

Research Article

Interorganizational Learning Mechanisms in Porto Digital

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ABSTRACT

Industrial clusters are highly concentrated professional environments, being a potential area for development of dynamic managerial capabilities and interorganizational learning. This study proposes to identify interorganizational learning mechanisms and their integration to the dynamic managerial capabilities in a technology cluster. This is an exploratory research and it uses a qualitative approach through a single-case study. The data analysis was based on content analysis techniques proposed by Bardin. It was identified formal and informal mechanisms that enable the learning between companies and the importance of the role of management core in fostering interorganizational learning, through the various projects that have integrator scope and cooperation between companies. The study revealed that the existence of a department for cluster management is essential to maintain relations between companies and their professionals. This research allowed expanding the knowledge related to the cluster perspective and interorganizational learning, providing the identification of mechanisms that favor the development and mobilization of dynamic managerial capabilities, which collaborate to fill theoretical gaps related to the constructs and reveal their complex nature that is determinant for the governance of a cluster.

Keywords: interorganizational learning; dynamic managerial capabilities; technological cluster; digital port; interorganizational learning mechanisms

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INTRODUCTION

Interorganizational learning is the integration of knowledge between companies and their members through the exchange of information, experiences, and knowledge (Lane & Lubatkin, 1998). It benefits small to large enterprises for the proximity allows them to share resources, market information, and technology (Chen, Wang, Chang, & Hung, 2014).

Understanding the importance of this proximity, some companies install themselves close to others that operate in the same sector, creating geographic areas where business concentration becomes high, forming the so-called industrial conglomerates or clusters (Porter, 2000). This type of formation can favor the industry, since the sharing of inputs, professionals, information, and social relationships occur in these environments. Ouro, Olave, and Barreto (2020) developed a literature review to systematize knowledge about interorganizational learning in micro and small business networks. The results indicated that the number of publications, mainly in the Brazilian context, is limited.

In the cluster environment, the ability to learn is associated with the capacity of managers in creating a learning environment, which makes the dynamic managerial capabilities to be seen and understood as a theoretical lens that can contribute to foster interorganizational learning. The social relationships maintained by managers are called social capital managerial, an attribute of the dynamic managerial capabilities construct, accompanied by the managerial human capital and managerial cognition. According to Adner and Helfat (2003) and Helfat and Martin (2015), such attributes are mobilized, combined, and integrated by the managers through the development of dynamic capabilities in the organization. In other words, they work together as an articulate manner for the internal and external resources to act in face of the market dynamics.

The strategy to stand out in the competitive and dynamic market is trying to be close to other companies. Business clusters are environments with a high concentration of professionals that provide communication between people (Mueller & Jungwirth, 2016) who work in the same professional area and facilitate the exchange of experiences (Balland, Belso-Martinez, & Morrison, 2016) even through informal conversations (Arbuthnott & Von Friedrichs, 2013). There are also moments when one, or more, companies can act in a common project, having a formal cooperation (Molina-Morales & Expósito-Langa, 2013), which can also allow the exchange of knowledge (Balland et al., 2016).

Porto Digital (Digital Port) is part of a technological cluster located in the city of Recife (PE), Brazil, managed by a team of professionals composing the management core, responsible for the management of the geographical area, for the administration of the physical facilities used by the companies, by controlling the entry and permanence of organizations based on bureaucratic and legal procedures and the mediation of relations between organizations. Such relationships indicate a potential for learning at an interorganizational level, which can occur through the sharing of information, knowledge, and experience among the various members, in addition to creating social relationships (Chen et al., 2014). Some studies, in the literature, have discussed about the interorganizational learning as a process of collective acquisition and sharing of knowledge among a set of organizations (Larsson, Bengtsson, Henriksson, & Sparks, 1998), but

the existence of a management core as a strategic agent in managing this process is scarce in interorganizational research.

Thus, it is assumed that there may be links regarding the learning processes between the organizations that compose the Porto Digital and those related to managerial human capital, managerial social capital, and managerial cognition, which integrate the dynamic managerial capabilities, a construct that had its first studies in the early 2000s (Adner & Helft, 2003; Peteraf & Reed, 2007; Sirmon & Hitt, 2009), while the concepts of clusters and industrial clusters are researched for longer (Enright, 1991; Jacobs & Man, 1996; Porter, 2000).

Studies that approach how the dynamic managerial capabilities in environments of agglomeration favor interorganizational learning represent a new conceptually innovative research advance, since the understanding of this type of formation can foment interorganizational learning and the development of dynamic managerial capabilities, allowing researchers to generate new knowledge and perspectives of analysis for the field of organizational strategy and knowledge.

In this study, it is assumed that the development of managerial capabilities dynamics in an environment with a high concentration of companies together (such as industrial conglomerates or clusters) can foment interorganizational learning.

However, what are the learning mechanisms involved in this dynamic? Considering this research question, the purpose of this article is to identify interorganizational learning mechanisms and their integration to the dynamic managerial capabilities in a technology cluster.

This article contributes to the expansion of knowledge related to the perspective of cluster and interorganizational learning, so that it is possible to promote and develop knowledge by sharing relationships that can result in strategic differentials. Likewise, it contributes to filling a theoretical gap regarding the identification of learning factors (mechanisms) in the relationship between located companies in a collaborative environment (Eiriz, Gonçalves, & Areias, 2017), and, consequently, in understanding how the dynamic managerial capabilities can contribute to the development of interorganizational learning in clusters.

LITERATURE REVIEW

The development of dynamic capabilities occurs through mechanisms of learning and involves experience and cognitive accumulation processes, deliberately. The articulation of knowledge happens by sharing of information between individuals and working groups (Zollo & Winter, 2002).

There can be found learning processes in technologically intensive sectors (Alberti & Pizzurno, 2015), which occurs because companies strategically seek proximity to others, aiming to share knowledge, professionals, resources, and market information (Chen et al., 2014). This allows the development of interorganizational relationships in which experiences can be exchanged (Anand, Kringelum, Madsen, & Selivanovskikh, 2021; Iftikhar, Ahola, & Butt, 2022; Holmqvist, 2003).

An example of this is the existence of enterprises based on promising ideas, which are entering the market in the startup phase, which is a promising marketing, considering that, according to the Exame (2021), Brazil has more than 14,000 startups, and has presented growth of 207% in this year. Therefore, it strategically seeks to approach other companies aiming to promote collaboration strategies with the establishment of relationships among the participants, the creation of an attractive working climate and the occurrence of interorganizational discussions, offering benefits that are not achieved in closed corporate office environments (Gattringer & Wiener, 2020).

These interorganizational relationships are strengthened in environments where backgrounds are composed of companies from the same industry being located geographically close, which are defined by some authors as clusters (Delgado, Porter, & Stern, 2010; Harrison, Kelley, & Gant, 1996; Marini, Silva, & Nascimento, 2016; Porter, 2000). This type of training provides mutual gains, including learning (Anand et al., 2021; Wegner, 2011).

The integration of knowledge between different sources and companies, generating new knowledge that integrates with its current base, is defined, according to some authors, such as Lane and Lubatkin (1998), Greve (2005), and Eiriz, Gonçalves and Areias (2017), as interorganizational learning. In addition, it can be understood as one of the main mechanisms to improve and generate new experiences through partnerships (Rajala, 2018; Seo, 2020).

Mozzato, Bitencourt, and Grzybovski (2015) and Colet and Mozzato (2018) understand that interorganizational learning includes the effect of interaction between companies, through synergistic relationships, considering the relationships that go beyond the organizational limit, generating learning and collective knowledge. Some constituent elements of interorganizational learning are the trust established and cooperation between agents, the social interactions and proximity, interdependence, and susceptibility to learning.

According to Mozzato and Bitencourt (2014) and Colet and Mozzato (2018), when companies become partners, the transparency in the relationship between them is strengthened so that there is a mutual commitment, which promotes the establishment of trust between the agents and ensures obligations between the actors and the fulfillment. On the other hand, this process of interorganizational learning can be “hindered by lack of either motivation or ability to absorb and communicate knowledge between the partner organizations” (Larsson et al., 1998, p. 285).

Nevertheless, when the relationship is established, there is a cooperation between agents, which includes not only the professional, but also the social dimension, and can be fostered by the proximity existing between the various actors.

It is possible that, in the relationship and exchange of knowledge, an interdependent association between companies can be developed along with the sharing of objectives, resources, or tasks. Additionally, there is also the possibility of learning through the different actors, depending only on individual predisposition and learning capacity. Colet and Mozzato (2018) understand that these elements, associated with an environment of industrial agglomerate and/or clusters, in which there is cooperation, enable an interorganizational relationship of collaboration that

provides acquisition, sharing, and knowledge creation, which is corroborated by Holmqvist (2003), Wegner (2011), Anand, Kringelum, Madsen, and Selivanovskikh (2021), and Iftikhar, Ahola, and Butt (2022).

Eiriz et al. (2017) identify a set of activities that improve knowledge creation and interorganizational sharing, such as: informal and close personal contacts between managers, researchers, and other employees; joint development of meetings, seminars, workshops, professional training, and other events; sharing of human resources; similar organizational culture with strong shared values and beliefs; fluid communication through personal and electronic means; joint participation in research and development (R&D) projects; strong exchange of information between the parties; sharing facilities; sharing of research and testing equipment; joint publication of studies and other research and technical documents; joint participation in international fairs; and participation in different councils.

All these elements are achievable through formal and informal practices between the organizations since it is expected to be sporadic and casual meetings between professionals (Larentis, Mello, & Antonello, 2021), especially in an environment of cooperation, when there is geographical proximity. According to Eiriz et al. (2017), these meetings allow the establishment of personal networks, which go beyond organizations. The authors say that seminars, professional training, and workshops can allow fostering interorganizational learning through sharing and generating explicit knowledge. Complementarily, they attest that proximity encourages contact between people, which is relevant to creation and transference of knowledge, especially due to the informality of interactions between organizations and professionals (Eiriz et al., 2017). All these aspects become even more powerful when it comes to a cluster perspective.

It is possible to see in the theories discussed so far the relevance of social capital in the interorganizational learning construct. For instance, in a study performed with 813 ventures that executed R&D consortium projects with external parties, such as the Ministry of Small and Medium Enterprises (SME) and Startups in Korea (Seo, 2020), it was possible to observe the positive influence of high social capital on technological performance and business. The social capital has been present in the perspective of learning, being also possible to find it in theories of organizational strategy, as it was previously observed in the construct of dynamic managerial capabilities (Adner & Helfat, 2003; Helfat & Martin, 2015), in which the managerial social capital represents one of the attributes of that construct.

It is possible to affirm that interorganizational learning is strengthened by the existence of dynamic managerial capabilities that encompass the attribute of managerial social capital, as by the contribution of cognitive managerial capital, since organizational learning establishes a link between cognition and actions (Crossan, Lane, & White, 1999). Regarding the relationship between companies, the actions are mirrored in the experiences exchanged between managers and professionals, reinforcing the link between cognition and action.

Social life is also considered as a learning mechanism from the moment the professional performs a given action or activity and shares it with others (Silva, 2009; Soares & Silva, 2012). It is through

social interactions that human beings become learners, and their understanding is built (Bruner & Haste, 1987; Silva, 2009).

According to Nicolini and Meznar (1995), the organization is responsible for developing a system of social relations, which allows everyone to participate, promoting effective learning and knowledge generation. These social relationships can occur in a context of communities (e.g.: professional communities), which through interpersonal relationships, coexistence, and communication influence learning of professional and/or managerial (Silva & Rebelo, 2003). For this reason, it is understood that there is the sharing of experiences through socialization.

The model proposed by Milagres and Burcharth (2019) systematizes the occurrence of knowledge transference in interorganizational partnerships, which can be analyzed in three blocks: the factors that precede the knowledge transference, the transference itself, and the results achieved.

With regard to antecedents, Lane and Lubatkin (1998) approach the factors individually, encompassing motivation, cognition, learning behavior, emotions, endurance, and capability to learn. The interorganizational factors concern motivational aspects, governance structure, trust, and ability to acquire knowledge. They are influenced by aspects related to the knowledge attributes, such as intellectual property and technological sophistication, and by macro-contexts such as public policies (Milagres & Burcharth, 2019).

The knowledge transfer process is determined by procedures of relational and cognitive governance, and by time. There are two dimensions connected to the results, which are effectiveness and performance organizational. The latter has as moderators the technologies for the market, the sectors characteristics, the competitive market, and the absorption capacity (Milagres & Burcharth, 2019). It is understood that knowledge transfer is determined by a set of factors that influence before, during, and after the process aspects determined by Milagres and Burcharth (2019) and related to market dynamics, the persons, the cognitive and social aspects. These factors also enhance the relationship of interorganizational learning with the dynamic managerial capabilities construct and its attributes (managerial capitals – human, social, and cognitive).

The human capital and cognition developed by managers are the result of experiencing different cycles of knowledge transformation, enabling a substantial accumulation of intellectual capital, and allowing them to act dynamically in market scenarios that involve frequent changes (Reinhardt, Bornemann, Pawlowsky, & Schneider, 2001). Through relationships and constant exchanges of information within the organization, the development of social relationships allows the exchange and use of knowledge, which may stem from internal or external sources of the organization.

METHODOLOGY

This is an exploratory research, with a qualitative approach in a single-case study strategy (Merriam, 2009) to capture a rich description of the phenomenon in order to find pattern in

data (Godoy, 2010) about the interorganizational learning mechanisms and their integration with the dynamic managerial capabilities. Ouro et al. (2020) recommended the development of qualitative research related to interorganizational learning in Brazil to broaden the understanding of this topic.

The data analysis was based on techniques of content analysis in order to understand the phenomenon. It was adopted, through the vision of the researcher, procedures proposed by Bardin (2008) that helped him to form the data, transforming them into information. For a better understanding of this path, the steps adopted are described in the next paragraphs in sequence.

Selection of the case and research subjects

The development of this research, which aims to identify the interorganizational learning mechanisms and their integration to the dynamic managerial capabilities in a technology cluster, requires the selection of a case that involves several companies and that are related to each other. Adopting the criteria of accessibility, reachability, representativeness, and a high concentration of companies, Porto Digital met these conditions, and, for this reason, it was selected as a viable alternative for research development.

Porto Digital is a business training in the technology industry that concentrates companies of information and communication technology and creative economy. It was founded in 2000, and it actually is one of the main important technology parks and innovation environments in Brazil. Porto Digital is situated in the city of Recife/PE, Brazil, and it currently comprises a total of more than 300 companies and more than 10,000 employees, who work directly for these companies in the same physical space. Its localization is singular and contributed to the revitalization of the historical center of Recife and its local economic development, which characterizes this case as unique in Brazil.

Porto Digital has a management unit called management core. Considering the role of the management unit in promoting integration between companies, the administration of the physical space where the companies are installed, and knowledge retained by the professionals related to the dynamics of the environment, the management comprises a total of 19 business counselors, three directors, three managers, and nine supervisors.

Eleven professionals who work in the management of Porto Digital participated in this study, being five business counselors, two directors, two managers, and two supervisors who have their identities preserved throughout this research out of respect for the request for anonymity that was made. The time of occupation of the position of the interviewees until the date of the interview varied from one year and four months to 20 years. Some of them have been part of Porto Digital since its foundation.

Data collection

Previous dimensions and categories were delimited based on the literature mentioned in the topic of literature review with the aim of systemizing this research and guide data collection. Table 1 allowed the development of semi-structured interview scripts, in which questions, previously elaborated, guided the execution.

Table 1

Dimensions and categories of the interview script

Objective	Dimensions	Previous categories
	Dynamic managerial capabilities (Adner & Helfat, 2003; Helfat & Martin, 2015)	Relations: - Social - Professionals Formal education Professional experience Professional performance
Identify interorganizational learning mechanisms linked to dynamic managerial capabilities in a technological cluster.	Learning mechanisms (Colet & Mozzato, 2018; Eiriz et al., 2017; Mozzato, Bitencourt, & Grzybowski, 2015)	Proximity Environment Projects Communication and information exchange tools
	Sharing information (Eiriz et al., 2017; Lane & Lubatkin, 1998; Milagres & Burcharth, 2019)	Constituent elements: - Confidence - Cooperation - Interaction - Susceptibility to learning Activities Systems

Note. Source: Authors.

Questions elaborated from the previous dimensions helped the conduction of the interviews. However, since it was used a semi-structured script, there were moments, in the course of the findings, in which adaptations and/or reformulations were necessary in order to obtain more accurate information.

Thus, due to the isolation necessary at the time of collection (May 2020), since the spread of COVID-19 became serious worldwide, companies, following the guidelines of the World Health Organization (WHO), started to operate remotely, from home. For this reason, it was not possible to conduct in-person interviews. However, videoconference via Zoom and Skype apps were used as an alternative to conduct the interviews.

In total, 11 interviews were carried out, totaling 9 hours and 37 minutes of dialogue. Considering the availability of each respondent, the shortest interview time was 30 minutes and the longest was 1 hour and 10 minutes. On average, the interviews lasted 52.5 minutes.

Before the interview, a Term of Free Consent and Clarification was sent to each of the participants, informing them about the research objectives and ethical procedures adopted. With this clear, before starting the interview, the participants were asked permission to participate and be recorded in the videoconference.

The recorded interviews were transcribed, and a file with the transcription of the interviews was sent to each of the interviewees in order to assess the content and indicate possible adjustments and/or additional information.

Data analysis

The data analysis process occurred after the interviews, with the transcription of the recordings. Once completed, a data protocol with the text transcript of the interview was sent to the respondents who collected the feedbacks. We followed the procedures described by Bardin (2008) in the analysis process, which took place in three steps:

At first, the pre-analysis was carried out, and consisted of the floating reading of all interviews. This step was important to familiarize with the text and recap the interviews, allowing the identification of details that were not noticed during the collection. The selected material started to be explored with the aim of identifying the categories previously established, and to signalize sections that allowed inferences aligned with the objective initially proposed. Then, the process of data categorization was carried out to facilitate the process of interpretation of the findings.

Finally, the last step was based on the categorization previously performed and proper treatment of the results, followed by inference and interpretation, grounded in the literature and in the researcher's reflection and intuition.

This research used validity and reliability criteria proposed by Paiva, Leão, and Mello (2011) and Larrinaga (2017) related to the saturation of the collection of data, which occurs when nothing new is added to the process and clarity of procedures, and to the search for information and feedback from the interviewees, in order to confirm the veracity of transcripts. Units of analysis were established, and the case selection is associated with the knowledge potential about the studied phenomenon.

RESULTS

This section presents and discusses the results of this research. Initially, the management core is described, regarding its importance and the integrative role of the structure of cluster; in sequence, the interorganizational learning mechanisms identified are discussed, which involves projects, social networks, and partnerships between companies and professionals. Finally, it is presented the integration between the interorganizational learning mechanisms and the dynamic managerial capabilities mobilized and integrated in the management core of Porto Digital.

Management core

In Porto Digital, there is a management unit called management core, which is responsible for administering its physical space and the development of projects and activities with a group of companies that holds the task of designing *ad hoc* solutions, products, and/or services demanded, thus having an integration between companies that indicate the existence of interorganizational learning processes.

Porto Digital is part of a technology cluster. This fact is already sufficient to represent an attraction for companies, especially for those that are starting a marketing business. The nature of this type of business encourages sharing and accessing knowledge benefits for the located companies (Anand et al., 2021; Wegner, 2011). This fact is made clear through the excerpt from the interview with the manager:

... we work to reduce bottlenecks and make companies become more competitive and so they can access more markets, and we tackle various bottlenecks, from a labor qualification, which they need, to thus contribute to the formation of startups through incubation, pre-incubation, finally, opening paths abroad as well, international and local partnerships. Anyway, the Porto Digital has its works focused on companies and, in fact, as purpose, it points to their economic development (Manager 2).

The commitment of the management core of Porto Digital with the companies regarding the strategic positioning in the market and the development of new businesses through startups confirm what Gattringer and Wiener (2020) said. Likewise, it is noteworthy in respondents' answers that there is also the promotion of interorganizational learning through partnerships between companies, which is corroborated by what is advocated by Rajala (2018) and Seo (2020).

Knowledge is available to those responsible for startups in other manners. In addition to the partnerships that are mediated by the management core, they also have formal structures to the transmission of experiential knowledge through meetings or projects aiming to share situations that have already been lived and experienced by other professionals, as it is shown in the dialog below taken from the interview with Supervisor 1:

... we also have a team of mentors, and this team of mentors are usually market people, some from the academy, most of them are people, in fact, from the market, and we want people who already had startups, which have already gone broke, who have already built another one, who have already gone broke again, because it is from the failures that we can evolve and who knows how to create each time more unicorns inside Porto Digital (Supervisor 1).

As exposed, knowledge, successes, and disappointments obtained over time are shared with those who are in the process of starting a new company, in a startup, with an exchange of experiences (Milagres & Burcharth, 2019). It allows professionals to reflect on their future decisions, mitigating risks or failures due to inexperience of new businesses, and they can learn with other companies.

Interorganizational learning mechanisms

In Porto Digital, the interorganizational learning mechanisms contribute to put dynamic managerial capabilities in action and represent the essence and singularity of learning process in the cluster. The professionals who work in management core use these mechanisms to put in practice strategies and innovation process to become and maintain Porto Digital more competitive in the market. The analysis process revealed the presence of three interorganizational mechanisms: projects, social networks, and partnerships.

Projects

Knowledge does not benefit only new businesses and startups, but the interorganizational learning process becomes beneficial for all members of the cluster. The management core has a fundamental position in integrating and sharing knowledge with the projects such as the Open Innovation Lab and Mind and Bear (detailed later), which result from initiatives aimed at capturing knowledge for the development of *ad hoc* solutions, as informed by the manager and the counselor:

... a program called OIL was created, the Open Innovation Lab, which is an opportunity that Porto Digital has to bring together some companies and make these companies come up with a solution technology for the government, for example (Manager 1).

... Mind and Bear, which is a happy hour with the park's companies. Anyway, it also has several knowledge events, not only for startups, local companies, but for all companies. They are open events, which today are all on the network, we are doing everything online. We called it Jump Sessions. So, it is workshops, lectures, in short, informal events to discuss various skills (Manager 2).

... Open Innovation Lab, which is a business opportunity that deals with challenges, real problems of real companies that are willing to generate business for the technology companies in Porto. So, they bring a real company with a real problem and share its problems with those involved in order to seek and offer solutions and the best solution is hired. From content, knowledge, through lectures, courses, meetings, in short, as a business generation thing, as is the case with OIL, they have applied efforts to carry out ... (Counselor 1).

When Manager 1 informs the existence of encouragement of communication and relationship between companies, through the creation of projects that allow interaction between professionals, he makes it clear that it is for this reason that the managerial positioning generates partnerships and strengthens relationships and mutual trust, developing, then, constituent elements of interorganizational learning mentioned by Mozzato and Bitencourt (2014) and Colet and Mozzato (2018). The effect of interaction between companies and partnerships helps generate a mutual commitment to transparency and relationship, establishing trust between the parties.

This cooperation between companies allows integration of knowledge, skills, and resources to serve a specific market demand and to develop new products, services, and innovation. One example is Voxia, a solution to convert videos recorded sections in text, as shown by Manager 2:

“... the open innovation cycle generated Voxia for the Public Ministry, since even the Public Prosecutor’s Office didn’t know about its problem or its difficulty.”

In addition, according to Manager 2, “a program called OIL was created, which is the Open Innovation Lab, an opportunity that Porto Digital has to bring together some companies and make them present a technological solution to the government, for example.” According to information available on the Porto Digital website, OIL is a program that aims to promote network innovation actions for large companies and public institutions, enabling the generation of new business for cluster companies (Porto Digital, 2021). The operationalization occurs in innovation cycles, whose phases help understand the corporate challenge; develop solutions through environmental actors; and finally, implement and improve them. There is a collaborative effort between professionals to carry out what was requested, thus having mutual cooperation, as discussed by Holmqvist (2003), Wegner (2011), Colet and Mozzato (2018), Anand et al. (2021), and Iftikhar et al. (2022).

Unlike the Open Innovation Lab, whose structure is formal, projects like Mind and Bear and the Jump Sessions are informal meetings that allow the interaction between professionals and companies and represent other ways of articulating the knowledge of these actors (Eiriz et al., 2017) through activities that are developed maintained by the management core of Porto Digital. The director of business and innovation, based on experiences from other countries obtained through the management core, provides those ‘informal’ moments designed to promote integration.

Social networks

The knowledge obtained through social interactions allows the articulation and sharing of skills and tasks in a non-formalized way. For this, the environment is a motivator, as informed by Manager 1: “The environment itself facilitates the transfer of knowledge, the interaction. And in the other building, which you did not know (attached unit, which was not visited), the entrepreneurship group works very closely, together.” Professionals share the same space, which favors social interaction between them, as well as helps overcome adversities, so they can be able to develop ideas, products, and creative solutions.

Eiriz et al. (2017) discuss factors of interorganizational learning based on the authors. Through their discussion, it is possible to see that the structure of Porto Digital in its various environments provides casual and occasional encounters between other people, professionals and managers, which strengthen the creation and sharing of knowledge. Resources that generate a competitive advantage, as informed by the counselor:

... I called serendipity, the occasional contact that always brings a value because there is an exchange of information, insights, guidance, and then there can also emerge strategic alliances, partnerships, etc. This condition is what I think is the most interesting condition for the company that is located in Porto Digital, it has a competitive edge when compared to other company in the same segment that does not have this coexistence (Counselor 3).

The network of relationships between professionals working in the companies located in Porto Digital, the serendipity, mentioned by the Counselor 3, refers to the times when there is an exchange of information in informal environments, such as at lunchtime in restaurants and in casual encounters in pubs, with the socialization of knowledge through informal social relations, which is characterized as a mechanism of interorganizational learning by Mozzato and Bitencourt (2014), Eiriz et al. (2017), Colet and Mozzato (2018).

This knowledge is added to the existing and may generate new ones, which characterizes interorganizational learning. This can happen through the socialization among professionals in informal moments, such as those mentioned above, and formal, as in the development of joint projects, as pointed out by Eiriz et al. (2017). However, there must be, on the part of the management, the incentive. There is, in the current administration, a strengthening of this aspect, as stated by the manager:

... I can divide the competences considering the two administrations – Chico’s management and Pierre’s management. A very required skill in Chico’s management was project management knowledge, all the management tools, everything that had linked to the processes that we have, and the resource we received need be spent and intended as correctly as possible. These were not lost in Pierre’s management, but the skills required are much related with communication and articulation ... (Manager 1).

The management change occurred at the end of 2018, with the replacement of the director president. After that, the behavior of professionals was characterized by the strengthening of their communication and integration, which resulted in a better working relationship between the companies. The professionals of the management core began to communicate more frequently, arising new processes and new formats, which aimed at a realignment, which leads people to reinvent themselves, seeking to adapt to the new strategic purposes of the organization.

The change in management aimed to direct Porto Digital to the strengthening of its social relations, in order to reach an enrichment of the so-called social capital, which is one of the attributes of dynamic managerial capabilities (Adner & Helfat, 2003; Helfat & Martin, 2015). Expanding social relations means that professionals can build a greater network of contacts and, consequently, can have more access to information, which is strategically important in positioning companies in the market, specifically the technological, which is highly volatile.

Those who visit the place where Porto Digital is installed can easily notice the constant interaction in a space called ‘island.’ In addition to this fact, there is also the exchange of information between professionals in the groups of apps and social networks, in which usually there is the sharing of information and knowledge, as stated by the manager:

They change – mainly medium and small companies –, they have custom of exchanging information and knowledge. “How do you do this; how do you do that.” Have a group formed. And many ask: “People, I’m developing a project like this and like that, and was wondering if anyone has any experience in such a thing that could guide me.” At the time, appear three, four, five, six, seven, eight, ten people talking. Then, in order not to pollute the group, the group administrator says: “Please, talk in private” (Manager 1).

The use of apps and social networks represents an informal communication mechanism. Tools like WhatsApp and other messaging apps become fundamental to maintain the relationship between professionals, managers, and companies, which is characterized by Eiriz et al. (2017) as a fluid communication process through electronics.

Partnerships

In this regard, there isn't a structured form of knowledge transferring between companies, but the management core of Porto Digital is working on a project that aims to create a relationship of sharing information between them, as can be seen in the manager's speech:

With regard to companies, we have not yet been able to develop a process of learning that we can say is collaborative, or that the management core can pass to companies. ... So, we are developing this platform – it is even called Capacita Porto Digital – which is a collaborative platform, where individuals and legal entities can be on this platform, contributing what they have to knowledge, concept, and exchanging experience (Manager 1).

It is possible to see that there is a concern of the management core in developing formalized ways of sharing information and relationships between companies (Colet & Mozzato, 2018; Mozzato et al., 2015), which favors the establishment of interorganizational learning mechanisms.

A process that involves the development of an integrative culture (Nicolini & Mezner, 1995), which follows a perspective of structuring of sharing knowledge and makes use of formalized platforms, however, in an informal environment. There are meetings and events that promote the interorganizational learning, although, in addition, there are structures that, according to the counselor, intensify social relationship, which is the key to the learning process between the companies:

... if we talk about knowledge, we are talking about people, therefore, the main social asset, not only social but also collective, of an innovation environment is people and for you to attract and retain people you have to create conditions, ... the ones I have already talked about: a restaurant, a pub, a cafeteria, a bookstore, good urbanity, infrastructure, cleaning, building, coworking, auditorium, laboratory. All of this you create of reputation, of image, it creates an aura for you to attract people and that you retain. By doing this you trigger the second most important point, which I think is relationship assets. The asset of relationship, internal relationship between people who make the daily life of Porto Digital, companies, these 10,000 people, whether relationships are spontaneous ... (Counselor 2).

Through the counselor's speech, it is reiterated the sharing of experiences, information, and knowledge through the relationships, as mentioned by Milagres and Burcharth (2019), and that environment is fundamental. It is not only about being close, as evidenced by the various respondents' speeches, but the company needs to have a structure that brings people together, that allows sharing.

Integrating interorganizational learning mechanisms and dynamic managerial capabilities

The empirical data and the analyses process highlight that the management core has an important role in the development of interorganizational learning mechanisms of the cluster, and it is possible because of the capacity of the professionals who manage the core to mobilize and integrate dynamic managerial capabilities. Figure 1 is a framework that represents the interorganizational learning mechanisms supported by the management core in order to create an environment of innovation between companies and professionals.

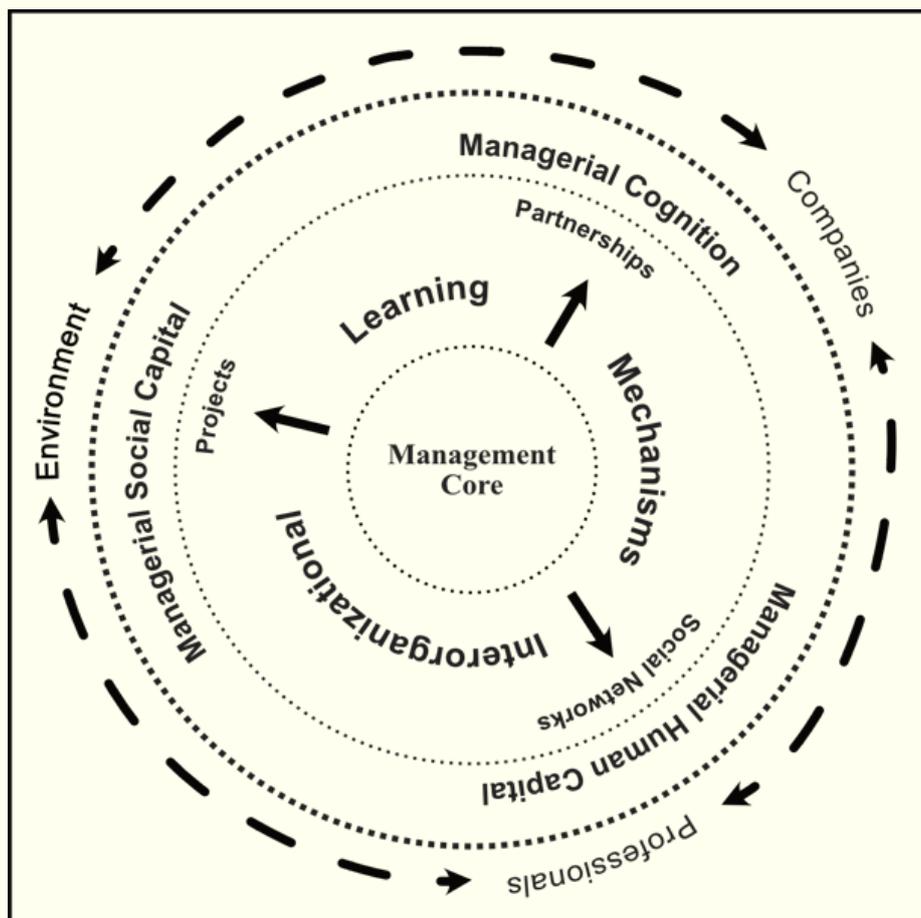


Figure 1. Interorganizational learning mechanisms and dynamic managerial capabilities: an integrated view.

Based on the findings of this study, it was assumed that the dynamic managerial capabilities and interorganizational learning in Porto Digital are complementary constructs. Therefore, the attributes of the first construct make it possible to strengthen the second. As in cluster environment, social interactions are constant (Mueller & Jungwirth, 2016), which makes the attribute of managerial social capital to become much more powerful.

Figure 1 indicates the presence of three learning mechanisms that characterize the dynamics of the actuation of the management core, highlighting its preponderant role and putting the

dynamic managerial capabilities into practice, through interorganizational learning mechanisms, as projects developed to integrate companies and professionals, the partnerships between the participants of cluster environment, and social network boosting the interaction in the physical area where Porto Digital is located. This interorganizational learning process is the result of the mobilization by the management core of the three mechanisms that favor the integration among organizations and professionals.

A central feature of the findings of this study is that, at Porto Digital, the mobilization of dynamic managerial capabilities and interorganizational learning collaborate with the development of mechanisms that create an environment for innovation and knowledge management in the cluster.

Porto Digital is an environment where hundreds of companies and thousands of professionals carry out joint projects, interrelating and exchange information. These finds reinforce what have already been mentioned by Mueller and Jungwirth (2016) as characteristics from clusters environments, but it was perceived that there is a bidirectional relationship, which takes place both formally and informally.

Regarding the environment, there are spaces called common areas, which are places where professionals meet others. These spaces are not business environments, they are pubs, restaurants, squares, auditoriums, and laboratories included in the cluster. The serendipity occurs in these places, the so-called occasional get-together, where people from different companies talk, exchange information, share knowledge and experiences, as Larentis, Mello, and Antonello (2021) point out that formal and informal relations have an important impact on interorganizational learning.

For instance, through Rec'n'Play, for example, several professionals from the most varied places (cities, states, and regions) exchange information with each other, that is, external knowledge that is obtained. Likewise, the Open Innovation Lab projects allow the use of internal and externals resources of companies coming from university centers, research, institutions, and governments to develop *ad hoc* solutions.

In Figure 1, the cluster environment is represented by a dotted line for it is not a closed, isolated formation, not even related to other companies or business structures. Instead, Porto Digital is a cluster of technological and creative economy companies that relate to other companies outside of it.

A theoretical advance in relation to the literature is the positioning of the management core as a central element of the relationships, which demonstrates its management in the process of integration, development, and control of the environment, developing a relation governance explained by Belso-Martinez, Expósito-Langa, and Tomás-Miquel (2016), so the core is responsible for mediating relations between companies through integrative projects and partnerships.

The management core of Porto Digital provides informal mechanisms, through the support structures for companies and the creation of a social capital structure in its geographic surroundings, such as pubs, restaurants, and cafes that are part of the environment where the cluster is installed. These informal spaces are important areas for knowledge sharing as mentioned by Hunter and Cox's (2014) research, and make the technological cluster unique in Brazil.

The strengthening of social managerial capital draws attention because it strategically directs the management core for the development of dynamic managerial capabilities. The other attributes are intrinsic to its professionals, such as the managerial human capital and managerial cognition. The three attributes have equal importance regarding interorganizational learning.

Managerial human capital is essential to expand the capacity of acquire the knowledge that is shared (Adner & Helfat, 2003), in addition to assisting in fundraising and in the development of projects. Managerial cognition provides the exchange of experiences between professionals, a factor that is enhanced by professional plurality, with greater exchange experience in several areas, and networks of specialists are powerful resources of experience and knowledge, and resources share (Andersson & Evers, 2015). In the same way, social network is one of the relevant mechanisms for organizational learning (Wiewiora, Chang, & Smidt, 2020). Therefore, social relations contribute to managerial social capital that enhances the network of relationships and provides opportunities for the management team to mobilize human, managerial, and cognitive attributes in professional action, which reveals the contribution of managerial action in learning among the companies that make up Porto Digital.

CONCLUSION

This article aimed to identify the interorganizational learning mechanisms and their integration to the dynamic managerial capabilities in Porto Digital, located in the city of Recife (PE), Brazil, part of a cluster of technology whose governance is carried out by the management core.

This study revealed that the management core of Porto Digital is the promoter of interorganizational learning in the cluster, being crucial for establishing a structure of interorganizational relationships between companies. Such actions point out that the existence of a core structure for the cluster is fundamental in its development.

In short, there is a relationship between the constructs addressed in this research, which encompass an integration of the attributes of dynamic managerial capabilities and the interorganizational learning mechanisms, which stimulate a relationship network to disseminating information and sharing knowledge between companies.

These formal and informal mechanisms allow managers of organizations that are part of the cluster, even the management core of Porto Digital itself, to mobilize internal and external knowledge, which can be useful for creating, modifying, or reconfiguring resources and competences of companies in face of market changes.

Related with formal processes, it was possible to identify the importance and responsibility of the management core in fostering interorganizational learning through the various projects that have an integrative and cooperation scope between companies. It is concluded that the existence of a cluster management core is determinant to create an interorganizational learning environment between companies and their professionals.

Regarding the informal mechanisms, it was possible to identify a strong presence of serendipity, by way of informal meetings between people provided by the structure of cluster support such as pubs, restaurants, cafes, and others. These environments are geographically located close to the companies, within the perimeter that corresponds to the Port Digital, being frequently used by professionals. This cluster specificity made this case representative in Brazil.

In this particular case, the alignment of dynamic managerial capabilities and interorganizational learning mechanisms was determinant to the management core in developing a process of innovation and strategies, responsible for a more accentuated competitiveness in Porto Digital, especially due to its potential for creating and sharing knowledge between professionals, companies, and the environment where the cluster is located.

This research contributed to expand the knowledge related to cluster management and the interorganizational learning, providing the identification of mechanisms integrated with the dynamic of managerial capabilities, which collaborates to fill theoretical gaps related to the constructs and reveal their contribution to the clusters.

However, this study has limited knowledge for the fact that the researchers only experienced the environment, projects, and/or formal and informal meetings from the 'voice' of the interviewees, that is, throughout data collection and analysis, since the world was experiencing the COVID-19 pandemic when this research was carried out. Therefore, it is suggested that further research be developed in order to characterize the interorganizational learning processes, which can help researchers and companies understand the role of the mechanisms identified in the interorganizational knowledge generated from formal and informal relationships fostered by the management core and enhanced by the interaction between companies and governmental and educational institutions.

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