The Influence of Dynamic Capabilities in Knowledge-Intensive Enterprises: A Study on a Regional Program to Foster Innovation in KIE Firms

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Abstract

The literature on innovation policies for knowledge-intensive entrepreneurship has discussed the implications of these policies on businesses and how they relate to knowledge-intensive entrepreneurship and regional development. This article explores the relationship between dynamic capabilities (network and absorptive) and entrepreneurial attitudes with the innovative capacity of knowledge-intensive companies participating in a regional public policy for innovation and entrepreneurship. Forty-six questionnaires were administered, assessing dynamic capabilities and entrepreneurial attitudes. Data underwent Factor Analysis and ANOVA. The findings support prior research on the relationship between Causation/Effectuation, Network Capacity, and Absorptive Capacities. The study's results indicate that both policymakers and managers of knowledge-intensive companies can adopt several strategies to foster innovation, which are discussed in the main findings of the research. This research fills a gap in the literature by examining factors influencing the development of innovative capabilities in knowledge-intensive companies within a government innovation stimulus program. Most studies focus on regional policy impact or performance analysis, while this article emphasizes the evolution of internal capabilities within such firms.

Keywords: Knowledge-intensive entrepreneurship, Dynamic capabilities, Innovation policy, Regional development, Absorptive capacity, Network capacity.

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1. Introduction

Foster programs and public policy mechanisms to stimulate innovation have been used to promote regional development, especially in emerging economies. (Trajtenberg, 2009; Cunningham et al., 2016). It is possible to cite some actions created or enhanced by governments for regional innovation policies, such as: i) formation of innovation hubs and knowledge spillovers; ii) fostering technology transfer from universities to companies; iii) the stimulation of the creation and maturation of knowledge-intensive companies (Da Cunha, Vilhena & Selada, 2009; Patanakul & Pinto, 2014; Gifford, Mckelvey & Saemundsson, 2021; Hope & Limberg, 2022). These actions and mechanisms offered by these policies are used to improve the capabilities of the beneficiated companies, especially considering their initial levels in human and social capital stocks and their entrepreneurial attitudes.

In this context, the Knowledge-Intensive Companies field (KIC) has been a widely studied point of research that seeks to identify which factors enhance the creation and development of the KIC (Groen, 2005; Caloghirou et al., 2015; Protogerou & Caloghirou, 2016). These studies address both the regional level, which investigates the interinstitutional dynamics that enhance the KIC, and the firm level, seeking to understand the internal factors, such as the different dynamic capabilities, such as absorptive and networking capabilities. These capabilities adjust to the way these entrepreneurs build, accumulate, and apply knowledge creating innovative capabilities, enabling the market success of these companies (Boccardelli & Magnusson, 2006). Hence, there is still room for studies that analyze which factors may lead these firms to develop their innovative capabilities when they join a government innovation stimulus program. This study seeks to reduce this gap in the literature by answering the following research question: how do dynamic capabilities (network and absorptive) and entrepreneurial behavior impact on the innovative capacity of the knowledge-intensive companies during their participation in a regional public policy to foster innovation and entrepreneurship?

The research question is grounded in the increasing emphasis on understanding how firms build innovation capabilities through both internal and external mechanisms. This study focuses on dynamic capabilities, including network and absorptive capacities, and entrepreneurial decision-making, as key drivers for fostering innovation, particularly in knowledge-intensive firms.

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Dynamic capabilities, such as absorptive capacity, have been shown to enable firms to acquire, assimilate, and exploit external knowledge, thereby enhancing their innovation potential. Recent studies, such as Alves and Galina (2021), have emphasized the need for better measures of dynamic absorptive capacity to evaluate how firms can leverage external knowledge for sustained innovation performance in national contexts. Moreover, the role of entrepreneurial orientation, particularly through the concepts of causation and effectuation, is seen as a crucial mediator in firms' innovation processes. Sarsah et al. (2020) highlighted that entrepreneurial orientation can significantly boost radical innovation, especially when supported by absorptive capacities.

In regional innovation programs, several key factors significantly contribute to enhancing the innovation capacity of knowledge-intensive firms. This study aims to investigate these factors through the following hypotheses. First, companies with higher innovative power exhibit greater potential for developing new products, thereby positively impacting their overall innovation capabilities (H1). Additionally, entrepreneurial decision-making approaches, particularly causation and effectuation, are expected to further augment these firms' capacity to innovate by fostering strategic adaptability and planning (H2). Network capacity also plays a crucial role, as it promotes collaboration and the exchange of knowledge, which, in turn, enhances innovation capabilities (H3). Moreover, absorptive capacity—defined as the firm's ability to recognize, assimilate, and apply external knowledge—proves to be a key factor in boosting innovation among knowledge-intensive firms (H4).

This research aims to list variables that can determine how capabilities and behaviors impact the Innovation Capacity of KICs, when they are under the benefit of public policies to encourage innovation. By identifying key variables in this context, the study can provide crucial insights for the development and implementation of more effective policies, aiming to promote an environment conducive to innovation and technological progress.

This study is structured in five more sections, in addition to this Introduction. The second section deals with the Literature Review on public policies of innovation, dynamic capabilities and entrepreneurial decision making (causation & effectuation). The third section discusses the analytical framework that guides this research, presenting how the addressed constructs are related. The fourth section deals with the Methodology approached in the research, while the following one presents the Results obtained. Finally, the last section concludes by dealing with the study's Final Considerations.

2. Literature Review

a. Public Policies of Fostering Innovation and Entrepreneurship

Innovation plays a fundamental role in the economic success and competitiveness of an organization. To be able to innovate, companies need to demonstrate agility in adapting to changes in the environment. Knowledge Intensive Companies (KIC) play a crucial role in this context, as they depend heavily on knowledge and Research & Development (R&D) activities to boost their operations. As a result, they have the ability to innovate in a more agile and impactful way compared to conventional companies. However, this characteristic also presents significant challenges, as EICs require highly qualified professionals, substantial investments in R&D, robust financial resources, and a broad support network to ensure their survival and success in the face of competition (Klimas & Czakon, 2022; Sikosek, 2024).

Public policies are important instruments in fostering entrepreneurship and innovation, being more relevant for economic development of the Knowledge-Intensive Companies. These instruments can impact the KIC from a set of policies and decisions from a systemic perspective (Caloghirou et al., 2015). Caloghirou et al. (2015) argue how public policies are important in fostering entrepreneurship and innovation, and they are most relevant to the Knowledge-Intensive Companies. The authors state that public policies can impact the Knowledge-Intensive Companies from a set of policies and decisions from a systemic perspective. In this way, an innovation policy can be conceptualized as a series of governmental activities in plans, programs, projects, or actions to foster innovation (Audretsch & Link, 2012; Bajmócy & Gébert, 2014; Patanakul & Pinto, 2014; Silva, Serio & Bezerra, 2019). Edler & Fagerberg (2017) add that these policies must be applied at different times and under different motivations, including different approaches.

The authors demonstrate three types of innovation policies: i) oriented to the mission, which, according to Ergas (1987), aim to provide new solutions that work for specific challenges on the policy agenda; ii) invention policies, which have a narrower focus, as they focus on activities (R&D), and transfer the exploitation and diffusion of the invention to the market; iii) oriented to the system, which concern resources at the system level, such as the degree of interaction between the different parts of the system.

Policies can not only provide a solution to a social challenge, but also to stimulate entrepreneurship, innovation and growth and therefore transform local economies and sophisticate local supply. The development of new technologies that can emanate from policies can also support the diversification of relevant sectors of the local economy and create opportunities in other related sectors (Zabala-Iturriagagoitia, 2022).

b. The importance of Entrepreneurial Behavior in Public Policies of Innovation (PPI)

Public policies to stimulate science, technology and innovation (S,T&I) aim to boost the creation of interaction environments between the academy and the market, by generating closer relationships between these actors (Cóser, Brandão, Raposo, & Gonçalves, 2018), expanding the capacity of these actors to develop new products and generate technological innovation. In this way, the decision making of managers involved in the process of innovative entrepreneurship is a relevant factor for entrepreneurship. In this sense, the decision making related to risk and investment, for example, reflects how well these companies can transform the knowledge they possess into the development of new products and technological services for their customers (Cooper, 2011, 2019).

Contextual elements and entrepreneurial microprocesses linked to individual behavior are intrinsically intertwined. This interaction between input and output elements is complex, involving high levels of endogeneity in the causal trajectories. Although innovation and entrepreneurship ecosystems have conceptual similarities, their respective trajectories, and levels of success present significant differences - even within a single country (Spigel, 2017; Fischer, Moraes & Schaeffer, 2019; Fischer, Schaeffer, & Queiroz, 2019; Stam & van de Ven, 2019; Rocha, Moraes & Fischer, 2022).

Innovations propagate through a society or social system incrementally, with initial adoption by a small group of innovators, followed by a majority adopter, and finally by laggards. Companies with greater innovative power tend to be at the forefront of this diffusion, developing and adopting innovations before other companies (Rogers, 2003; Christensen, Raynor & McDonald, 2013).

In many cases, innovative companies tend to group themselves geographically into innovation clusters. In these areas, collaboration and interaction between knowledge-intensive companies is common, creating an environment conducive to sharing ideas and resources. Companies with greater innovative power within these clusters can play a crucial role in driving innovation throughout the local business community (Martin & Sunley, 2006).

Innovative companies are often involved in innovation networks, which may include other companies, universities, research institutions and government organizations. In these networks, sharing knowledge and resources is essential to drive innovation. Companies with greater innovative power are more likely to lead or influence these networks, which can benefit other companies involved, especially knowledge-intensive ones (Burt, 2000; White, Powell, Koput & Owen-Smith, 2005).

Companies with greater innovative power often have more developed social capital and a solid reputation in the market. This can facilitate strategic partnerships, access to financing and collaborations with other companies. As a result, these companies have more resources available to invest in research and development of new products, positively impacting the innovation capacity of knowledge-intensive companies (Adler & Kwon, 2002).

Chesbrough (2020) asserts that companies adopting open innovation are more effective at transforming external knowledge into new products and services, thereby enhancing their competitiveness in global markets. Emphasize that collaborative innovation is crucial for knowledge-intensive firms, as it fosters synergies and accelerates innovation capacity. Companies employing open innovation strategies often create a virtuous cycle of innovation, where the introduction of new products strengthens their innovative capabilities, producing positive effects within the business ecosystem. Bogers et al. (2019) explain that the dynamic capabilities of innovative companies enable them to develop products faster and adapt swiftly to market changes, solidifying their leadership position.

During a participation in a regional program of fostering innovation, these firms are usually enabled to advance in their levels of competitive advantages. Thus, the higher the initial levels of these companies in converting knowledge into new products (Sousa-Ginel, Franco-Leal & Camelo-Ordaz, 2017), possibly, the greater the organization's capacity to build new competitive advantages and generate innovation. In this sense, the first hypothesis of the study is proposed:

H1: In a regional program of fostering innovation, the ability to develop new products is higher in the group of firms with higher innovative power that have more ability to positively impact the capability of innovation in the knowledge-intensive companies.

c. The importance of Entrepreneurial Behavior in Public Policies of Innovation (PPI)

The causal-effect approach suggests that certain actions or decisions can cause or influence specific outcomes. In the business context, entrepreneurial decisions, such as investments in research and development (R&D), strategic partnerships or the introduction of new business models, can have a positive impact on companies' innovation capacity (Davidsson, 2015). Successful entrepreneurial decisions can serve as inspiring examples for other companies, demonstrating the benefits and opportunities associated with innovation. This can lead to an imitation effect, where other knowledge-intensive companies are motivated to follow suit, thereby increasing innovation capacity across the industry or region.

Effectuation theory suggests that entrepreneurs not only respond to existing opportunities but also create them through their actions. By making entrepreneurial decisions, entrepreneurs can actively shape the business environment, stimulating innovation and creating new opportunities for growth and new product development in knowledge-intensive companies (Sarasvathy & Dew, 2005; Sarasvathy, 2009). Entrepreneurial decisions often involve building and strengthening business and collaboration networks. Social capital derived from these networks can provide access to resources, knowledge and innovation opportunities that can boost the innovation capacity of knowledge-intensive companies (Adler & Kwon, 2002).

The theoretical concepts involved in the dominant paradigms that address the causation & effectuation connection are based on distinct, but not exclusive, theoretical principles in the applicability of these models in different organizational contexts (Sarasvathy, 2001a; Read & Sarasvathy, 2005; Read et al., 2009; Lemos., 2016).

The existence of the causation type of decision model is based on the idea of broad predictability and management control to ensure the maximization in reducing risks and uncertainties in the innovation process (Sarasvathy, 2001a; Ahuvia & Bilgin, 2011). From this logic of analysis, the model supports the development of methodological actions that lead the direction of the different variables, to control the results and the effects produced throughout the innovation process, to guarantee the desired results (Sarasvathy, 2001; Read & Sarasvathy, 2005; Chandler et al., 2011).

The decision-making model known as effectuation assumes that all events and variables involved in the innovation process cannot be fully controlled, considering that the adaptability to risk is an inherent factor in innovative processes (Sarasvathy, 2001a; Tasic & Andreassi, 2008). Thus, the innovative trajectory of organizations is influenced by economic and behavioral aspects, represented respectively by the political-economic scenario experienced by the organizations, as well as their ideologies and purposes (Buchanan & Vanberg, 1991; Sarasvathy, 2001a; Sarasvathy & Dew, 2005; Lemos, 2016).

Entrepreneurial decision-making, addressed through the logics of causation and effectuation, plays an important role in the innovation of knowledge-intensive companies. According to Sarasvathy (2001), causation starts with a specific objective and selects the means to achieve it efficiently. However, this process is more suitable for stable environments, as it relies on forecasts and detailed plans (Sarasvathy & Dew, 2005). Effectuation, also developed by Sarasvathy, focuses on available resources and dynamic adaptation, enabling the creation of value in uncertain scenarios, which is especially relevant for knowledge-intensive companies facing complex environments (Berends et al., 2014).

The entrepreneurial behavior associated with the innovative process, referred in the literature as effectuation and causation, appear to be, in a combined manner, an advantage for entrepreneurial behavior based on knowledge and participation in startups, operating within a journey proposed by public policies to stimulate innovation (Vanderstraeten et al., 2020; Roach et al., 2016; Berends et al., 2014; Yu et al., 2018; Buarque et al., 2020; Henninger et al., 2020). Thus, the following hypothesis can be considered in this study:

H2: In a regional program of fostering innovation, entrepreneurial decision making (causation & effectuation) positively impacts the innovation capacity of the knowledge-intensive companies.

d. The importance of Entrepreneurial Behavior in Public Policies of Innovation (PPI)

A company's networking capacity encompasses its ability to build, manage and exploit connections with a variety of stakeholders, be they partners, suppliers or even competitors. These networks facilitate the exchange of knowledge and essential resources to transform scientific insights, combined with a solid understanding of the market, into products and services (Vesalainen & Hakala, 2014; Sousa-Ginel, Franco-Leal, & Camelo-Ordaz, 2017; Sikosek, 2024). Previous studies have highlighted the importance of network capabilities in creating a competitive advantage, especially for KIE companies.

It is only through the effective development of these networking skills that KIE companies can gain expertise in commercializing new products in unexplored sectors, particularly during the early stages of operation where knowledge in product development and technology transfer is crucial. In this context, networks play a fundamental role in obtaining necessary resources and support (Boccardelli & Magnusson, 2006; Sousa-Ginel, Franco-Leal, & Camelo-Ordaz, 2017; Sikosek, 2024).

Absorptive capacities play a vital role in the innovation process and in strengthening a company's competitive advantage. They refer to the organization's ability to acquire, assimilate, transform, and apply new information, being essential to foster internal innovation. Absorptive capacity requires members of the organization to learn new approaches and integrate new knowledge, adopting new practices and requiring adaptation to methods different from those already existing. Furthermore, absorptive capacity demands the development and application of knowledge structures that allow the incorporation of newly learned practices. However, this can lead to internal challenges when there is a lack of cohesion or when there is conflict with current knowledge or knowledge structures (Cohen & Levinthal, 1990; Zahra & George, 2002; Cepeda-Carrion, Cegarra-Navarro & Jiménez, 2012; Sikosek, 2024).

Participation in an innovation network can provide knowledge-intensive companies with access to resources and expertise that they do not have internally. This includes access to funding, advanced research infrastructure, specialized technical skills, and market insights. These additional resources and expertise can increase companies' ability to successfully develop and implement innovations (Ahuja & Katila, 2001; Reagans & McEvily, 2003). Innovation networks serve as platforms for learning and knowledge dissemination. Companies can learn from the experiences and practices of other companies on the network, as well as access information about market trends, emerging technologies, and collaboration opportunities.

This learning and dissemination of knowledge can fuel creativity and inspire new innovative ideas. Innovation network theory emphasizes the role of interactions between companies, research institutions, government, and other entities in promoting innovation. These networks facilitate the sharing of knowledge, resources, and experiences, creating a favorable environment for the development and dissemination of new ideas and technologies (Breschi & Malerba, 2005; Câmara et al., 2018). The network effect refers to the phenomenon whereby the value of a network increases as more participants joins it. In a regional policy of fostering innovation, a robust network of companies, research institutions and other organizations can create a virtuous cycle of innovation, where increased participation and interaction leads to an increase in the innovation capacity of all parties involved (Burt, 2000; Metcalfe, 2002).

Firms that rely heavily on knowledge, such as high-tech firms, benefit directly from collaborative networks to access information, resources, and specialized skills that complement their internal capabilities (Laursen & Salter, 2006; Boschma, 2017). Studies indicate that diversified networks increase innovative potential by providing access to multiple perspectives and know-how, while deeper networks promote trust and lasting cooperation, both crucial for innovation (Phelps, 2010; Li-Ying & Wang, 2015). Thus, building robust and diversified networks becomes a strategic asset, essential to improving innovative performance, especially in highly complex and technically demanding sectors.

In the context of a regional policy of fostering innovation, the capabilities to connect with actors of the innovation ecosystem is important for the development of the KICs, as it is related to organizational learning and technological evolution (Diánez-González & Camelo-Ordaz, 2017; Mcgrath, Medlin & O'toole, 2019). Knowledge-intensive companies generally seek to participate in networks to access technological knowledge and commercial opportunities (Walter, Auer & Ritter, 2006; Huynh et al., 2017; Oukes et al., 2019). Their managers decide to participate in cooperative networks to collaborate and share knowledge that can generate innovation (Breschi & Malerba, 2005; Câmara et al., 2018). In this way, Network Capability is important for Innovation Capability, so Hypothesis 3 of the study is formulated:

H3: In a regional program of fostering innovation, network capacity positively impacts innovation capability in the knowledge-intensive companies.

Absorptive capacity refers to a company's ability to acquire, assimilate, transform, and apply new external knowledge to improve its processes, products, or services. According to this theory, companies with greater absorptive capacity are more effective in taking advantage of innovation opportunities and adapting to changes in the external environment (Cohen & Levinthal, 1990). The capabilities of a company to perceive relevant information from the external environment, assimilate it, and incorporate it into the business model are central to its innovative performance (Cohen & Levinthal, 1990). These capabilities relate to management and learning aspects (Tsai, 2001), and are even more relevant in the knowledge-intensive companies, since they are organizations that constantly rely on leveraging new knowledge and transforming that knowledge into innovation. (Protogerou & Caloghirou, 2016).

Absorptive capacities follow a trajectory that is dependent on the accumulation of knowledge (Utterback & Abernathy, 2018; Cohen & Levinthal, 1990; Rothwell, 1994). In this sense, individuals and the organization accumulate knowledge in a specific area based on previous learning processes and acquire new knowledge in that same area. This concept is divided in the literature into two fronts: i) potential absorptive capacities, which encompass the dimensions of acquisition and assimilation, defined by the literature as Realized Absorptive Capacity (RACAP); ii) performed absorptive capabilities, which include the dimensions: transformation and application of knowledge defined as Potencial Absorptive Capacity (PACAP) (Camisón & Villar-López, 2014; Zahra & George, 2002).

The development of absorptive capabilities in the KICs depends highly on internal resources. This construct is important for the development of innovative capabilities in the KICs and it is also related to knowledge conversion capabilities, for the development of innovative capabilities in organizations (Sousa-Ginel, Franco-Leal, & Camelo-Ordaz, 2017; Zahra, Van De Velde, & Larraneta, 2007). Companies with greater absorptive capacity can learn from previous experiences, both internal and external, and adapt their innovation strategies and processes based on this learning. This contributes to a continuous cycle of learning and improvement, boosting the capacity for innovation over time (Argote & Ingram, 2000).

Absorptive capacity refers to a firm's ability to identify, assimilate, and apply external knowledge to create new products and processes, and is especially critical for knowledge-intensive firms (Cohen & Levinthal, 1990). This absorption process facilitates access to advanced technologies, innovative practices, and ideas that go beyond the firm's internal resources, thus boosting innovative potential (Zahra & George, 2002).

Empirical studies show that firms in high-technology and R&D-intensive sectors, such as biotechnology and information technology, use absorptive capacity to gain competitive advantage. These firms often face dynamic markets and need continuous knowledge updating and innovation to remain competitive (Fosfuri & Tribó, 2008). Furthermore, effective use of absorptive capacity allows firms to quickly integrate external advances, increasing their innovative agility and ability to adapt in a rapidly evolving technological environment (Flatten et al., 2011).

In a regional innovation promotion program, companies have the opportunity to interact with other organizations, such as universities, research centers and other companies, forming knowledge networks. Companies with a greater absorptive capacity are better able to integrate into these networks, taking advantage of available resources and knowledge and, thus, strengthening their capacity for innovation (Autio, Nambisan, Thomas & Wright, 2018). Empirical studies have consistently shown a positive relationship between companies' absorptive capacity and innovation capacity. Research carried out in different sectors and regional contexts has shown that companies with greater absorptive capacity tend to innovate more frequently and launch more successful products on the market (Dahlander & Gann, 2010; Laursen & Salter, 2006). Thus, Hypothesis 4 of the study is presented:

H4: In a regional program of fostering innovation, absorptive capacity positively impacts innovation capacity of the knowledge-intensive companies.

3. Analytical Framework of the Research

The analytical framework of this research is presented in Figure 1. It seeks to list variables that can determine how capabilities and behaviors impact the Innovation Capability of the KICs, when they are under the benefit of public politics of fostering innovation. In this case, two groups of variables are established that can, with their levels of the starting at the receipt of benefits, influence the engagement of teams in the program: i) entrepreneurial/innovative attitudes (new product development and decisions of the Causation & Effectuation type) and ii) dynamic capabilities (absorptive and network).

In this way, it is considered that when a team from a knowledge-intensive company already acts in an entrepreneurial and innovative way and already has some capacity for knowledge absorption and networking, it will also be able to apply this knowledge during the Program more effectively in the development of its innovative capabilities, promoting a more effective impact of the Program on the technological evolution and on the success of these companies/teams.

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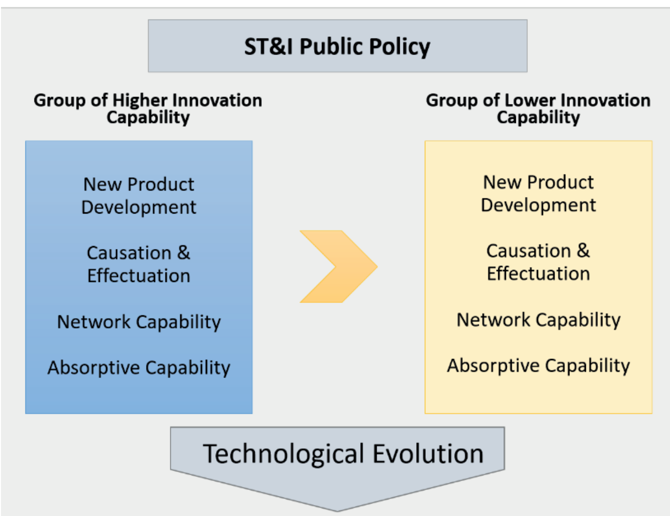
The proposed research design aims to investigate how the internal capabilities of the KICs are influenced by public policies to promote innovation, focusing on entrepreneurial/innovative attitudes and dynamic capabilities. By identifying key variables in these areas, the research offers an analytical framework for understanding how these capabilities affect the Innovation Capacity of KICs. Furthermore, by considering initial levels of receipt of benefits from innovation policies, the research allows for a longitudinal analysis of the development of internal capabilities over time, providing valuable insights into how companies can adapt and adopt new technologies more effectively.

This approach not only connects theory and practice but can also inform the design of more effective policies to promote a more significant impact on technological development and the success of companies/teams, thus contributing to the advancement of knowledge about internal capabilities and their relationship with innovation. The hypothesis test, to be discussed later, will present which constructs impact Innovation Capability and at what level of importance.

Figure 1. Analytical Framework of the Research. Developed by authors.



4. Methodology

a. Empirical Corpus of the Research

The survey application was carried out in Ceará, a state in the Brazilian Northeast region. This state has about 9,240,580 in estimated population, distributed in 148,894.442 km², in 184 municipalities, with an HDI of 0.682 and with monthly household income per capita of R$ 1,028.00 (IBGE, 2010, 2020, 2021; IPECE, 2020). The State of Ceará in the Innovation Index of the Brazilian States (FIEC, 2021) shows that in 2021, this state currently ranks 11th in the general index, ranking 9th in capabilities and taking the 14th position in results. It is 2nd among the Northeastern states, behind only Pernambuco (10th), with São Paulo in first place. Specifically, the public policy researched was the Economic Clusters of Innovation Program (ECIP) promoted by the Government of the State of Ceará, in the northeastern region of Brazil. The objectives of the ECIP are:

i Strengthen regional economic and social development;

ii. Generate greater competitiveness in the regions by increasing the productivity of activities with greater potential;

iii. Create a new economy based on the region's innovative entrepreneurship;

iv. Foster the wealth of the region with better income distribution;

v. Increase the wealth of the state with better distribution among the regions; and

vi. Retain and attract talent trained in the region, by offering high quality opportunities.

The Program is coordinated, monitored, and supervised by a central team from the State Government and was created as a strategic initiative to strengthen innovation and competitiveness in specific regions of the state, with the aim of fostering sustainable economic development, increasing the competitiveness of local companies and creating a conducive environment for innovation and entrepreneurship. Before its official launch, the program went through a series of preparation phases, during which meetings and discussions were held with representatives from various sectors of society. These meetings included government agencies, universities, research and technology institutes, unions and business associations. These entities played an essential role in assessing the demands and economic characteristics of each region, which helped identify strategic clusters and the main challenges faced by local companies.

Discussions focused on analyzing production chains, innovation opportunities and specific problems in each sector of Ceará, such as lack of skilled labor, limited access to technologies and challenges to innovation. These meetings allowed the structuring of an action plan adapted to each cluster, with solutions to increase the competitiveness of companies and strengthen intersectoral collaboration for sustainable regional development. The program sought to align local demands with public policies and establish a solid basis for cooperation between the sectors involved. This ensured that the program's actions were aligned with the real needs of companies and that there was a collective commitment to support the development of each economic cluster in a targeted and effective manner.

The program had the participation of 41 Regional Researchers from their respective Clusters, who promoted the transfer of knowledge between science and technology institutions (STIs) in their region and the productive sectors; the entrepreneurial construction of innovative technological solutions, with 46 startups benefited in the realization of projects that aimed to contribute to the development of these programs and generate impact on science, technology, and innovation in the Clusters. The ECIP offered scholarships as a stimulus for entrepreneurs to engage in the activities developed. In addition, a journey for the development of solutions and improvement of business proposals was also offered with a set of activities that were developed by the KICs and that also connect with the development of entrepreneurial skills and behaviors presented in the proposed analytical framework, according to the Table 1.

Table 1. Activities of the KICs Stimulation Journey and its relationship with the constructs of the study.

Constructs that relate to the ECIP journey	Activities of the Journey of Stimulation to the KICs of the Program
Dynamic Capabilities	Capacity building in: i) Business modeling; and ii) Corporate Agreement
Causation & Effectuation	i) Product Roadmap; ii) Product design; iii) Prototype; and iv) Demoday Preparation
Dynamic Capabilities	Workshops in: i) Corporate Governance; ii) Agile Methodologies Sales Stream and KPIs; iii) Finance and Pricing; and iv) Mentoring with Market Mentors
Causation & Effectuation	i) Connection with the Innovation Ecosystem; ii) Monitoring for Business Evolution; and iii) Resource Raising Opportunities

Source: Developed by authors

b. Data Collection

Due to the opportunity of direct access to all startups participating in the program, it was not necessary to apply any statistical procedure for sample selection. The non-probability sample by accessibility used here was composed of 46 startups - these being the unit of analysis of this study (Vergara, 2016).

As for the data collection procedure, which took place between January and March 2022, questionnaires were applied to entrepreneurs, managers, and technicians of the projects, who received electronic questionnaires accessed through links sent by e-mail. The questionnaire, applied during the companies' participation in the public policy, was prepared based on variables intrinsic to the dimensions of the constructs addressed in the Theoretical Framework.

To this purpose, the scale, structure and order of questions and formatting were defined according to scales already used by several seminal authors in the field of intensive entrepreneurship of knowledge (Table 1). In the questionnaire, 5-point Likert scales were applied to the questions.

Hence, the variables that make up the research instrument were developed from the confluence of theoretical aspects raised in the literature associated with the theme of the knowledge-intensive companies. Scales consolidated in the literature were applied to the following constructs: i) Dynamic Capabilities, including the dimensions Creativity and New Product Development, Absorptive Capacity and Network Capacity; ii) Entrepreneurial Behavior, including the two decision making processes - Causation & Effectuation; and iii) Innovativeness, which includes Innovative Capability.

c. Data Analysis

The data collected underwent treatment that occurred through statistical procedure (Vergara, 2016), using two computational tools: Microsoft Excel and IBM SPSS Statistics (Cooper & Schindler, 2014), that supported the operationalization of the Factorial Analysis and the Analysis of Variance practiced (Corrar, Paulo & Dias, 2014; Hair et al., 2009).

d. Exploratory Factorial Analysis (EFA)

With the Exploratory Factorial Analysis, two extraction methods were tested - Main Components and Factorization by Main Axis. Exploratory Factor Analysis (EFA) is a statistical technique used to identify underlying patterns in data and reduce the dimensionality of a set of observed variables. EFA uses techniques such as factor extraction and component rotation to simplify and interpret results. Factor extraction involves identifying the latent factors that explain most of the variability in the data. The orthogonal varimax rotation method was used as rotation method and the factor loadings in the range of ± 0,30 to ± 0,40 (Hinkin, 1995, 1998; Corrar, Paulo & Dias, 2014; Hair et al., 2009).

In this study, based on the above-mentioned statistical steps and tests, it was examined the correlation of 75 original variables of ten measurement scales built from five conceptual domain dimensions of the three constructs studied, as shown in Table 2, which connects these attributes.

Table 2. Characteristic composition of the scale items per construct

Constructs	Conceptual Dimensions / Literature	Scales of Measurement	Questions (Obs. Var.)
Dynamic Capabilities	Creative Development of New Products **(CNDP)** Rindfleisch & Moorman (2001), adapted from Moorman & Miner (1998)	New Products and Creativity	7
	Absorptive Capacity **(AC)** Flatten et al. (2011)	Potential Absorptive Capacity	10
		Performed Absorptive Capacity	8
	Network Capacity **(NC)** Walter, Auer & Ritter (2006)	Coordination	6
		Relational Abilities	4
		Partners Knowledge	4
Entrepreneurial Behavior	Causation e Effectuation **(CE)** Chandler et. al. (2011); Chandler et. al. (2011); Sarasvathy (2001)	Entrepreneurial Decision-Making Causation e *Effectuation* type	7
		Entrepreneurial Decision-Making Effectuation type	13
Innovativeness	Innovative Capacity **(IC))** Tuominen & Hyvönen (2004) Camisón & Villar-López (2010)	Organizational Practices of Innovation for Production of Products and Services	8
		Organizational Innovation Practices for Knowledge Generation	8

Source: Developed by authors

e. Analysis of Variance (ANOVA)

This research aims to reject the null hypothesis, and to do this, Analysis of Variance (ANOVA) was used to reflect the differences between the treatment groups on the dependent variable, assuming equal means as the null hypothesis. ANOVA is a statistical technique used to compare the means of different groups and determine whether there are statistically significant differences between them. The process involves calculating the total variation in the data and decomposing this variation into different sources, such as between-group variation and within-group variation. ANOVA compares the magnitude of variation between groups with the magnitude of variation within groups, using statistical tests to assess whether differences between group means are greater than would be expected due to chance.

The estimated ANOVA model considered as dependent variable the Innovative Capacity (IC) and as factors related to the independent variables: Causation & Effectuation (CE), Creative Development of New Products (CDNP), Absorptive Capacity (AC) and Network Capacity (NC). See Equation 1 described:

$$IC = CE + CDNP + AC + NC \quad (1)$$

Each factor (independent variables) was grouped into two levels - high or low. For this, the statistical measure of the median was used as a parameter to divide the factor. The criterion was established as follows: if above the median it assumes value 1 (high level); otherwise, it assumes value 2 (low level).

In this way, the hypotheses proposed by the analytical framework (Figure 1) will be falsified one by one using the ANOVAs in which it is assumed that there is a difference of means of innovative capabilities between the groups of startups divided by the median (plus and minus) of each of the independent variables (CE; CDNP; AC; NC). The following represents, as an example, the way to test the Hypothesis, which is repeated for the other hypotheses, considering for each one the groups formed by the respective independent variable.

Hypothesis - H1:

$CNDP_1 \neq CNDP_2$, as being:

$CNDP_1$ = average of the innovative capacity of the group of startups above the median of the CDNP

$CNDP_2$ = average of the innovative capacity of the group of startups below the median of the CDNP

To this end, the appropriate calculation measure is the f statistic, whose interpretation was based on a significance lower than 0.10, corresponding to the critical f value above 3,84 (Hair et al., 2009). Parametric modifications were applied under non-normality and heterogeneity of variance behaviors to ensure higher reliability of the ANOVA results: the bootstrapping procedure to correct likely deviations from normality in the sample distribution and discrepancies between group sizes (Haukoos & Lewis, 2005); and when necessary, the Welch bootstrap f test, for variance heterogeneity correction (Blanca et al., 2018; Delacre et al., 2019).

5. Formation of the Constructs of the Proposed Framework

The results show that all samples of variables have a satisfactory size for performing factorial analysis [KMO>0,8], except for the sample associated with the construct "Creative Development of New Products", which presents an unsatisfactory size; but feasible for factorial analysis [KMO<0,8; >0,6].

In addition, the results showed that there is correlation between the "original variables" that make up the sample of each construct [P<0.05]. This allows us to reduce the set of original variables into a smaller number of factors that can explain part of the variability of the total data of the analyzed construct.

Subsequently, a first factor extraction analysis was performed using the "Main Components" method with the application of orthogonal varimax rotation of the factors, considering factorial loadings above 0.30.

Afterwards, a second factor analysis was performed. Now with factor extraction by the "Factorization by Main Axis" method with the use of orthogonal varimax rotation, continuing to consider factorial loadings above 0.30. Both extraction methods aimed to detect the number of factors with self-values greater than 1. As consolidated in Table 3.

Table 3. Variance Explained by Extraction Methods

Construct	Number of Factors	Elevated Self-Values	Main Components (%) accumulated from Explained Variance	Factorization by Main Axis (%) accumulated from Explained Variance
Creative Development of New Products (CDNP)	1	3,109	37,7	31,17
	2	1,171	61,14	50,42
Absorptive Capacity (AC)	1	9,566	26,31	24,93
	2	1,835	49,57	46,72
	3	1,624	72,36	67,66
Network Capacity (NC)	1	8,183	35,99	34,91
	2	1,218	67,15	62,38
Causation & Effectuation (CE)	1	11,692	27,05	26,26
	2	1,527	54,08	51,42
	3	1,191	72,04	67,8
Innovation Capacity (IC)	1	7,927	25,41	20,4
	2	1,538	44,01	37,58
	3	1,21	59,51	52,23
	4	1,097	73,57	64,86

Source: Developed by authors

The idea of working with two options of arrangements was to increase the possibilities of analysis as to the extraction of factors and as to the total variance explained, seeking the most theoretically suitable configuration for the study. In this sense, it was observed from the results, that the best alternative arrangement was the "Main Components" method, by presenting better cumulative percentages of data variability explanation per construct. As for the factor extraction analysis, both methods extracted the same number of factors for each construct.

5.1 Test of the Framework Hypotheses

To verify the inexistence of normality deviation in the frequency distribution of the data of the variable "Innovation Capacity" and thus avoid damage to the results of the ANOVAs, the Shapiro-Wilk statistical test was performed, which presented a significant result.

$$Z(47)=0,954;P>0,05 \quad (2)$$

Furthermore, it was carried out variance equivalence verification by Levene, which increased the reliability of the ANOVA results. The results pointed out that the data of the variable "Innovation Capacity", when related to the independent variables, present relatively equal variability, as follows:

$$CDNP - [L(1,45)=2,010; P>0,05] \quad (3)$$

$$AC - [L(1,45)=2,065; P>0,05] \quad (4)$$

$$C - [L(1,45)=0,210; P>0,05] \quad (5)$$

$$CE - [L(1,45)=0,013; P>0,05] \quad (6)$$

For all relations, whose variances are homogeneous, the ANOVA was performed without the request of any correction method. The study initially compared the means of the groups for the variable "Creative Development of New Products" to verify the existence or not of a different effect of the groups on the variable "Innovation Capability". It was verified through the ANOVA that, on average, the values belonging to the groups that compose the independent variable are equal, when related to the dependent variable.

$$[F(1)=0,304; P>0,05] \quad (7)$$

Finally, it was evidenced, through the statistical parameter of the F, that the variable "Causation & Effectuation" presents an average of the different groups among themselves, which points out that their groups cause a significantly different effect on the variable "Innovation Capacity".

[F(1) = 3,690; P<0,05]	(8)

Soon after, the ANOVA was performed comparing the averages of the groups of the "Network Capacity" variable as to the "Innovation Capacity" variable (Table 5). The findings show that such variable causes a statistically significant effect on this variable, since the group means of the independent variable are different [F(1)=3,690; P<0,10].

Without delay, an equal check was performed, relating the variable "Absorptive Capacity" to the variable "Innovative Capacity". The result of the ANOVA evidenced that the independent variable is significant, that is, its groups cause a different effect on the dependent variable.

[F(1)=3,390; P<0,10]	(9)

The results described have been organized in Table 4.

Table 4. ANOVAs for testing differences between groups

Dependent Variable	Factor	Statistical Effect of the F	GL1	Statistical Significance
Innovation Capacity	H1 - Creative Development of New Products (CDNP)	0,304	1	0,584
	H2 - *Causation & Effectuation* (CE)	4,460	1	0,040
	H3 – Network Capacity (NC)	3,690	1	0,061
	H4 – Absorptive Capacity (AC)	3,390	1	0,072

Source: Developed by authors

Considering the literature base for the proposed analytical framework, the results presented in Table 4 fit with the authors who stated that there is a relationship between Causation/Effectuation (Breschi & Malerba, 2005; Berends et al, 2014; Roach et al, 2016; Yu et al, 2018; Vanderstraeten, et al, 2020; Henninger et al, 2020); Network Capacity (Breschi & Malerba, 2005; Walter, Auer & Ritter, 2006; Huynh et al., 2017; Diánez-González & Camelo-Ordaz, 2017; Câmara et al., 2018; Mcgrath, Medlin & O'toole, 2019; Oukes et al., 2019;) and Absorptive Capacity (Cohen & Levinthal, 1990; Rothwell, 1994; Tsai, 2001; Zahra, Van de Velde & Larraneta, 2007; Utterback & Abernathy, 2018; Sousa-Ginel, Franco-Leal, & Camelo-Ordaz, 2017) demonstrating that the startups benefited from the Public Policies Program to which they were inserted may have been a favorable environment for the construction of these relations.

The relationship between innovation capability and causality/effect suggests that entrepreneurial actions and innovation processes are directly influenced by a sequence of causes and effects, in which each innovation can generate new challenges and opportunities that, in turn, affect future performance (Breschi & Malerba, 2005; Berends et al., 2014). Studies indicate that innovation is a dynamic process in which previous decisions generate subsequent effects, expanding the possibilities for development and continuous innovation (Roach et al., 2016; Vanderstraeten et al., 2020). This demonstrates that, in a dynamic environment, innovation is not only a response to external factors, but also a sequence of strategic choices.

Networking capability is related to organizations' ability to build and leverage networks of relationships to obtain resources, share knowledge, and stimulate innovation (Breschi & Malerba, 2005; Walter, Auer, & Ritter, 2006). Firms with stronger networks can access valuable information and technologies that increase their innovative potential, which is particularly important for startups operating in highly uncertain environments (Huynh et al., 2017; Diánez-González & Camelo-Ordaz, 2017). Furthermore, collaboration with strategic partners within these networks can be a determining factor for innovative success (Câmara et al., 2018; Mcgrath, Medlin, & O'Toole, 2019).

Absorptive capacity refers to the ability of organizations to recognize, assimilate, and apply external knowledge to generate innovation (Cohen & Levinthal, 1990; Rothwell, 1994). Organizations with high absorptive capacity can more effectively integrate new knowledge, resulting in greater innovation capacity (Tsai, 2001; Zahra, Van de Velde, & Larraneta, 2007). This is particularly relevant for startups, as their ability to absorb and adapt external innovations can be a crucial competitive differentiator for the development of new products and services (Utterback & Abernathy, 2018; Sousa-Ginel, Franco-Leal, & Camelo-Ordaz, 2017).

However, the connection between the behavior of developing something new and creative as influential in the innovative capacity of startups benefited by the Program (ECIP) was not observed, contradicting the literature that points to this relation (Cóser et. al., 2018; Cooper, 2011, 2019; Sousa-Ginel, Franco-Leal, & Camelo- Ordaz, 2017). This result may demonstrate that the public policy studied was not relevant for this relation to happen and that it points to probable improvements in the proposed journey.

6. Discussion

The lack of differences in the ability to develop new products among knowledge-intensive companies, regardless of their innovative power (H1), suggests the need for a more in-depth analysis of the variables at play, as well as the validity of the initial hypothesis and the metrics used. in the search. A likely explanation is related to the homogeneity of Knowledge-Intensive Companies: It is possible that the knowledge-intensive companies included in the study are all relatively similar in terms of their resources, knowledge, and innovation strategies (Cohen & Levinthal, 1990; Teece, 2007). If these companies already have a solid base of knowledge and innovation capacity, the impact of innovative power on the ability to develop new products may be limited, since these companies are already operating at a high level of innovation.

Another explanation is in relation to the interdependence of the Variables. There may be a complex interdependence between innovative power and the ability to develop new products, which was not adequately captured by the initial hypothesis. For example, even if knowledge-intensive companies have strong innovative power, if resources or market conditions are not favorable, this may limit their ability to translate this power into new products (Eisenhardt & Martin, 2000). There is also the probability of the effect of External Variables. Uncontrolled external factors, such as economic conditions, government policies, market changes or unforeseen events, may have influenced results. These factors may have leveled the differences between knowledge-intensive companies, regardless of their innovative power (Zahra & George, 2002).

One possibility that explains the result of this hypothesis is that the questionnaire is self-administered, then the perception that a company has about its capacity to develop new products and its capacity for innovation does not necessarily reflect reality. This can cause problems of bias in the responses and in the presentation of the research results. Another factor that can influence is that the sample of companies included in the study may not have been representative enough to capture the diversity of the universe of knowledge-intensive companies. Furthermore, there may be a selection bias in the participation of companies, which may distort the results.

Regarding entrepreneurial decision making (causality & effectuation), the justification for the positive result (H2) is based on the capacity of entrepreneurial decision making to provide a competitive advantage to knowledge-intensive companies, stimulating innovation through flexibility, use of resources, experimentation, collaboration, and resilience. The entrepreneurial approach allows companies to be more flexible and adaptable to changes in the business environment and market conditions. Through the combination of causality (deliberate planning) and effectuation (action based on available resources) logics, companies can adjust their innovation strategies according to emerging opportunities and challenges encountered (Sarasvathy, 2001; McGrath & MacMillan, 2000).

The effectuation approach emphasizes using existing resources creatively and effectively to achieve desired objectives. In knowledge-intensive companies, which generally have valuable intangible resources, such as highly qualified human capital and advanced technologies, the application of effectuation logic can leverage these resources to drive innovation (Sarasvathy, 2001). Entrepreneurial decision-making values experimentation and iterative learning, enabling knowledge-intensive companies to test new ideas and innovation approaches in an agile and efficient way. This continuous process of trial and error favors the generation of new insights and knowledge, contributing to the development of innovative solutions (Dew, Read, Sarasvathy & Wiltbank, 2009; Rasmussen & Sorheim, 2006).

The entrepreneurial approach encourages stakeholder engagement and collaboration with external partners, which can expand access to complementary resources and specialized knowledge. In knowledge-intensive companies, where interdisciplinary collaboration and technology transfer are fundamental to innovation, entrepreneurial decision-making can facilitate the formation of strategic collaboration networks (Gulati, Nohria & Zaheer, 2000). The effectuation approach, in particular, emphasizes the importance of dealing with uncertainty and ambiguity in a creative and proactive way. In knowledge-intensive companies, which often operate in highly dynamic and competitive environments, the ability to make entrepreneurial decisions under conditions of uncertainty can be crucial to maintaining and strengthening innovation capacity (Alvarez & Barney, 2007).

As for hypothesis H3, the network's ability to positively impact the capacity for innovation in knowledge-intensive companies is based on synergy, collaboration and access to shared resources and knowledge that a well-established network can offer. These elements can create an enabling environment for the generation, development, and implementation of innovative ideas. A well-established network can offer knowledge-intensive companies access to a wide range of shared resources and knowledge. This may include access to funding, technical expertise, research infrastructure, market information and innovation best practices. These shared resources and knowledge can enable companies to develop and implement new ideas more effectively and efficiently (Gulati, 1998).

Regular interaction with other network members allows knowledge-intensive companies to exchange experiences, lessons learned and insights into innovation-related challenges and opportunities. This collective learning can stimulate creativity, inspire new approaches and provide valuable feedback for the continuous improvement of innovation processes (Hansen & Haas, 2001). A robust network can facilitate collaboration on research and development projects between companies, research institutions, universities, and other interested parties. These collaborations can result in the combination of different areas of expertise, the complementarity of resources and the synergy of efforts, leading to significant advances in technological and product innovation.

A well-connected network can open doors to market opportunities and strategic partnerships that can drive innovation. This may include access to new customers, expanded distribution channels, technology licensing opportunities and international collaborations. Active participation in a network can increase the visibility of knowledge-intensive companies and facilitate access to new markets and customer segments (Gargiulo & Benassi, 2000). A diverse and resilient network can help knowledge-intensive companies better adapt to external changes such as changes in regulation, economic fluctuations, and technological evolution. Through a solid network, companies can benefit from sharing information, collaborating on innovative solutions, and supporting each other during periods of uncertainty and challenges (Gargiulo & Benassi, 2000; Borgatti & Cross, 2003). Absorptive capacity positively impacts the innovation capacity of knowledge-intensive companies in a regional innovation promotion program (H4), as it allows these companies to identify opportunities, adapt to changes, collaborate with external partners, develop internal resources, and promote a cycle of continuous learning and improvement. Absorptive capacity allows knowledge-intensive companies to identify, assimilate and effectively apply available external knowledge. This includes new technologies, industry best practices, customer insights and research findings. By absorbing this knowledge, companies can strengthen their internal capabilities and develop new innovative solutions (Cohen & Levinthal, 1990; Zahra & George, 2002).

In a regional innovation promotion program, companies are often exposed to rapid and disruptive changes in the technological and market environment. Absorptive capacity allows companies to understand and adapt to these changes in an agile way, incorporating new knowledge and adjusting their innovation strategies as necessary (Eisenhardt & Martin, 2000; Teece, 2007). Absorptive capacity facilitates collaboration and cooperation with external partners, such as other companies, universities, research institutes and suppliers. By absorbing the knowledge and ideas of these partners, knowledge-intensive companies can broaden their perspectives and capabilities, resulting in more robust and effective innovative solutions (Ahuja & Katila, 2001).

Absorptive capacity is not just limited to the assimilation of external knowledge, but also involves developing internal resources to utilize that knowledge effectively. This may include the creation of knowledge management systems, the training of employees and the implementation of processes that facilitate the practical application of knowledge absorbed in the innovation of products, services, and processes. Absorptive capacity is intrinsically linked to feedback and continuous learning. Companies that have this capability can constantly evaluate their performance, assimilate new information and insights, and adjust their innovation strategies based on this learning. This feedback loop and continuous learning is essential to drive innovation consistently over time (Jansen, Van Den Bosch & Volberda, 2006).

7. Final Considerations

This article achieved its fundamental objective by exploring in a comprehensive and detailed way the impact of dynamic capabilities, more specifically network and absorptive capabilities, in relation to entrepreneurial behavior, on the innovative capacity of knowledge-intensive companies. The study focused on a specific regional context, analyzing how these capabilities influence the performance of companies participating in a public policy program aimed at promoting innovation and entrepreneurship. The results obtained not only provide valuable insights into the internal dynamics of these companies, but also contribute significantly to the broader understanding of the factors that drive innovation and business development at regional levels. By elucidating the interconnection between dynamic capabilities, entrepreneurial behavior and innovative capability, this study not only informs more effective policymaking, but also offers practical guidance for companies seeking to strengthen their competitive position through innovation and entrepreneurship.

The results obtained revealed that the supported startups did not have their innovative capabilities fully impacted by their entrepreneurial capabilities, indicating that the Program needs to focus on developing more training and development actions in this relationship between entrepreneurship and innovation of the beneficiary companies. On the other hand, network and absorptive capabilities proved to be more relevant for the Program, reinforcing the logic of the literature.

The study's results indicate that both policymakers and managers of knowledge-intensive companies can adopt several strategies to foster innovation. For policymakers, it is essential to strengthen collaboration networks between companies, universities and research centers, encouraging the creation of innovation clusters and technology hubs. In addition, training programs that improve the absorptive capacity of companies should be supported, enabling them to absorb and apply new knowledge. Policies that favor causality and effect in the innovation process are also crucial, creating a dynamic environment where companies can make informed strategic decisions.

For managers of knowledge-intensive companies, it is essential to invest in strategic networks to access new technologies and information, in addition to fostering internal absorptive capacity through continuous training and partnerships. Decision-making should consider causality and effect relationships, adjusting innovation strategies based on previous results. These actions can improve companies' competitiveness and innovative performance, especially in the context of startups and high-tech sectors.

As limitations of the study, it is possible to mention that the research was conducted using a cross-sectional design, capturing the final moments of the companies' participation in the public policy program. It would be beneficial to apply the same study scale to the companies after a certain period of program completion to measure how these companies were impacted over time by the ECIP. Additionally, conducting qualitative studies within the program is recommended to gather more in-depth insights on the constructs addressed here and to enable further analysis of the relationships between these constructs.

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