the partners to innovate improves. Partnership among the publications refers to the ability of partners to coordinate actions in pursuit of market opportunities or respond to threats. It plays the role of a catalyst in transforming IT investments into partnership value which is a strategic value to co-create and generate innovations with partners only exploited jointly through strong RC.

Cluster Blue: Relational Networks, Capabilities, and Innovation Performance

The second cluster presented publications showing the importance of relational networks as organizational capabilities for innovation performance. Relational networks include relations or networks of relationships among individuals and firms through norms and values associated with relationships that contribute to innovations. These relationships facilitate action and thereby create value (Duodu & Rowlinson, 2019). It embraces the driving factors of innovations from a relational perspective. The aspects of explorative, exploitative, and transformative learning mediate the relationship between a firm's relational network and innovations (Wang et al., 2019). Zhang et al. (2021) analyzed the impact of relational embeddedness, emphasizing mutual trust and reciprocity norms in cooperation networks to promote the acquisition and utilization of existing knowledge and new ones, consequently enhancing RC to innovate (Zhang et al., 2021). David et al. (2021) suggested that the internal interaction between adherent and non-adherent members of cooperative enterprises positively influences innovation performance (David et al., 2021). Most findings provide empirical evidence that relational networks are essential assets for effective innovation in cooperatives, and private and public sectors establishing RC as an important capability in disruptive

environments. Ganguly et al. (2020) highlighted that relational and cognitive social capital play a significant role in improving the quality of shared knowledge and innovation (Ganguly et al., 2020). The relational aspects associated with innovation performance are fully evidenced in the literature. Innovation networks offer an efficient mechanism for firms to realize their potential for knowledge learning and innovation improvement. Firms in innovative ecosystems are required to possess RC to acquire knowledge and complementary assets to facilitate their innovation performance. However, the relational networks created in innovative ecosystems are more positively associated with an exploitation-orientated vision (Fang et al., 2019).

Cluster Green: Alliances Formation

This cluster constitutes interdisciplinary, therefore, following our research positioning in innovation management, we focus on the relevant aspect of alliances for innovation performance. Different from relational networks, alliances in innovation contexts are perceived as an answer to cooperation in using resources to gain a competitive advantage against competitors. They are usually formal associations among firms, not individuals, in specified circumstances, and against competitors outside the firm's reaching membership. Therefore, RC are mediators to produce strong ties between firms' relations to enhance alliances and better knowledge integration during the innovation process (Wang and Rajagopalan, 2015). Steiner et al. (2017) identified resource heterogeneity as relevant for alliance formation and organizational success. They contribute to understanding the role of resources in alliance formation regarding prior relationship experience, resource heterogeneity, and causal ambiguity. They contributed to the debate on the role of RC vs. firm-internal resources for sustained competitive advantage (Steiner et al., 2017). Value creation through alliances requires the simultaneous pursuit of partners with characteristics on certain dimensions to supplement deficiencies of firms to innovate. Partnering firms need to have different resource and capability profiles to share to attend to complementarities requirements and compatibility in cultural and operational norms to produce direct and indirect effects on alliance performance. Conversely, organizational routines in partner selection maximize the potential benefits of an alliance. In summary, the evidence regarding the variance in relational-based capabilities to manage alliance portfolios can explain performance heterogeneity among firms.

Cluster Yellow: Collaborative Innovation and Technology Management

Collaborative innovation dominates among the publications, and the existence of firms' activities executed by people perform together under an elevated level of technological and behavioral interdependence (Cui et al., 2020). They highlighted knowledge-sharing trajectories (Majchrzak and Malhotra, 2016), multi-actor collaboration (Torfing, 2019), and building collaborative capabilities as a consequence of RC. Due to the impact of RC on knowledge, scholars paid significant attention to the impact of collaboration on innovation processes and subsequent firms' innovation performance. Current research argues that collaborative innovation has a strong potential to create relational rents (Smirnova et al., 2018). Relational learning also appears as a dynamic capability to strengthen collaborative innovation contributing to the firm's performance. Mandal (2018) suggested that technology management in big data analytics, business knowledge, and relational knowledge are prominent enablers of the firms' agility to innovate (Mandal, 2018). Technological aspects associated with knowledge and collaboration are commonly featured in the literature. Collaborative innovation is not merely a coordination of orderly arrangements of efforts to pursue a common technological purpose or merely a cooperation to join agreed-on goals into a share comprehension about design systems or reconfigure technological resources towards innovativeness. Collaboration to innovate merges cooperation (commitment towards the same end) and coordination (complexity to work together effectively) (Vivona et al., 2022). This takes place for RC as an antecedent of innovation management.

4 Discussion

Academicians and practitioners immensely discussed innovation Management. Publications have emphasized the importance of knowledge management and sharing in promoting innovations (Ganguly et al., 2020). Others focus on the building blocks of stakeholder engagement to address multi-level platforms (i.e., innovation networks) during innovation processes (Lievens & Blažević, 2021). More recently, the positive

effect of organizational integration through technology as well as relational capital factors underscore the critical role of relational and technological capital in stakeholders' relationships, specifically to function as a catalyst for exploiting capabilities to achieve innovativeness targets (Benzidia et al., 2021).

RC appears as a background on how to develop innovation strategy through network environments sourcing competitive advantage originating from cooperation. This relational view also helps us to comprehend how to enhance innovative strategic actions using specific relationship rents (Chang et al., 2012). The strategic value of RC for innovation management is to search external valuation based on existing knowledge and gather information about market needs, opportunities, and competitive dynamics as useful external maps or guides about how to explore and exploit knowledge to innovate (Castro et al., 2013).

RC are also critical in decision-making on detecting technological opportunities (Kogut & Zander, 1992; Tomlinson & Fai, 2013) since their inter-personal dynamics usually foster opportunities for learning and knowledge creation (Kostova & Roth, 2002; Pan et al., 2021). RC as an intangible resource is harder to measure and, therefore, harder to cultivate (Srivastava & Gnyawali, 2011) because of its role in building opportunities to innovate through interactions within relationships (Ngugi et al., 2010).

A higher level of RC implies that partners stay involved in innovation processes to develop relationship-specific investments (Skarmeas et al., 2016). As innovation management literature still remains silent about when relational joint actions could work in enhancing innovation performance, some authors (Khraishi et al., 2020) uncovered supplier's complementary capabilities as a mediator of the relationship between critical relational antecedents (supplier's asset specificity and goal compatibility) and open innovation performance. However, despite their incentivizing power, relational joint actions can be a double-edged sword if not effectively managed.

We could add further evidence in this discussion section. To summarize some recent publications involving any level of analysis about relational impacts for the firms, Table 3 presents additional perspectives highlighted by researchers to confirm RC's significance.

Table 3. Recent Relational perspectives

Authors	Relational Perspective
(Yeniaras et al., 2021)	Relations of social ties in emerging economies to firm performance
(Seepana et al., 2021)	Competitive relationships on entrepreneurial orientation on performance outcomes.
(Pan et al., 2021)	Green relational Capital on product innovation
(Ortiz et al., 2021)	Trust to foster innovation
(Malewska et al., 2021)	Relational capabilities at the operational level on the identification, creation, and exploitation of opportunities
(Laatikainen & Ojala, 2021)	Relational Resources into the pricing of digital innovations
(Kafel & Ziębicki, 2021)	Relational strategies challenging neo-strategic management
(Benzidia et al., 2021)	Critical role of relational and technological capital in buyer-supplier relationships
(Ali et al., 2021)	Employees' levels of intellectual capital (human, structure, and social) increase innovativeness
(Zobel & Hagedoorn, 2020)	Relational perspective enabling value capture in an open innovation context
(Zadykowicz et al., 2020)	Relational interactions supported knowledge sharing and joint learning sense-making
(Wang et al., 2020)	The roles of relational ties in the supply chain.
(Statsenko & Corral de Zubielqui, 2020)	Collaboration across supply chains to build diversity and resilience

Authors	Relational Perspective
(Salisu & Abu Bakar, 2019)	Through relational capability, SMEs develop efficient collaborative relationships to acquire new techniques and knowledge.
(Arranz et al., 2020)	Eco-innovation possesses two properties of innovative capabilities, namely, persistence over time and interrelation with other innovations
(Alinaghian et al., 2020)	Elucidating the roles and association of relational embeddedness and patterned activities
(Zhao et al., 2019)	A proper combination of external social measures, internal competitive resources, and capabilities can create a shared value for the economy and society.
(Singh et al., 2019)	Adoption of green innovation performance practices especially from the dynamic capabilities and relational learning capabilities landscape.
(Monteiro et al., 2019)	Relational resources have an indirect impact on export performance through dynamic capabilities.
(Sheng & Hartmann, 2019)	Relational social capital attenuates the negative association between subsidiaries' cross-border knowledge tacitness shared and both explorative and exploitative innovation capability.
(Smirnova et al., 2018)	Firms should account for the effects of relational learning on innovation collaboration

4.1 Why relational capabilities really matter

RC influences the exploitation and exploration of knowledge through resource allocation processes (Malewska et al., 2021; Sheng & Hartmann, 2019; Todorova & Durisin, 2007) by providing favorable judgments in dynamic contexts (Kostova, 1999). Among seminal scholars, there is a consensus that RC is associated with a level of dual acts and social networks (Alinaghian et al., 2020; Dyer & Singh, 1998; Kale et al., 2000; Kostova, 1999). Trustfulness succeeds when relationships are strategic and care to foster engagement and alignment for innovation (Kostova & Roth, 2002; Levin & Cross, 2004; Morgan & Hunt, 1994; Ortiz et al., 2021; Poppo & Zenger, 2002), where firms may delight from it to manage those innovations.

RC are critical in innovation management, especially in more dynamic markets, as knowledge requirements force innovators to seek complementarities in their resources, leading them to search for successful partnerships (Dyer et al., 2018; Srivastava & Gnyawali, 2011). These partnerships appear in the literature on alliances (Steiner et al., 2017), networks (Gulati, 1998), and open innovation (Bogers et al., 2018). A lack of RC can inhibit the firms' ability to manage innovation without these alliances and networks.

Specific factors such as resistance to change (Kogut & Zander, 1992), "lack of self-awareness" (Lane & Lubatkin, 1998), and "lack of absorptive capacity" (Szulanski, 1996) inhibit the firm's willingness to integrate with internal and external knowledge to manage potential innovations. According to the literature, the stronger the firm's knowledge base, the greater tendency to use safeguards against knowledge expropriation (Williamson, 2007), which can generate complexities in knowledge integration (Grant, 1996). Therefore, RC appears as a capacity to scan environments to ascertain learning processes with trustable partners involved in acquiring and sharing information and knowledge (Kogut & Zander, 1992).

These potential benefits and barriers to firms succeeding with relational resources are magnified in the context of innovations since the center is in the network, not at the individual level (Powell et al., 1996). Therefore, RC in the literature mediates this paradox to balance the partners' interest through relational rents (Statsenko & Corral de Zubielqui, 2020; Wang et al., 2017),

enhance collaboration (Smirnova et al., 2018; Wang et al., 2017), potentialize knowledge-creation (Zheng et al., 2011), and create learning process (Powell et al., 1996; Salisu & Abu Bakar, 2019) towards innovativeness.

To demonstrate the importance of RC in innovation management, we develop a framework that combines all perspectives identified across the publications and supports our conceptualization of RC (Figure 6). RC is an enabler of resource reconfiguration, knowledge management, and partnership creation to access new possibilities to manage innovations. RC are embedded in the dynamic capabilities view presented in absorptive capacity, organizational ambidexterity, collaboration, and cooperation in all forms supported by the cognitive perspective of trustfulness. RC also supports innovation outcomes to reshape business models, enhance organizational learning, support innovative projects or business operations, and in any type of innovation. Therefore, we highlighted RC as a valuable and intangible resource for innovation performance and is at the center of successful innovation management. Innovation management here is considered as relation resources and strategies to address business uncertainties (turbulence, dynamism, and complexity) and external conditions (alliances and networks) for innovation performance.

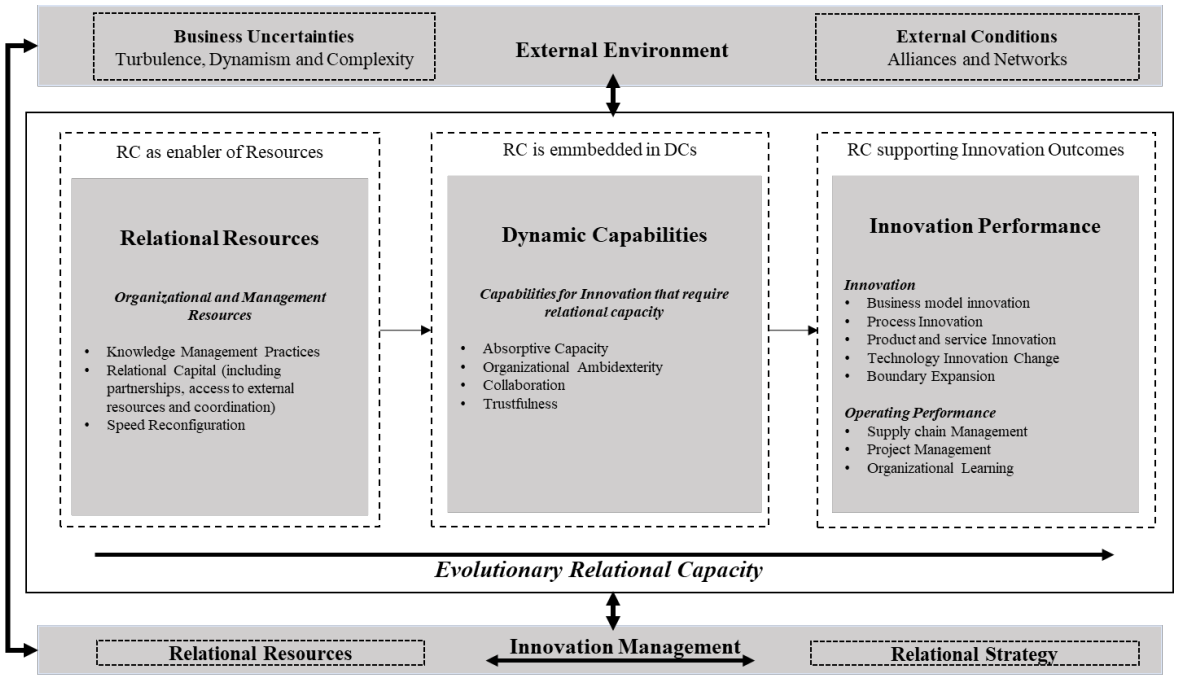

Figure 6. Relational Capabilities Framework in Innovation Management

5 Conclusion and Implications

5.1 Conclusion

RC emerged as a promising approach to innovation management. Using theoretical-conceptual analysis, we showed that RC has been spread out among different directions across innovation perspectives which led us to stress different conceptualizations and contradictory or competing perspectives. Some authors employed terms indistinctively, such as relational rents (Dyer & Singh, 1998), relational governance (Poppo & Zenger, 2002), relational capital (Kale et al., 2000), relational embeddedness (Kostova, 1999), relational assets (Saraf et al., 2007), power relationships (Todorova and Durisin, 2007), and relational capability (Lorenzoni & Lipparini, 1999). These

differences might be perceived as positive, showing that the RC quickly gained ground. However, they are not contributing to forming a concept for innovation management.

It is more difficult to make comparisons among studies, leading to a very fragmented approach instead of ensuring the consolidation of knowledge. The RC terminology fits these criticisms. RC descriptions employed by the most cited and pivotal articles provide a conceptual feature proposed by researchers here, explored to enrich our theoretical-conceptual view about RC in innovation management. It is used to promote a better condition to build our final definition. We conceptualize RC in innovation performance to the following features:

"Relational capabilities are factors supporting or moderating the value co-creation and value capture in firms' internal and external contexts. It is composed of interconnected and interdependent networked actors, which includes any possible stakeholder. It reflects the ability to collaborate and exchange information to promote flexibility to innovate and competitive advantage. It can translate into long-term agreements, thereby promoting deeper relationships and trust, which facilitates knowledge transfer, product development, and business innovation growth".

Nevertheless, there is a strong emphasis on inter-organizational competitive advantage. RC should be considered more than a construct and may open some interesting opportunities to build a theory. First, it avoids similarities under conceptualizations. Second, it provides room to explore in detail the dynamics where RC really matters. Third, there is space to investigate joint dynamics of relationship factors.

Differences and commonalities among RC offer guidance for research on determining under which circumstance the construct is most appropriate, providing a more powerful explanation regarding the investigated phenomenon. It helps to understand the possibilities that RC offers to innovation management research. RC is a key research field, including heuristic decisions and management of collective uncertainty or any situation that affect more than one actor. It emerges to address innovations, new markets, or industries, even in each scenario where knowledge co-creation predominates over any other goal. Additionally, it is present in cases where the relationships among actors are unstable and unclear, co-evolving in unforeseen ways, which most times may change from competition to cooperation.

5.2 Theoretical implications

This study advances current RC knowledge by developing a conceptual understanding underpinned by relevant concepts and empirical evidence. It contributes by offering a reflection to look back on the extent and impact of RC over the past 40 years by showing the significance of RC as an antecedent and consequence of innovation management. As an antecedent, RC are evidenced in the form of collaboration to innovate, merging in cooperation (commitment towards the same end), and coordination (complexity to work together effectively). As a result, RC emerges in a behavioral interdependence of activities executed by actors who together enhance knowledge-sharing trajectories, build capabilities, complement resources, promote relation-specific assets, and effective governance for innovations.

Conceptualizing RC firms may understand how to enhance innovation management and improve their overall competitive advantage. Specifically, this study addressed the research question (what is the conceptualization of relational capabilities from the innovation management perspective?") by developing a framework (see Figure 6) that links RC and innovation management using a relational-based view. Through this framework, we explain how RC enables the effectiveness of the determinants of inter-organizational competitive advantage (complementary resources and capabilities, relation-specific assets, knowledge-sharing routines, and effective governance). This enables firms to respond to dynamic and complex innovation threats quickly and proactively and

enhance their external conditions to manage innovations efficiently and effectively.

This study also contributes to the dynamic capabilities and innovation theory by providing a detailed conceptualization of RC and their theoretical propositions in the framework, grounded in the relational view supporting the key idea that to respond to dynamic and unknown innovations effectively, firms need to increase their RC.

Other research areas may be affected theoretically by this study considering that the clusters analysis provides a broad range analysis of other research fields beyond innovation management. For example, in the supply chain where RC assumes a strategic role for cleaner production combining capabilities among buyers and suppliers. Yet, in information technology management RC offers collaborative contributions among developers to overcome cybersecurity threats. In alliances, RC is central for partners to work together internationally.

5.3 Practical/managerial implications

This study has contributed a conceptual representation of RC that could be deployed by the innovation holder to surreptitiously obtain a material benefit through new organizational processes, relational resources reconfiguration, or develop capabilities complementarities. Using the bibliometric analysis to present empirical evidence about the evolution of RC, practitioners may also be confident about the powerful impact that relational rents may generate for their business and the importance of RC in managing innovations. In advancing to understand this conceptualization, managers might build on established wisdom to separate professional and relational competencies under the assumption that professional learning is possible to innovate but a relational one is gathered across the maturity of innovation processes.

Practitioners should comprehend the important relational distinction because it may reflect a growing view of the differences of relational networks to innovate existent which should be viewed as a socio-relational focus of learning, rather than competency-based communities. These relational networks are also opportunities to combine personal beliefs, culture, political, and legal aspects to be considered for decision-making to innovate. Further, managers likely look at innovation management from a new relational perspective, understanding that relational rents can be developed specifically for innovation management.

Furthermore, agility in the innovation process is demonstrated by swiftness in anticipating and detecting external needs from clients/customers and markets, understanding the motivation and consequences behind innovations, exploring options, making informed and shared decisions, and then implementing appropriate responses. Therefore, this study explains how RC matters to how firms redesign their existing resources and prepare for quick and effective reactions to new types of unpredictable and unknown innovations. In this aspect, RC are rare capability. By their very nature, every new innovation is inherently unpredictable. The practice of cultivating relationships becomes rooted in organizational routines, making it hard for competitors to take over business shares. As such, the diversity of relationships by RC development may vary, thereby making RC valuable, unique, and non-substitutable capabilities for firms to manage innovations. Thus, RC is beneficial as it allows for proactive innovation management that has, or is, happening in a dynamic market environment, thereby helping managers to achieve superior competitive advantage.

5.4 Limitations and suggestions for further research

Finally, some limitations should be considered. First, despite the findings, bibliometric analysis is limited to a very narrow stream of research, and future research should try to definitively test the position of the selected stream of research empirically or within other fields such as disruptive innovations. Further, we only analyzed a particular portion, not the entire content, of

the bibliometric information of papers in other research fields outside innovation management. Thus, an integration of this type of literature review with a traditional review would enhance the overall capital of such studies. Second, the Web of Science database provides one citation and publication unit for any affiliation included in an article. The issue is that the number of affiliations included in different publications is not the same, so some deviations occur under this perspective. Third, while this study aims to be an additive for dynamic capabilities and innovation theory, many exceptional situations may occur due to the specific characteristics of RC in each research topic. Therefore, many particularities may occur, producing better results for some issues but forgetting others. Thus, this article's main objective is to provide RC conceptualization which leads to innovation management. Different perspectives may bring different interpretations and conclusions regarding the results found in the study. Moreover, crucial research may not appear in the results due to several factors that are not directly considered in the analysis including the criterion defined for publications fully analyzed and the general diffusion and promotion of the RC research field.

Considering these limitations, future research may go beyond the inter-organizational perspective of relationships to include perspectives from the wider network toward innovativeness. Further studies are also needed to uncover additional factors in diverse and external contexts to employ RC in a combination of longitudinal case design and matched data on relationship quality from stakeholders during the innovation process. Other research settings should be explored to confirm further and extend RC conceptualization and this research's conclusions. Qualitative comparative design can further strengthen the results to accommodate for rival findings.

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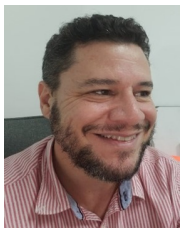

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