



Knowledge absorption capacity and its influence on innovation generation in a health ecosystem

Luciano Vieira

*Universidade Regional do Noroeste do Estado do Rio Grande do Sul – Ijuí – RS –
Brasil*

ORCID: 0000-0001-6590-5730

Jorge Oneide Sausen

*Universidade Regional do Noroeste do Estado do Rio Grande do Sul – Ijuí – RS –
Brasil*

ORCID: 0000-0003-3684-1410

Gloria Charão Ferreira

*Universidade Regional do Noroeste do Estado do Rio Grande do Sul – Ijuí – RS –
Brasil*

ORCID: 0000-0002-9329-2510

Lidiane Kasper

*Universidade Regional do Noroeste do Estado do Rio Grande do Sul – Ijuí – RS –
Brasil*

ORCID: 0000-0001-6752-1634

Resumo

Este artigo objetiva compreender a realidade de um ecossistema de saúde, analisando o processo de absorção de conhecimento e sua influência em termos de inovação gerada. Quanto a metodologia, caracteriza-se como uma pesquisa empírica, qualitativa e descritiva. Os resultados encontrados mostram que a capacidade absorptiva do conhecimento no ecossistema de saúde de Passo Fundo (RS) é desenvolvida por meio de um conjunto de processos e mecanismos, sendo que as três capacidades (reconhecimento, assimilação e aplicação) estão presentes e se explicitam de forma clara e objetiva, como também aparecem por força dos mecanismos de cooperação e relacionamentos. Quanto à tipologia de inovação resultante da capacidade absorptiva é centrada nos processos de negócios e, quanto ao grau, prepondera o incremental. Os achados principais desta pesquisa destacam a importância do papel da capacidade de absorção do conhecimento e das relações interorganizacionais para o processo de inovação do ecossistema de saúde.

Palavras-chave: Capacidade de Absorção do Conhecimento. Ecossistema de Inovação. Setor da Saúde. Relações Interorganizacionais

Knowledge absorption capacity and its influence on the generation of innovation in a health ecosystem

Abstract

This article aims to understand the reality of a health ecosystem, analyzing the process of knowledge absorption and its influence in terms of innovation generated. In terms of methodology, it is characterized as empirical, qualitative, and descriptive research. The results found show that the absorptive capacity of knowledge in the health ecosystem of the city of Passo Fundo is developed through a set of processes and mechanisms, with the three capacities (recognition, assimilation, and application) being present and expressed clearly and objectively, as well as through cooperation mechanisms and relationships. As for the type of innovation resulting from absorptive capacity, it is focused on business processes; in terms of degree, it is predominantly incremental. The main findings of this research highlight the importance of knowledge absorption capacity and inter-organizational relationships for the innovation process in the health ecosystem.

Key-words: Knowledge Absorption Capacity. Innovation Ecosystem. Health Sector. Inter-organizational Relations.

Capacidad de absorción de conocimiento y su influencia en la generación de innovación en un ecosistema de salud

Resumen

Este artículo tiene como objetivo comprender la realidad de un ecosistema de salud, analizando el proceso de absorción de conocimiento y su influencia en términos de innovación generada. En cuanto a la metodología, se caracteriza por ser una investigación empírica, cualitativa y descriptiva. Los resultados encontrados muestran que la capacidad de absorción de conocimientos en el ecosistema de salud de Passo Fundo (RS) se desarrolla a través de un conjunto de procesos y mecanismos, estando las tres capacidades (reconocimiento, asimilación y aplicación) presentes y explícitas en términos claros y objetivos. manera, como también aparecen debido a los mecanismos de cooperación y relaciones. En cuanto a la tipología de innovación resultante de la capacidad de absorción, se centra en los procesos de negocio y, en términos de grado, predomina la incremental. Los principales hallazgos de esta investigación resaltan la importancia del papel de la capacidad de absorción de conocimiento y las relaciones interorganizacionales para el proceso de innovación del ecosistema de salud.

Palabras clave: Capacidad de absorción de conocimientos. Ecosistema de Innovación. Sector Salud Relaciones Interorganizacionales.

1 Introduction

The dynamic nature of the environment characterized by new business models increases the importance of knowledge and accelerates the pace of innovation to support competitiveness and organizational survival (Ketonen-Oksi;

Valkokari, 2019; Moustaghfir; Schiuma, 2013). The topic addressed here has become particularly important, as it is no longer enough for companies to be exposed to knowledge; they must also have the capacity to absorb it. (Gunsel; Siachou; Acar, 2011; Silveira, de Menezes Lima; Sarmiento, 2023), to anticipate changes and continuously improve their results (Dávila; Durst; Varvakis, 2018; Yuan, *et al.*, 2022). This capacity is understood as Absorptive Capacity (ACAP) (Cohen; Levinthal, 1989).

The evolution of ACAP studies emerges as a latent theme in strategic management literature and has been used to explain organizational phenomena such as performance, knowledge acquisition and transfer, innovation, strategic alliances, and learning (Helfat, 1997; Van Den Bosch; Volberda; Boer, 1999; Lane; Koka; Pathak, 2006). Although some authors have studied the antecedents of this ability, some predictors require further study and investigation (Zahra; George, 2002; Jansen; Van Den Bosch; Volberda, 2005; Lane; Koka; Pathak, 2006).

On the other hand, inter-organizational relationships for generating innovation are not a contemporary issue. In the 1990s, studies by Cooke and Morgan (1994) on regional innovation systems asserted that these systems are strengthened by the dynamics of horizontal and vertical inter-firm networks. They are also strengthened by an institutional system rich in vocational training, and by public and private investment in research and development (R&D), innovation, and technology transfer. Later on, the concept of global innovation networks emerged as a new perspective for the study of the Geography of Knowledge, given that these networks are based exclusively on universities (Lemos, 2011).

Studies that consider innovation from a multilevel (sectoral, regional, national, and global), multimodal, and multilateral perspective (Carayannis; Campbell, 2011), have proliferated in recent years, due to their critical factor in explaining the development of firms, especially technology-based ones (Rubens *et al.*, 2011).

Business, entrepreneurial, and innovation ecosystems emerged from an analysis of the main concepts of agglomeration and interaction between companies. This study focuses on the innovation ecosystem. The use of the term innovation ecosystem has gained prominence in recent years in academic and business circles (Cobben, *et al.*, 2022). There are those who criticize it (Oh *et al.*, 2016) and those who defend it (Ritala; Almpantopoulou, 2017), but its growing use and usefulness as a framework for explaining innovation environments is undeniable.

In this regard, innovation ecosystems have become an important driver of economic and social development (Cobben; Ooms; Roijackers, 2023). Universities, companies, government, and other actors present in the same environment/territory constitute a complex and dynamic network of relationships that can contribute to the promotion of entrepreneurship and innovation. This complex network of interactions has become a competitive asset in a knowledge-based economy, due to its capacity to transform knowledge into high value-added innovation. (Spinosa; Schlemm; Reis, 2015; Cobben; Ooms; Roijackers, 2023).

According to Arias-Pérez, Lozada, and Henao-García (2020), the correlation between ACAP and networks was the primary approach identified in the literature review. This was the fundamental reason for selecting the research gap related to the capacity to absorb external sources of knowledge in their study. Thus, the

search for external knowledge to innovate and the occurrence of ACAP allow the company to play an active role in collaborating with the external environment. Therefore, knowledge of the assets and challenges of the regional environment are essential to the innovation development process. (Agostini *et al.*, 2021).

Studies of economic origin relevant to the health sector pose an important academic challenge, which is to articulate the dimensions of social and economic development. In this sense, the healthcare sector is considered an economic and innovation pillar in modern economies. Data from the Organization for Economic Cooperation and Development (OECD, 2022) show that, in developed economies, healthcare spending often consumes between 10% and 12% of Gross Domestic Product (GDP), with extreme cases such as the United States, where this percentage is close to 18%. With regard to the development of innovations, evidence from the UNESCO Science Report (2021) indicates that the health sector accounts for about a quarter of all global business investment in Research and Development (R&D). Similarly, healthcare is considered a strategic sector of social interest, once it plays an important role in public policy in several countries.

However, a study conducted by Güner *et al.* (2024) identified eight dimensions that influence innovation performance in the healthcare sector, which are: organizational culture, leadership, human resources, organizational structure, knowledge acquisition and sharing, cooperation, policy and management support, and technology. With regard to the dimension of Knowledge Acquisition and Sharing, the authors emphasize the importance of how healthcare organizations acquire, process, and disseminate information and insights. For the authors, effective mechanisms for gaining external knowledge and sharing internal knowledge are essential for generating new ideas and solutions. Collectively, these eight dimensions offer a comprehensive view of the multifaceted factors that healthcare organizations must consider when seeking to improve their innovation performance. Thus, by focusing on these areas, organizations can strategically improve their ability to develop and implement new ideas and solutions.

From this perspective, the present study is justified by its relevance to the context of companies in the healthcare sector. When observing the gaps in research on the topics of “ACAP” and “innovation” in an ecosystemic context, it is clear that there are topics that have yet to be explored, especially when it comes to these aspects from different perspectives.

In this sense, studies exploring this perspective reinforce the importance of knowledge absorption capacity and inter-organizational relationships in promoting innovation in ecosystem environments. Companies grouped together in a given territory develop ACAP based on the connectivity and density of actors inside and outside the ecosystem, directly impacting innovation and the creation of competitive advantages. This research adds to the literature evidence linking innovation ecosystems and knowledge absorptive capacity, in order to understand their critical role in innovation.

Therefore, this study aims to understand the reality of a health ecosystem by analyzing the process of knowledge absorption and its influence when it comes to generated innovation.

This article is structured in five sections, beginning with this introduction. The second section presents the theoretical framework that guided the study; it

addresses the central concepts of absorption capacity, innovation, and innovation ecosystem. The third section explains the methodological procedures that supported the development of the research. The fourth section presents the discussion and analysis of the results. Finally, the last section is devoted to the final considerations.

2 Theoretical Framework

2.1 The main theoretical constructs used in the study

The term “absorptive capacity” originated at the organizational level in the studies of Cohen and Levinthal (1989, 1990, 1994). In the study published in 1989, the authors emphasize that research and development (R&D), in addition to generating innovations, also develops the organizational capacity to identify, assimilate, and exploit knowledge, referred to as the company's absorption capacity. In the second article, published in 1990, the concept was revised and redefined by the authors as “[...] the ability of a company to recognize the value of new external information, assimilate it, and apply it for commercial purposes, which is essential to its innovative capabilities” (Cohen; Levinthal, 1990, p. 128). Since then, the concept has been recognized and expanded. Several models for measuring ACAP have arisen, among them the two best known: Cohen and Levinthal (1990) and Zahra and George (2002).

For this study, the model developed by Cohen and Levinthal (1990) was adopted. This model has already been validated, as pointed out in the bibliometric study by Apriliyanti and Alon (2017), as the most cited in national and international literature.

Moving from the concept of ACAP to that of innovation, its typologies and degrees, the literature, from pioneering studies on innovation (Schumpeter, 1934), reveals a vast list of taxonomies, as well as a variety of types of innovation.

A benchmark in guidelines for collecting and interpreting data on technological innovation, in its latest publication on the Oslo Manual in October 2018, the Organization for Economic Cooperation and Development (OECD) highlighted two main types of innovation: product innovations and business process innovations (OCDE; EUROSTAT, 2018). The basic definitions of a product and business process innovation are as follows: a product innovation is a new or improved product or service that differs significantly from the company's previous goods or services and has been introduced to the market; a business process innovation is a new or improved business process for one or more business functions that differs significantly from the company's previous business and has been put into use by the company (OCDE; EUROSTAT, 2018).

Moving on to the terminology involving the degree of novelty of innovation, studies classify it as either radical or incremental (Bessant; Tidd, 2009; Tidd; Bessant; Pavitt, 2015). A radical innovation would be one that, based on a technological or market novelty, leads to the creation of a new market, which may or may not result in the discontinuity of the existing market (Tironi; Cruz, 2008). In other words, radical innovation involves more intense disruptions, causing profound changes in services, products, and processes (Bessant; Tidd, 2009). Incremental innovation, on the other hand, can be defined as innovation that incorporates improvements

(technical characteristics, uses, costs) to preexisting products and processes (Tironi; Cruz, 2008).

Consequently, the term ecosystem has reinvigorated great interest in different disciplines, especially when combined with a second qualifying word (Cobben, *et al.*, 2022). The initial concept of an ecosystem dates back to the 1930s, with researchers in ecology providing a reference point when analyzing the relationships between vegetation and the environment (Willis, 1997). Since then, the term has gained momentum and has been widely used.

In the field of Social Science, Rothschild (1990) brought the fields closer together by comparing economics with ecosystems, stating that the global economy could be considered an ecosystem, where organizations and consumers would be living organisms. One of the first applications of the ecosystem metaphor to organizations can be found in Moore's (1993) studies on the concept of business ecosystems. According to the author, a business ecosystem is an economic community based on interaction and mutual support between organizations and individuals, elements of the business world.

Transposing the concept of business ecosystem to innovation ecosystem, the latter is considered a driver among actors or entities, with the aim of generating technological development and innovation for a given location or region (Adner; Kapoor, 2010; Teixeira; Trzeciak; Varvakis, 2017). According to Gomes *et al.* (2017), innovation ecosystems are characterized by the co-creation or joint creation of value, and their formation is composed of actors including companies, customers, suppliers, complementary innovators, and other agents such as regulators.

Regarding the boundaries of an ecosystem, Ritala and Almpantopoulou (2017) suggest that they can be drawn from a geographical perspective (local, regional, national and global), from a temporal scale (a static moment in time or dynamic interactions), from its permeability (open or closed) or from the type of flow (knowledge, value, material). In this sense, innovation ecosystems are spaces that bring together infrastructure, institutional and cultural arrangements to attract entrepreneurs and raise financial resources.

This approach is consistent with the New Legal Framework for Science, Technology, and Innovation, due to the possibility of interactions among universities, industry, government, civil society, and the natural environment, which may be generated by the new organizational configurations resulting from this regulation. According to Decree No. 9,283 (2018, p. 29), innovation ecosystems are "spaces that aggregate infrastructure, institutional and cultural arrangements, which attract entrepreneurs and financial resources, constitute places that enhance the development of the knowledge society and include, among others, science and technology parks, smart cities, innovation districts and technology hubs". From this perspective, the aforementioned concept of innovation ecosystem was used in this study.

2.2 The theoretical model of analysis

Production clusters have evolved into regional innovation systems, which continue to evolve into innovation ecosystems (Kon, 2016; Moore, 1996). Environments characterized by complexity and dynamism encourage organizations

to establish collaborative inter-organizational relationships, in order to remain competitive and develop capacities for innovation (Ketonen-oski; Valkori, 2019). From this perspective, innovation ecosystems are established as environments that promote the continuous interaction, evolution, and dynamics of different actors, including complementary and/or substitutive relationships that are important for innovative performance (Granstrand; Holgersson, 2020).

Health innovation ecosystems operate as complex adaptive systems, where complexity management and collaborative networks are essential. The analysis of these systems becomes relevant insofar as it reveals characteristics such as adaptation, sensitivity to initial conditions, path dependence, and emergent behaviors (Moeenian *et al.*, 2024).

Collaboration between actors in the ecosystem is facilitated by different forms of proximity: spatial, social, and cognitive, as well as a new dimension identified as “potential proximity,” which involves strategic attraction between stakeholders. These interactions promote aggregation and integration of resources through cross-border collaboration, thereby creating collective value (Eriksson *et al.*, 2023).

In this sense, this study considers that certain conditions present in the ecosystem environment, such as density, fluidity, connectivity, and diversity (Stangler; Bell-Masterson, 2015), act as indicators of ecosystem vitality - characteristics that facilitate the growth of new businesses and drive innovation. However, it is important to consider that not all companies operating in an innovation-promoting environment are able to access and internalize the external resources available.

Thus, mere networking and participation in innovation ecosystems are no guarantee that knowledge will be disseminated (Yoo; Sawyerr; Tan, 2016). This process depends on the organization's ability to recognize value, assimilate, and apply external knowledge in its internal processes and routines. This practice is understood as Absorption Capacity (Cohen; Levinthal, 1990; Lane; Lubatkin, 1998; Zahra; George, 2002). In this way, it is observed that the capacity for absorption acts as a catalyst, recognizing the value and assimilating the available knowledge so that the organization can apply and use it internally to enhance innovation.

From a strategic perspective, innovation is linked to obtaining sustainable competitive advantages, competitive positioning, core competence concepts, innovation capacity, and organizational learning. In terms of degree, innovations can be classified as incremental or radical. Incremental innovations occur when improvements and advances in methods and products are introduced gradually (Teixeira *et al.*, 2019). For these same actors, radical innovations occur when abrupt changes take place.

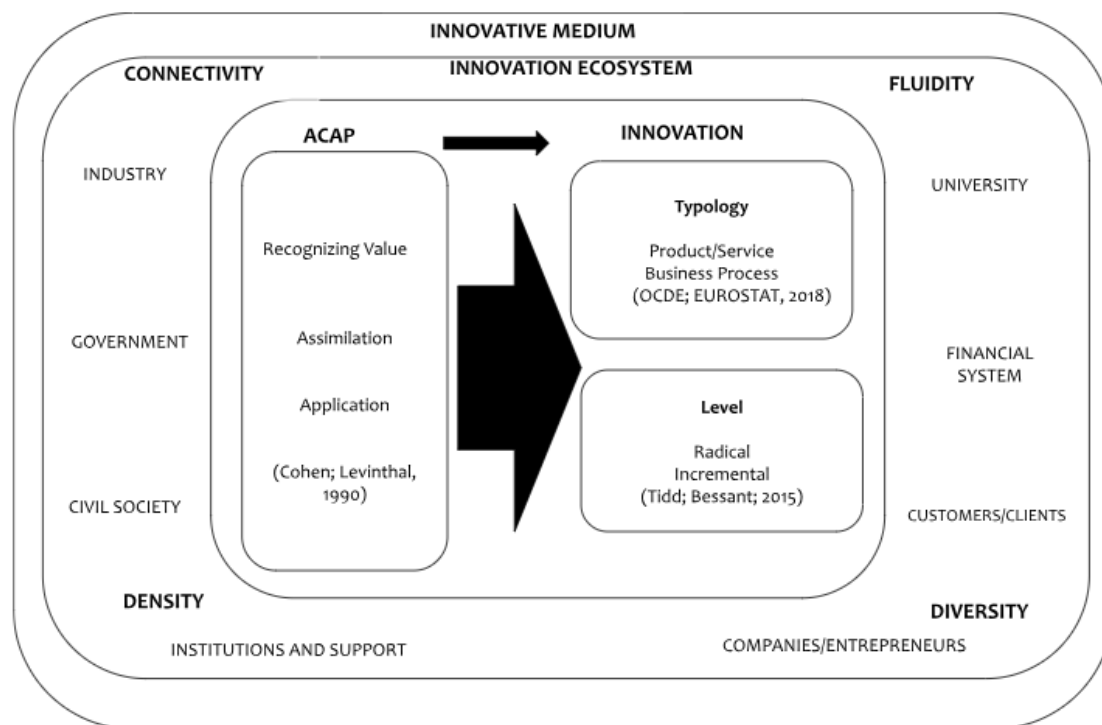
According to the Oslo Manual (2018), there is innovation in product and/or service, and innovation in business processes. A product innovation consists of a new or improved product or service that differs significantly from the company's previous goods or services and has been introduced to the market.

A business process innovation is a new or improved business process for one or more business functions that differs significantly from the company's previous business and has been put into use by the company (OCDE; EUROSTAT, 2018).

In view of this, this study uses as its theoretical basis the Innovative Environment approach (Aydalot, 1986), defined as a territorial organization where the innovation process is born, that is, the company is not an isolated agent of innovation, it is inserted in a specific environment/territory and this environment is what makes the company act. In relation to the theoretical constructs analyzed here, we have: 1) Absorptive capacity, based on the model proposed by Cohen and Levinthal (1989); 2) Innovation, according to the concept defined in the Oslo Manual (2018); and 3) Innovation ecosystem, based on the definition in the New Legal Framework for Science, Technology, and Innovation (BRASIL, 2018).

Figure 1 seeks to show the set of relationships established by the chosen theoretical constructs, as well as to demonstrate a summary view of the model under analysis used in this study.

Figure 1 - Theoretical model of analysis



Source: elaborated by the authors (2023).

3 Methodology

To meet the objectives of this study, an empirical research approach was used through descriptive qualitative research (Sampieri; Collado; Lucio, 2013).

The study was conducted in the healthcare ecosystem of the municipality of Passo Fundo, located in the north of the state of Rio Grande do Sul, Brazil. The ecosystem is composed of organizations and institutions associated with ACISA (Association of Commercial, Industrial, Service, and Agribusiness Enterprises), belonging to the health sector of this municipality. For the selection of research

subjects, the non-probabilistic technique of intentional judgment was employed. The research subjects were managers in strategic positions (management core), occupying leadership and coordination roles, whose decisions influence their organizations and ecosystem dynamics. Twelve (12) ecosystem actors were interviewed, including members from universities, hospitals, analytical laboratories, the pharmaceutical industry, medical clinics, commercial and industrial associations, and public authorities.

This group of interviewees constitutes the core of agents who coordinate and, through their decisions and actions, establish the functionality and vitality of the healthcare ecosystem. Therefore, relevant for inferring data and information necessary to find answers for the study objectives.

During the data collection phase, three university representatives, six company representatives, and three government representatives were interviewed, totaling twelve managers. The interviews were semi-structured, following a script prepared in advance by the researchers, which resulted in two sets of questions: set 1 - ACAP (recognition, assimilation, and application of knowledge) and set 2 - innovation (product/service and business processes) and degree of innovation (radical and incremental innovations).

The interviews were conducted individually, online, using Microsoft Teams®, and were recorded (with the prior consent of the selected participants, who remained anonymous through coding) and subsequently transcribed in full for data analysis. A total of 36 hours of interviews were conducted with the 12 participating organizations.

Categorical content analysis was used for data analysis and interpretation (Bardin, 2016). The categories of analysis were established based on the theoretical framework. ACAP was investigated according to the model proposed by Cohen and Levinthal (1990), considering the capabilities of recognition, assimilation, and application. For the typologies of innovation, the concepts of the Oslo Manual (OECD; EUROSTAT, 2018) were used, considering innovation in products and services and in business processes. With regard to the degree of innovation, the concepts of Tidd, Bessant, and Pavitt (2015) were used, based on radical and incremental innovations. Once this stage was completed, it was time to explore the material.

The analysis of the results was carried out based on the manifest content extracted from the collected material (interviews, documents, and observation), followed by a theoretical interpretation of the study, considering the categories of analysis used.

This analysis was organized based on the three chronological phases established in Bardin's model (2016), namely: a) pre-analysis, which aimed to systematize ideas based on a cursory reading of the material and documents collected, with a view to preparing the material for the analysis itself; b) exploration of the material, considering the systematization of the previous stage; and c) treatment of the results through inference and theoretical interpretation of the data collected.

To support the data analysis, the NVIVO®11 software was used, which assisted in compiling the theoretical basis and transcribing the interviews, with the aim of relating theory to empirical analysis.

4 Analysis and Discussion of Results

4.1 Mechanisms for developing absorption capacity in the health ecosystem

The investigation showed that ACAP in Passo Fundo's health ecosystem is developed through a set of processes and mechanisms, with the three capacities (recognition, assimilation and application) being present and made explicit in a clear and objective way by the organizations that make up the ecosystem. They also appear as a result of the cooperation mechanisms and relationships established in the ecosystem arrangement, as can be seen in the systematization presented in Chart 1.

Table 1 – Systematization of ACAP development mechanisms

Recognition	Assimilation	Application
<ul style="list-style-type: none"> • Benchmarking • Stakeholder Diversity • Strategic Leadership Behavior • Alliance with External Partners • Consulting and Events 	<ul style="list-style-type: none"> • Interaction and Cooperation • Level of Knowledge of Team Members • Training and Case Studies 	<ul style="list-style-type: none"> • New Working Methods • New Ventures • Agreements and Cooperation • Strategic Adaptation • New Niche
ACAP		

Source: elaborated by the authors (2023).

The ability to recognize internal and external knowledge in Passo Fundo's health ecosystem is developed through benchmarking, diversity of actors, strategic leadership behavior, alliance with external partners, strategic adaptation and consulting and events.

Regarding benchmarking actions, it was observed throughout the research that this is a very common practice among the respondents. By using tried and tested practices, one can save time and resources when implementing a change, both in process and product, and it is possible to achieve greater levels of assertiveness. Organizations look to benchmarking for information and practices that encourage change, i.e. projects that have already been tested in other organizations or regions, and try to implement them in their own area of activity. These include technical visits to regions that have been successful in their initiatives and have adopted innovative product and service management practices, and participation in workshops with specialists who share knowledge and information that is useful for developing intra- and inter-organizational innovations. This practice corroborates the findings of Martins, Santos and Carvalho (2010), who also identified this technique in a study on libraries, as an important strategic alternative that promoted significant advances in terms of capturing information to improve processes, as in the case of Passo Fundo's health ecosystem.

There is also a plurality of organizations discussing similar objectives from the perspective of complementarity and the recombination of knowledge based on an integrative approach. In the healthcare innovation ecosystem, diversity is evident in the formation of innovation hubs, an initiative of one of the ecosystem actors interviewed, which brings together stakeholders from universities, industry, government, and civil society in pursuit of a common goal. These practices corroborate Zahra and Nambisan (2011), who analyzed entrepreneurship in innovation ecosystems and found that the health and success of these relationships are generally closely linked to the wealth of opportunities existing within these ecosystems.

In strategic leadership behavior, the management process is a complex and multifaceted phenomenon that concerns both the individual who manages the organization and the business environment in which this enterprise is embedded. In this respect, in the health innovation ecosystem analyzed, strategic leadership behavior emerges as a mechanism for developing the capacity for recognition, since depending on the style of the leadership and/or the founder, there is greater or lesser incentive for innovation. In other words, if this process of seeking competitive advantage lies in the organization's strategy, it will be developed in all sectors of the company, driven by its leaders. This finding corroborates the study by Danjour et al. (2015), who, when investigating service companies, indicated a strong and positive influence of strategic behavior on the companies' degree of innovation.

Alliances with external partners are expressed through the exchange of information regarding new products, new services, and new ways of carrying out processes. It is evident that suppliers and customers are the main partners, since this alliance enables access to new resources. Of particular note are the relationships between technology parks and companies in the healthcare sector, where partnerships represent an important source of exchange between the stakeholders, especially regarding management consulting and mentoring. This practice corroborates the study by Corso, Silva and Sandrini (2005), who investigated strategic alliances and revealed competitive advantages for all those involved in companies in the home appliance industry and their respective suppliers.

Consultancies and participation in events involve the interaction of ecosystem actors in practices of sharing news from the sector, most often provided by educational institutions, suppliers and/or partners in the sector. This mechanism for developing recognition capacity is heavily driven by stakeholders in the sector.

The ability to assimilate internal and external knowledge within the Passo Fundo healthcare ecosystem is developed through interaction and cooperation, the level of knowledge of team members, training, and case studies of success. Interaction and cooperation refer to the connections between the companies in the health innovation ecosystem, by way of technical and administrative cooperation between the players. Klevorick et al. (1995) have already stated that through cooperation, the parties involved can better manage their assets, access distant or unavailable productive and technical resources, exchange knowledge and technologies with other experts and train themselves in more efficient processes. Interaction and cooperation between companies in the health innovation ecosystem takes place mainly through partnerships between allied groups with

similar goals. This interaction occurs when there is a need to leverage resources to invest in infrastructure and in the practice of case studies relevant to complex problems. Cooperation is observed with mentoring. In other words, when a change needs to be made to a product or process, companies look to other organizations in the ecosystem or outside it for support and guidance.

In turn, the level of knowledge of team members is related to their ability to assimilate new external information and transform it into useful knowledge for the organization. The level of expertise of the team members has a direct impact on the ability to assimilate knowledge, because the higher the team's level of expertise, the easier it is for knowledge to be assimilated internally. Thus, your skills can bring together and expand intra-organizational knowledge, making its dissemination viable across all sectors of the organization.

With regard to training and cases, according to Schmidt (2005), the more training and qualification an employee receives, the greater their individual capacity to assimilate and use new knowledge will be. The practices used in the health innovation ecosystem are primarily training and cases, which are seen as important tools for training team members, based on the development of their individual capacity to assimilate new knowledge. This takes place through workshops, presentations of success stories in other cities or regions, corporate universities, business incubators, etc.

The ability to apply internal and external knowledge in Passo Fundo's health ecosystem is expressed through new working methods, new ventures, cooperation agreements, strategic adaptation and new niches.

New working methods result from the application of knowledge regarding the organization's ability to refine, expand, leverage and create existing skills, focused on the practical application of this knowledge (Cohen; Levinthal, 1990; Zahra; George, 2002; Todorova; Durisin, 2007). This capacity was identified in the analysis of new working practices, that is, ways of doing the same thing differently and more efficiently. This aspect was evidenced in the case where the organization replaced its commercial executives and looked for different profiles from the typical ones in the segment. It was also evidenced in the process of continuous improvement adopted by companies to increase levels of customer satisfaction.

With regard to new ventures, Cohen and Levinthal (1990) state that the application of knowledge is one of the dimensions of absorptive capacity. This capacity will give rise to the creation or improvement of new goods, systems, processes, organizational forms, leveraging existing competences or creating competences by incorporating acquired and assimilated knowledge. Examples found in the innovation ecosystem include the creation of investment funds to support new startups that emerge within the healthcare segment. This finding corroborates the study by Chakraborty, Ilavarasan and Edirippulige (2023), by highlighting health technology startups as important insofar as they have been revamping care in this area.

As far as cooperation agreements are concerned, these are increasingly becoming a constant in the business world, as they help to achieve common goals between the partners. Cooperation agreements can be complex business arrangements or simple partnerships between customers and suppliers. From this perspective, the technical-financial cooperation agreement between University A

and Hospital B exemplifies the capacity for application within the health innovation ecosystem, as it has generated important results for both organizations. This practice corroborates Jansen, Van Bosch and Volberda (2005), who state that integration mechanisms are positively related to the transformation and application of knowledge, especially in the density of connections between members of organizations, including trust and cooperation, which boost these capacities.

Strategic adaptation concerns the need for organizations to respond to the complexity of the market in which they operate. In the health innovation ecosystem, strategic adaptation refers to the constant implementation of new products or services and processes. In order for companies to remain competitive, it is considered a mechanism for developing the capacity to apply knowledge.

Finally, new niches are related to the health innovation ecosystem's response to market opportunities that arise from new possibilities to expand the products and services offered; and even from the fact of looking for new, previously unseen market niches. This practice is exemplified by the acquisition of a network of laboratories, by a group of entrepreneurs from different fields of activity, as well as by the consolidation of a business alliance that involves several players in the health sector to develop joint actions aimed at maximizing results in innovations for the sector.

4.2 Typology and degree of innovation of the healthcare ecosystem

Based on the “product” innovation typology, Santos, Perin and Sampaio (2018) consider it to be an opportunity for businesses in terms of growth and expansion into new areas. The survey revealed that in the health innovation ecosystem, individual initiatives by players lead to innovation in products or services - although this is not unanimous among the respondents - such as the acquisition of pioneering analytical and diagnostic equipment in the region, as well as product packaging. Nevertheless, as it is a highly regulated segment, which may be a barrier to innovation.

When it comes to business process innovation, this relates to new ideas developed by people that bring about changes in the institutional and organizational contexts, with the aim of improving the production of the good or service already marketed and producing benefits for the production process, such as reducing human fatigue, increasing production and reducing costs (Van de Ven; Poole, 2000). With this in mind, research into the health innovation ecosystem has shown that the individual players in the ecosystem practice innovation management to improve business processes.

Among the organizations investigated, there is a concern to constantly improve their processes, using available tools to improve the efficiency of routine activities and facilitating the management and organization of the company, as well as making use of new technologies to improve processes. Table 2 shows the evidence of these findings in the survey.

Table 2 – Empirical evidence of business process innovation

Innovation Typology	Evidences
Business Process Innovation	<ul style="list-style-type: none"> - Startup development; - Mapping opportunities in the sector (consultancy); - Strategic planning, developing a regional brand; - Forming governance for the sector; - Forming a techno-scientific partnership to train health professionals; - Building an annual budget; - Formation of a Board of Directors; - Implementation of the internal innovation sector; - Implementation of strategies to disseminate a culture of innovation; - Implementation of the doctor-patient communication platform; - Implementation of internal and external customer management techniques; - Change in the profile of managers; - Change in sources for attracting manpower (headhunter); - Implementation of a corporate university; - Change in integration and training processes for new employees; - Creation of the Portfolio Matrix (sales curve); - Implementation of a new sales model (NLP); - Training with contracted specialists; - Implementation of customer portfolio management equipment; - CRM implementation; - Constant changes to the company's organizational chart; - Change in market strategy

Source: Research data (2023).

Reports point to important initiatives for this type of innovation. In particular, individual attempts to join forces with other players to develop a regional force in the health sector. Another reported process involves individual initiatives to change processes in response to market demand, that is, innovations in business processes to maintain organizational competitiveness.

In the healthcare ecosystem, business process innovation initiatives are a common practice, largely due to competitiveness, motivated by the demands of these organizations' clients and, above all, by market dynamics.

Along the same lines, the incentive for telemedicine deserves to be highlighted, as the restrictions of the pandemic demanded this type of innovation. In addition, there are constant management actions, especially in clinics that require administrative knowledge, as the investigation depicted. Because of the concern with customer (patient) satisfaction, investments in physical structures, in the waiting rooms of offices, as well as the digitalization of test results, are all practices that demonstrate innovation in business processes.

Analyzing the degree of innovation is important to avoid risk when implementing any type of innovation. According to Koc and Bozdog (2017), the degree of innovation is considered an essential factor in explaining the success or failure of the innovations adopted. Besides, the authors suggest that the degree of innovation allows a better understanding of organizational policies, being useful for evaluating proposals and making sound decisions about the most appropriate innovation. In terms of the degree of novelty, innovation can be incremental and/or radical. While incremental innovation consists of improving existing goods, services or processes, i.e. doing better what is already being done, radical innovation is equivalent to making significantly different changes to goods, services or processes, i.e. doing things differently from what was being done before (Bessant; Tidd, 2009; OCDE, 2018).

In this sense, the research suggests that radical innovation in the healthcare innovation ecosystem is still in its early stages. It was found that there is no uniformity among the actors in terms of the degree of innovation. Movements are made individually, taking into account mainly the manager's/actor's view of the opportunities that arise in the sector. Although this is a highly regulated sector, players consider it a barrier to radical innovation. Even so, there are situations in which organizations in the health ecosystem introduce innovations that are considered radical: the acquisition of state-of-the-art diagnostic equipment, which radically changes the services provided; initiatives by entrepreneurs to explore new market niches, such as the creation of joint ventures; the acquisition of new equipment, such as the "Hair Cryotherapy Cap" for cancer treatment to prevent the patients' hair loss; completely new equipment to improve diagnostic imaging, also a new feature in the segment. It is clear that, even to a lesser extent, radical innovation occurs, which is the result of the capacity for relationships between the organizations that make up the innovation ecosystem.

The study showed that the degree of innovation in the health innovation ecosystem is incremental. The innovations observed based on the perception of ecosystem actors are primarily reactive and do not present significant changes to the product or process, but rather improvements that meet market demands. Another observation is that incremental innovation initiatives are carried out individually, and hardly ever collectively.

Thus, incremental innovation is very present in the strategic actions of the organizations surveyed. These innovations are encouraged by managers on a constant basis, in terms of providing services to the end customer, as well as management actions, in the search for continuous improvement to gain the competitiveness needed in the environment in which they operate.

5 Final Considerations

The aim of this article was to understand the reality of a health ecosystem, analyzing the process of knowledge absorption and its influence in terms of innovation generated.

The study pointed out that the development of knowledge absorption capacity in the health ecosystem is developed by various elements and mechanisms - in terms of recognition, assimilation and application capacity - considering the perception of the ecosystem actors interviewed. The mechanisms for developing the capacity to recognize external information are centered on benchmarking actions, interaction with a diversity of actors, activities influenced by the strategic behavior of managers and/or founders, the use of consultancies to search for information, and alliances with external partners.

It should be noted that the ability to recognize external information is associated with the ability of the main ecosystem players to come together and share the information that is essential to the process of innovation. As for the mechanisms for developing assimilation capacity, the main ones in the health ecosystem are the level of knowledge of the team, the training provided, and the interaction and cooperation among the organizations in the ecosystem. The level of knowledge of team members is considered by ecosystem actors to be an important mechanism in the development of assimilation capacity. In this way, it is possible to stay ahead of competitors, using the experiences and skills of team members as an important resource in the constant search for innovations.

In addition to developing team members, research reveals that training and presentations of success stories are common tools for this purpose. In other words, training is related to the development of teams with a focus on the expertise required by the competitiveness of the sector; the more trained the team, the more it will be able to assimilate external knowledge. Secondly, there are the success stories, which are presented to the teams in order to “empower” those involved, so that they develop a culture of innovation based on observing the main movements in the market and ensure that this information is internalized in the organization.

Interaction with other players in the ecosystem contributes as a mechanism for developing assimilation capacity. However, a polarity was identified within the ecosystem, where some companies/managers are more “sympathetic” to one company over another. It was also observed that strong competitiveness is present in the ecosystem, which invariably impacts on the capacity for cooperation between actors. This results in the search for actors outside the health ecosystem.

It was also possible to identify in the health ecosystem that the mechanisms for developing application capacity are related to: the implementation of new working methods, the consolidation of new ventures, cooperation agreements, the ability of companies to adapt strategically in turbulent environments and investments in new market niches by ecosystem players. It can be seen that the implementation of new ways of carrying out the same work is present in the research, i.e. the actors are constantly seeking to improve efficiency in their production system.

The implementation of new ventures highlights the entrepreneurial characteristic of ecosystem actors, presenting itself as a mechanism for developing application capacity. In the same vein, with a view to maintaining their competitiveness, organizations respond to market opportunities in an agile manner, based on their ability to recognize and assimilate new knowledge, in order to carve out new market niches. In relation to cooperation agreements between organizations, it should be noted that the health ecosystem carries out exchanges between the main stakeholders, both internal and external to the ecosystem, such as customers, suppliers and partners.

When analyzing the type of innovation that ACAP has produced in the health ecosystem, and the degree of innovation resulting from this process, we found that in the health ecosystem, the type of innovation produced by ACAP is innovation in business processes, as the ecosystem constantly makes adaptations and adjustments to its processes in order to maintain its competitiveness.

The presence of radical innovations was identified mainly when it came to establishing opportunities to open up new markets, where the top management of the organizations broadened their scope of action to meet the demands of their target audience. It was also observed that there is little investment in R&D in the organizations and the relationship with research institutes and universities is incipient. Radical innovations are therefore present in the ecosystem, but only to a modest extent.

Thus, the study reveals that the health ecosystem primarily generates incremental innovations, motivated in most cases by the reactive activity of ecosystem actors to the competitive dynamics of the market. These innovations are seen mainly in the management of organizations, such as the implementation of quality processes, improvements in customer service, environmental sustainability actions, the implementation of structures to better meet customer needs, activities to reduce operating costs, etc. Therefore, knowledge absorption has yielded primarily incremental innovation in health ecosystems.

Among the main findings of this research, it stands out the important role of knowledge absorption capacity and inter-organizational relations for the innovation process in the health ecosystem. Companies grouped together in a given territory develop ACAP, impacting directly on innovation and building competitive advantage.

From a theoretical point of view, the study contributes to a growing body of literature by integrating the discussion on absorptive capacity and innovation ecosystems from the perspective of territoriality and inter-organizational relations in a highly complex sector such as health. This integration broadens the understanding of how the mechanisms for recognizing, assimilating and applying knowledge manifest themselves in specific ecosystem contexts, contributing to the conceptual refinement of ACAP in simultaneously cooperative and competitive environments.

From a practical point of view, the conclusions of this research have recognized the complexity and importance of inter-organizational relationships for the formation of a cohesive Health Innovation Ecosystem, capable of providing the actors with greater levels of competitive advantage. In the same way, it presented the ecosystem actors with the possibility of further reflection on the existing

relationships and the opportunities present in this configuration of inter-organizational arrangements.

It is also necessary to consider that this study has some limitations. These include the fact that the findings are based on data extracted from a limited number of actors from the set of companies and organizations that make up the health ecosystem, all of whom belong to the strategic (decision-making) level of their institutions. Therefore, the results found concern the reality and context of this group of ecosystem actors interviewed. In view of this limitation, we suggest involving actors from different levels of decision-making and operation in the set of organizations that make up these inter-organizational arrangements that can better characterize an innovation ecosystem.

Therefore, this study highlights the crucial importance of future studies deepening the understanding of relational dynamics in health innovation ecosystems. Recommendations for future research emphasize the need to adopt multi-scalar approaches, carry out comparative studies between different ecosystems and implement longitudinal analyses. These research strategies have the potential to reveal valuable insights into the mechanisms of collaboration, knowledge transfer and the factors that influence the success of these collaborative networks. By following these research directions, it will be possible to develop a deeper and more comprehensive understanding of health innovation ecosystems that will help improve their practices and, consequently, advance innovation in this vital sector.

REFERENCES

ADNER, R.; KAPOOR, R. Value creation in innovation ecosystems: how the structure of technological interdependence affects firm performance in new technology generations. **Strategic Management Journal**, v. 31, n. 3, p. 306-333, 2010.

AGOSTINI, C.; SILVA, D. E.; GRUNEVALD, I. ; VALIM, A. R. M. Mapeamento do ecossistema regional de inovação da região dos Vales do Rio Pardo e Taquari. In: X Seminário Internacional sobre Desenvolvimento Regional, 2021, Santa Cruz do Sul. **X Seminário Internacional sobre Desenvolvimento Regional: Atores, Ativos e Instituições: O Desenvolvimento Regional em perspectiva**. Santa Cruz do Sul: Unisc, p. 1-16, 2021.

APRILIYANTI, I. D.; ALON, I. Bibliometric analysis of absorptive capacity. **International Business Review**, v. 26, n. 5, p. 896-907, 2017.

ARIAS-PÉREZ, J.; LOZADA, N.; HENAO-GARCÍA, E.. When it comes to the impact of absorptive capacity on co-innovation, how really harmful is knowledge leakage? **Journal of Knowledge Management**, v. 24, n. 8, p. 1841-1857, 2020.

AYDALOT, P. **Milieux innovateurs en Europe**. Paris: GREMI, 1986.

BARDIN, L. **Análise de conteúdo**. São Paulo: Edições 70, 2016.

BESSANT, J.; TIDD, J. **Inovação e empreendedorismo**. Porto Alegre: Bookman, 2009.

BRASIL. Decree No. 9,283, dated February 7, 2018. Regulates Law No. 10,973, dated December 2, 2004, to establish measures to encourage innovation and scientific and technological research in the productive environment, with a view to technological training, achieving technological autonomy, and developing the national and regional productive system. Brasília, DF: Presidência da República. 2018.

CARAYANNIS, E. G.; CAMPBELL, D. F. J. Open innovation diplomacy and a 21st century fractal research, education and innovation (FREIE) ecosystem: building on the quadruple and quintuple helix innovation concepts and the “mode 3” knowledge production system. **Journal of the Knowledge Economy**, v. 2, n. 3, p. 327-372, 2011.

CHAKRABORTY, I.; ILAVARASAN, P. V.; EDIRIPPULIGE, S. Critical Success Factors of Startups in the e-health domain. **Health Policy and Technology**, v. 100773, 2023.

COBBEN, D.; OOMS, W.; ROIJAKKERS, N.; Indicators for innovation ecosystem health: A Delphi study. **Journal of Business Research**, v. 162, n. 113860, 2023.

COBBEN, D.; OOMS, W.; ROIJAKKERS, N.; RADZIWON, A. Ecosystem types: A systematic review on boundaries and goals. **Journal of Business Research**, v. 142, p. 138-164, 2022.

COHEN, W. M.; LEVINTHAL, D. A. Innovation and learning: the two faces of R & D. **The Economic Journal**, v. 99, n. 397, p. 569-596, 1989.

_____. Fortune favors the prepared firm. **Management Science**, v. 40, n. 2, p. 227-251, 1994.

_____. Absorptive capacity: a new perspective on learning and innovation. **Administrative Science Quarterly**, v. 35, n. 1, p. 128-152, 1990.

Administração, Contabilidade e Economia, v. 7, n. 1, p. 14-27, 2016.

COOKE, P.; MORGAN, K. O sistema regional de inovação em Baden-Württemberg. **Jornal Internacional de Gestão de Tecnologia**, v. 9, n. 3-4, pág. 394-429, 1994.

CORSO, J. M.; SILVA, W. V.; SANDRINI, G. Alianças estratégicas e vantagem competitiva: uma visão analítica da cadeia de fornecedores. **REGE – Revista de Gestão**, v. 12, n. 4, p. 17-31, 2005.

DANJOUR, M. F.; MEDEIROS, B.C.; MEDEIROS JÚNIOR, J. V.; AÑEZ, M.E.M. Comportamento estratégico e grau de inovação: um estudo em micro e pequenas empresas do setor serviços. In: SIMPÓSIO INTERNACIONAL DE GESTÃO DE PROJETOS, INOVAÇÃO E SUSTENTABILIDADE, 4, **Anais [...]**. São Paulo, 2015.

DÁVILA, G. A.; DURST, S.; VARVAKIS, G. Knowledge absorptive capacity, innovation, and firm's performance: insights from the South of Brazil. In: TIDD, J. **Managing Knowledge, Absorptive Capacity and Innovation**. Singapura; World Scientific Publishing, p. 475-508, 2018

ERIKSSON, V.; KEIPI, T.; BJÖRKLUND, T. Dimensions of proximity in stakeholder choice reflected in the creation of knowledge-based innovation ecosystem partnerships. **Proceedings of the Design Society**, v. 3, p. 1505-1514, 2023.

GOMES, M. S.; VISINTIN, L.; TRINDADE, E. P.; GAUTHIER, F.O. Uma revisão sistemática sobre características e fatores de sucesso de ecossistema de inovação e de ecossistema de *software*. **Produção em Foco**, v. 7, n. 1, p. 18-32, 2017.

GRANSTRAND, O.; HOLGERSSON, M. Innovation ecosystems: a conceptual review and a new definition. **Technovation**, v. 90, p. 1-12, 2020.

GÜNER, Ş.; KÖSE, İ.; TOPAYLI, E.; YILDIZ, A. E. Strategic Dimensions Affecting to Innovation Performance in the Healthcare Sector: A Systematic Literature Analysis. **Süleyman Demirel Üniversitesi Vizyoner Dergisi**, v. 15, n. 42, p. 515-532, 2024.

GUNSEL, A.; SIACHOU, E.; ACAR, A. Z. Knowledge management and learning capability to enhance organizational innovativeness. **Procedia-Social and Behavioral Sciences**, v. 24, p. 880-888, 2011.

HELFAT, C. E. Know - how e complementaridade de ativos e acumulação dinâmica de capacidades: o caso da P&D. **Revista de Gestão Estratégica**, v. 18, n. 5, p. 339-360, 1997.

JANSEN, J.; VAN DEN BOSCH, V.; VOLBERBA, H. Managing potential and realized absorptive capacity: how do organizational antecedents matter? **Academy Management Journal**, v. 48, n. 6, p. 999-1015, 2005.

Kauffman Foundation Research Series on City, Metro, and Regional

KETONEN-OKSI, S.; VALKOKARI, K. Innovation ecosystems as structures for value co-creation. **Technology Innovation Management Review**, v. 9, n. 2, p. 25-35, 2019.

KLEVORICK, A. K.; LEVIN, R.C.; NELSON, R.R.; WINTER, S.G. On the sources and significance of interindustry differences in technological opportunities. **Research Policy**, v. 24, n. 2, p. 185-205, 1995.

KOC, T.; BOZDAG, E. Measuring the degree of novelty of innovation based on Porter's value chain approach. **European Journal of Operational Research**, v. 257, n. 2, p. 559-567, 2017.

KON, A. Ecossistemas de inovação: a natureza da inovação em serviços. **Revista de LANE, P. J.; KOKA, B. R.; PATHAK, S.** The reification of absorptive capacity: a critical review and rejuvenation of the construct. **Academy of Management Review**, v. 31, n. 4, p. 833-863, 2006.

LANE, P. J.; LUBATKIN, M. Relative absorptive capacity and interorganizational learning. **Strategic Management Journal**, v.19, n. 5, p. 461-477, 1998.

LEMONS, P. A. B. **As universidades de pesquisa e a gestão estratégica do empreendedorismo**: uma proposta de metodologia de análise de ecossistemas. 263f. Tese (Doutorado em Política Científica e Tecnológica) – UNICAMP, Campinas, 2011.

MARTINS, S. G.; SANTOS, A. S. D.; CARVALHO, L. M. O *Benchmarking* e sua aplicabilidade em unidades de informação: uma abordagem reflexiva. **Interface – Revista do Centro de Ciências Sociais Aplicadas**, v. 7, n. 1, art. 4, p. 57-68, 2010.

MOEENIAN, M.; GHAZINOORY, S; YAGHMAIE, P. Analysing the performance of a health innovation ecosystem in the COVID-19 crisis: complexity and chaos theory perspective. **Health Res Policy Sys**, v. 22, n. 59, 2024.

MOORE, J. F. **O fim da concorrência**: como dominar o ecossistema em que sua empresa está inserida. Tradução de Lenke Peres. São Paulo: Futura, 1996.

MOORE, J. F. Predators and prey: a new ecology of competition. **Harvard Business Review**, v. 71, n. 3, p. 75-86, 1993.

MOUSTAGHFIR, K.; SCHIUMA, G. Knowledge, learning, and innovation: research and perspectives. **Journal of Knowledge Management**, v. 17, n. 4, p. 495-510, 2013.

OCDE. **Health spending** (Indicador). 2022. Disponível em: <https://data.oecd.org/healthres/health-spending.htm>.

OCDE; EUROSTAT. **Manual de Oslo 2018**: a medição de atividades científicas, tecnológicas e de inovação, diretrizes para coleta, emissão de relatórios e utilização de dados sobre inovação. Paris: OCDE, 2018.

OH, D. S.; PHILLIPS, F.; PARK, S.; LEE, E. Innovation ecosystems: A critical examination. **Technovation**, v. 54, p. 1-6, 2016.

OMS. Organização Mundial da Saúde.; KRUG, Etienne G. **Relatório mundial sobre violência e saúde**. 2002.

relational capital in alliance learning of SMEs. **Journal of Small Business Management**, v. 54, n. 1, p. 234-255, 2016.

RITALA, P.; ALMPANOPOULOU, A. Em defesa do ecossistema de inovação 'eco'in. **Technovation**, v. 60, p. 39-42, 2017.

ROTHSCHILD, M. **Bionomics**: economy as ecosystem. New York: Henry Holt and Company, 1990.

RUBENS, N.; STILL, K.; HUHTAMAKI, J.; RUSSELL, M. G. A network analysis of investment firms as resource routers in Chinese innovation ecosystem. **Journal of Software**, v. 6, n. 9, p. 1737-1745, 2011.

SAMPIERI, R. H.; COLLADO, C. F.; LUCIO, M. D. P. B. **Metodologia de Pesquisa**. Porto Alegre: Penso, 5. ed., 2013.

SANTOS, M. J.; PERIN, M. G.; SAMPAIO, C. H. Capacidade de inovação de produto: Percepção dos gestores. **Revista Pretexto**, v. 19, n. 1, p. 43-55, 2018.

SCHMIDT, T. What determines absorptive capacity. In: *Druid tenth anniversary summer conference dynamics of industry and innovation: organizations, networks and systems*. Copenhagen. **Anais [...]**. Copenhagen: Copenhagen Business School, 2005.

SCHUMPETER, J. A.; NICHOL, A. J. Robinson's economics of imperfect competition. **Journal of Political Economy**, v. 42, n. 2, p. 249-259, 1934.

SILVEIRA, F. A.; DE MENEZES LIMA, J. J.; SARMENTO, A.G.M. Análise da relação entre os aspectos da polifasia cognitiva e da capacidade absorptiva individual na gestão do conhecimento organizacional. **Revista Foco (Interdisciplinary Studies Journal)**, v. 16, n. 4, 2023.

SPINOSA, L. M.; SCHLEMM, M. M.; REIS, R. S. Brazilian innovation ecosystems in perspective: some challenges for stakeholders. **REBRAE**, v. 8, n. 3, p. 386-400, 2015.

STANGLER, D.; BELL-MASTERSON, J. **Measuring and entrepreneurial ecosystems. Kauffman Foundation Research Series on City, Metro, and Regional Entrepreneurship**. Kansas: Ewing Marion Kauffman Foundation, 2015.

TEIXEIRA, C. S.; TRZECIAK, D. S.; VARVAKIS, G. **Ecosistema de inovação: alinhamento conceitual**. Florianópolis: PerSe, 2017.

TEIXEIRA, T. S. et al. Inovação e empreendedorismo: um caso no setor público. **Revista Pretexto**, v. 20, n. 1, p. 57-71, 2019.

TIDD, J.; BESSANT, J.; PAVITT, K. **Gestão da inovação**. Porto Alegre: Bookman, 2015.

TIRONI, L. F.; CRUZ, B. O. **Inovação incremental ou radical: há motivos para diferenciar? Uma abordagem com dados da Pintec**. Rio de Janeiro: IPEA, 2008.

TODOROVA, G.; DURISIN, B. Absorptive capacity: valuing a reconceptualization. **Academy of Management Review**, v. 32, n.3, p. 774-786, 2007.

UNESCO. **UNESCO Science Report: The Race Against Time for Smarter Development**. 2021. Disponível em: <https://www.unesco.org/reports/science/2021/en>.

VAN DE VEN, A. H.; POOLE, M. S. Methods for studying innovation processes. In: VAN DE VEN, A. H.; ANGLE, H. L.; POOLE, M. S. (ed.). **Research on the management**

of innovation: the Minnesota studies. New York: Oxford University Press, 2000. p. 31-54.

VAN DEN BOSCH, F. A. J.; VOLBERDA, H. W.; BOER, M. Coevolution of firm absorptive capacity and knowledge environment: organizational forms and combinative capabilities. **Organization Science**, v. 10, n. 5, p. 551-568, 1999.

WILLIS, A. J. The ecosystem: an evolving concept. **Functional Ecology**, v. 11, n. 2, p. 268-271, 1997.

YOO, S. J.; SAWYERR, O.; TAN, W. L. The mediating effect of absorptive capacity and YUAN, R., LUO, J., LIU, M. J., & YU, J. Understanding organizational resilience in a platform-based sharing business: The role of absorptive capacity. **Journal of Business Research**, v. 141, p. 85-99, 2022.

ZAHRA, S. A.; GEORGE, G. Absorptive capacity: a review, reconceptualization, and extension. **Academy of Management Review**, v. 27, n. 2, p. 185-203, 2002.

ZAHRA, S. A.; NAMBIAN, S. Entrepreneurship in global innovation ecosystems. **AMS Review**, v. 1, n. 1, p. 4-17, 2011.

Acknowledgement

We thank the National Council for Scientific and Technological Development (CNPq) for its financial support.

Luciano Vieira. Doutor em Desenvolvimento Regional (UNIJUÍ). Universidade Regional do Noroeste do Estado do Rio Grande do Sul – Ijuí – RS – Brasil. Endereço para correspondência: Rua Eduardo Kurtz, 146, bairro Santa Maria, Passo Fundo – RS. E-mail: luciano@primementoria.com

Jorge Oneide Sausen. Doutor em Engenharia de Produção (UFSC). Pós Doutorado em Administração. Universidade Regional do Noroeste do Estado do Rio Grande do Sul – Ijuí – RS – Brasil. Professor do Programa de Pós Graduação em Desenvolvimento Regional da UNIJUÍ. Endereço para correspondência: Rua São Boaventura, 44 - Bairro Elisabeth, Ijuí -RS. E-mail: josausen@unijui.edu.br

Gloria Charão Ferreira. Doutora em Administração (UBI/PT). Universidade Regional do Noroeste do Estado do Rio Grande do Sul – Ijuí – RS – Brasil. Endereço para correspondência: Rua Flores da Cunha, 111/504, Bairro Pátria Nova, Novo Hamburgo – RS. E-mail: gcfconsultoria@gmail.com

Lidiane Kasper. Doutoranda em Desenvolvimento Regional (UNIJUÍ). Universidade Regional do Noroeste do Estado do Rio Grande do Sul – Ijuí – RS – Brasil. Bolsista CAPES. Assistente em Administração no Instituto Federal Farroupilha – IFFar. Endereço para correspondência: Av. Tuparendi, 2096, apto. 202, Bloco 5, bairro Glória, Santa Rosa - RS. E-mail: lidianekasper@gmail.com

Submetido em: 16/02/2024

Aprovado em: 04/12/2025

CONTRIBUIÇÃO DE CADA AUTOR

Conceituação (Conceptualization): Luciano Vieira e Jorge Oneide Sausen

Curadoria de Dados (Data curation): Luciano Vieira e Jorge Oneide Sausen

Análise Formal (Formal analysis): Luciano Vieira

Obtenção de Financiamento (Funding acquisition):

Investigação/Pesquisa (Investigation): Luciano Vieira

Metodologia (Methodology): Luciano Vieira, Jorge Oneide Sausen e Gloria Charão Ferreira

Administração do Projeto (Project administration): Luciano Vieira

Recursos (Resources): Luciano Vieira

Software: Luciano Vieira

Supervisão/orientação (Supervision): Jorge Oneide Sausen e Gloria Charão Ferreira

Validação (Validation)

Visualização (Visualization)

Escrita – Primeira Redação (Writing – original draft): Luciano Vieira

Escrita – Revisão e Edição (Writing – review & editing): Jorge Oneide Sausen , Gloria Charão Ferreira e Lidiane Kasper.