



ANALYSIS OF THE RESOURCES OF TECHNOLOGY-BASED ORGANIZATIONS FROM THE PERSPECTIVE OF RESOURCE-BASED VIEW: THE CASE OF MINAS GERAIS INNOVATION ECOSYSTEM

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Abstract

Objective: This study aims to analyze Minas Gerais innovation ecosystem, limited to incubators and accelerators, from the perspective of the Resource-Based View, in order to promote a better understanding of the resources offered by Minas Gerais accelerators and incubators, and how these organizations distinguish and complement each other.

Methodology: The research method employed in the research is the case study, from an exploratory-descriptive perspective, with a qualitative character. The instruments of evidence gathering have been given through interviews with managers of the investigated organizations and an analysis of documents.

Originality: By shedding light on a point little explored in literature, which is to evaluate the resources offered by business incubators and accelerators, from the perspective of the resource-based view, this study approaches, in an innovative way, how these resources overlap or complement each other.

Results: The research has found that both incubators and accelerators from Minas Gerais deliver valuable resources to assisted enterprises, in a way that these two actors in the innovation ecosystem complement each other positively in preparing assisted businesses for the market.

Theoretical contributions: This paper adds positively to the strategy and innovation literature, due to the unique approach of assessing valuable resources offered by organizations that propel nascent enterprises to success in their respective market.

Contributions to management: By possessing the results of this study, managers who make up innovation ecosystems, especially those of incubators and accelerators, can better offer resources directed to the profile of the assisted companies.

Keywords: Incubators. Accelerators. Resource-Based View. Innovation ecosystem.

ANÁLISE DOS RECURSOS DE ORGANIZAÇÕES DE BASE TECNOLÓGICA PELA ÓTICA DA VISÃO BASEADA EM RECURSOS: O CASO DO ECOSISTEMA DE INOVAÇÃO DE MINAS GERAIS

Resumo

Objetivo: Este estudo visou analisar o ecossistema de inovação de Minas Gerais, circunscrito às incubadoras e aceleradoras, na ótica da Visão Baseada em Recursos, com o intuito de promover uma melhor compreensão dos recursos oferecidos pelas aceleradoras e incubadoras mineiras, e de como essas organizações se distinguem e se complementam.

Metodologia: O método de investigação empregado na pesquisa foi o estudo de caso, numa perspectiva exploratório-descritiva, de caráter qualitativo. Os instrumentos de coletas de evidências se deram por meio de entrevistas com gestores das organizações investigadas e análise de documentos.

Originalidade: Ao lançar luz a um ponto pouco explorado pela literatura, que é o de avaliar os recursos oferecidos pelas incubadoras e aceleradoras de empresas, na ótica da visão baseada em recursos, o estudo aborda de maneira inovadora como tais recursos se sobrepõem ou se complementam.

Resultados: A pesquisa constatou que tanto as incubadoras quanto as aceleradoras mineiras entregam recursos valiosos aos empreendimentos assistidos, sendo que esses dois atores do ecossistema de inovação se

complementam positivamente na preparação dos negócios assistidos para o mercado.

Contribuições teóricas: Este artigo agrega positivamente à literatura de estratégia e inovação, pela abordagem singular de avaliar recursos valiosos oferecidos por organizações que impelem empreendimentos nascentes ao sucesso em seus respectivos mercados.

Contribuições para a gestão: De posse dos resultados desse estudo, gestores que compõem ecossistemas de inovação, em especial aqueles de incubadoras e aceleradoras, podem oferecer melhor os recursos direcionados ao perfil das empresas assistidas.

Palavras-chave: Incubadoras. Aceleradoras. Visão Baseada em Recursos. Ecossistema de inovação.

ANÁLISIS DE LOS RECURSOS DE LAS ORGANIZACIONES DE BASE TECNOLÓGICA DESDE LA PERSPECTIVA DE RESOURCE BASED VISION: EL CASO DEL ECOSISTEMA DE INNOVACIÓN DE MINAS GERAIS

Resumen

Objetivo: Este estudio tuvo como objetivo analizar el ecossistema de innovación de Minas Gerais, limitado a incubadoras y aceleradoras, desde la perspectiva de la Vista Basada en Recursos, con el fin de promover una mejor comprensión de los recursos que ofrecen las aceleradoras e incubadoras en Minas Gerais, y cómo estas organizaciones distinguirse y complementarse.

Metodología: El método de investigación empleado en la investigación fue el estudio de caso, desde una perspectiva exploratoria-descritiva, con carácter cualitativo. Los instrumentos de recolección de evidencia se dieron a través de entrevistas con gerentes de las organizaciones investigadas y análisis de documentos.

Originalidad: Al arrojar luz sobre un punto poco explorado en la literatura, que es evaluar los recursos que ofrecen las incubadoras y aceleradoras de empresas, desde la perspectiva de la mirada basada en recursos, el estudio aborda de manera innovadora cómo estos recursos se superponen o complementan entre sí.

Resultados: La investigación encontró que tanto las incubadoras como las aceleradoras mineras entregan recursos valiosos a las empresas asistidas, y estos dos actores del ecossistema de innovación se complementan positivamente en la preparación de las empresas asistidas para el mercado.

Contribuciones teóricas: Este artículo se suma positivamente a la literatura sobre estrategia e innovación, debido al enfoque único de evaluar los recursos valiosos que ofrecen las organizaciones que impulsan las empresas incipientes al éxito en sus respectivos mercados.

Contribuciones a la gestión: En posesión de los resultados de este estudio, los gestores que integran ecossistemas de innovación, especialmente los de incubadoras y aceleradoras, pueden ofrecer mejor los recursos dirigidos al perfil de las empresas asistidas.

Palabras llave: Incubadoras. Aceleradores. Vista Bajo Recurso. Ecossistema de innovación.

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1 Introduction

In the competitive environment in which companies are immersed, innovation has become a central theme for most of them. Criteria such as cost, quality, flexibility and agility themselves no longer guarantee business success, and innovation must be at the core of business strategies and the development of new solutions for society's demands (SEBRAE, 2018; Schot, & Steinmueller, 2018).

The dynamics of innovation production has undergone significant changes since the end of the 20th century, and is now regarded a “product” that should be considered throughout the entire value chain into which a company is inserted, involving less evident actors, such as governments and research centers, with emphasis on the latter, i.e. universities (Etzkowitz & Leydesdorff, 2000; Maruyama, 2017).

The environment that shares actors and institutions aimed at generating innovative solutions for society is commonly treated as an innovation ecosystem (Aranha, 2016). The innovation ecosystem includes institutions and people linked to academia, government, companies of all kinds and the community in general, which, through collaboration and integration, seek the development of new products, knowledge and technologies (Munroe & Westwind, 2008; Jackson, 2011; Arantes, 2014; Koslosky, de Moura Speroni, & Gauthier, 2015; Audy & Piqué, 2016; Gomes & Teixeira, 2018; Dedehayir, Mäkinen, & Ortt, 2018; Cohen, Fehder, Hochberg, & Murray, 2019).

Within innovation ecosystems, there are the so-called innovation habitats. According to Aranha (2016), habitats are made of institutions that aim to support innovative companies in their initial stages, offering conditions to transform creative ideas into practical applications and bring their solutions to end users, so that they can achieve some sustainable growth. Within the context of innovation habitats, business incubators and accelerators are relevant actors (Arantes, 2014; Gomes & Teixeira, 2018).

Despite the relevant role that incubators and accelerators have been playing in the Brazilian innovation ecosystem (ICE, 2017), the difference or complementarity between these two actors is not very clear, and there may even be overlaps between them (Cohen & Hochberg, 2014; Ribeiro, Plonski, & Ortega, 2015; Maruyama, 2017; Dedehayi *et al.*, 2018; Cohen *et al.*, 2019). Furthermore, as stated by Lange and Johnston (2020), how these two actors complement each other and what valuable resources distinguish them are little explored in literature, before the businesses served, since there is still some debate on how incubators and accelerators add value.

It can be seen, therefore, that the relationship between business incubators and accelerators lacks greater clarity with regard to the resources that each of these actors offer to assisted innovative enterprises. Because of this, it is believed that the Resource-Based View (RBV) approach, or Resource Theory, is a useful tool to evaluate the resources offered by accelerators and incubators, as suggested by Huang, Chen, Yu e Zhu (2019).

This way, this research has deepened in the following aspects: (a) what resources incubators and accelerators offer to the supported enterprises; (b) how these resources, in RBV's view, can generate

sustainable competitive advantage for assisted businesses and (c) what the possible overlaps and complementarities between incubators and accelerators in supporting technology-based enterprises are.

To this end, this research has verified the context of Minas Gerais innovation ecosystem, using the case study method, supported by the gathering of evidence through interviews and documents, which has investigated incubators and accelerators in this state of Minas Gerais.

The focus on the Minas Gerais ecosystem rests on two aspects. The first, as stated by Faria, Sedyama, Almeida, Serpa and Lage (2017), is the performance of the so-called innovative entrepreneurship movement in Minas Gerais, which has consistently surpassed the national average, especially with regard to the mortality rate, revenue, job creation and tax collection of companies linked to some type of innovation environment, such as incubators and accelerators. The second aspect, on the other hand, is due to the fact that one of the researchers in the study is a member of an incubator in Minas Gerais, facilitating its access to the other incubators and accelerators in the state.

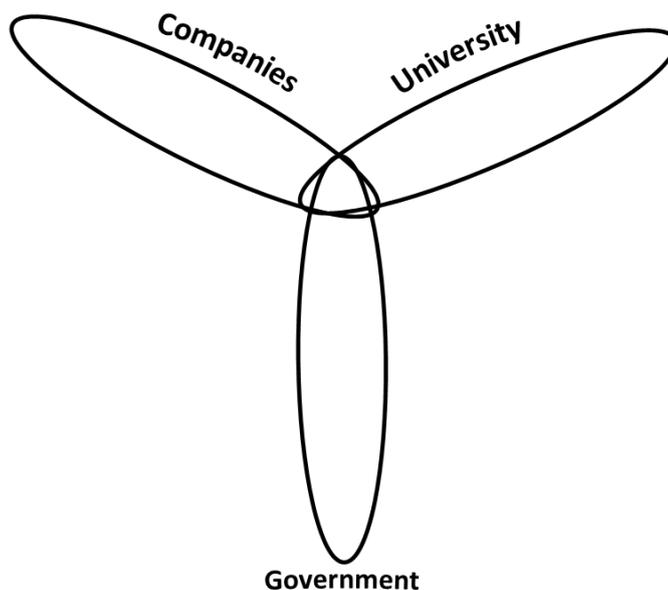
In this context, the aim of this research is to analyze Minas Gerais innovation ecosystem, limited to incubators and accelerators, from the perspective of the resource-based view, in order to promote a better understanding of the resources offered by accelerators and incubators from Minas Gerais, and how these organizations distinguish and complement each other. Besides helping to fill the theoretical gap highlighted by Lange and Johnston (2020), this research contributes to incubator and accelerator managers to better understand the roles played by such organizations, offering more effective resources to technology-based innovative companies in the context of the innovation ecosystem in Minas Gerais. This paper is divided into five sections: introduction; theoretical framework; methodology; data analysis and discussion; and, finally, concluding remarks.

2 Theoretical framework

2.1 The innovation ecosystem: context where incubators and accelerators are inserted

Etzkowitz and Leydesdorff (2000) have proposed an approach to describe the process of generating innovation, known as Triple Helix. Triple Helix can be understood in a perspective in which the university (academy), the government and some companies interact with each other in order to generate innovation, as well as entrepreneurship (Etzkowitz & Zhou, 2017; Un & Rodríguez, 2018). However, the roles established in the Triple Helix approach may overlap or suffer more significant influences from a certain actor, as, above all, in the Brazilian context, in which many universities are public, therefore, subordinated to government investments and decisions (Etzkowitz & Leydesdorff, 2000; Etzkowitz & Zhou, 2017). Figure 1 represents the view of the Triple Helix approach.

Figure 1 - Representation of the Triple Helix approach



Source: Made by the authors.

It is inferred that the Triple Helix approach brings together what is understood as an innovation ecosystem for the scope of this study, which presents a wide range of definitions, as it is a heterogeneous and dynamic phenomenon.

An innovation ecosystem can be understood as a network of organizations with complex interactions, in order to provide the generation of some innovation and entrepreneurial activity of a given region, in which, in general, a technological-based integrating unit tries to converge the efforts of the network for the intended purpose (Munroe & Westwind, 2008; Jackson, 2011; Koslosky *et al.*, 2015; Audy & Piqué, 2016; Gomes & Teixeira, 2018; Dedehayi *et al.*, 2018).

Within the context of innovation ecosystems, there is the concept of innovation habitats, which are places aimed at the generation and promotion of innovative enterprises, reducing risks for incipient businesses and promoting the sharing of knowledge and experiences. Examples of habitats are business incubators and accelerators, *coworkings*, living labs, among others (Teixeira, Almeida, & Ferreira, 2016; Aranha; 2016; Audy & Piqué, 2016).

2.2 Business incubators and accelerators

A business incubator is understood as an organization that provides support to entrepreneurs and nascent businesses, whose character is innovative. Such support takes the form of managerial support, qualifications, training and consultancy in the legal, financial, commercial and administrative aspects, as well as the provision of low-cost physical structure (Lalkaka & Abetti, 1999; ANPROTEC, 2016; Theodoraki, Messeghem, & Rice, 2018). Incubators can be considered as one of the ways that make it possible to strengthen ties, both between Triple Helix members (Etzkowitz & Leydersdorff,

2000) and between entrepreneurs and their network of contacts (Botelho *et al.*, 2014; Bruneel, Ratinho, Clarysse, & Groen 2012), strengthening new enterprises in preparation for competition, through their services and processes (Theodoraki *et al.*, 2018).

Business incubators generally operate in partnership with support institutions and universities, with or without profit, being the consequence, in Brazil, of a movement started in the 1980s, with the emergence of technology parks and the first business incubator in 1984, ParqTec, in São Carlos city, in the state of Sao Paulo (Dornelas, 2002; Reynolds, Bygrave, Autio, & Arenius, 2004; Plonski, 2012; Aranha, 2016; Theodoraki *et al.*, 2018).

With a similar purpose to that of incubators, initiatives emerged in the early 2000s intended at speeding up the process of supporting and making new businesses available in their respective market. Such initiatives have been labeled as accelerators. According to Ribeiro *et al.* (2015) and Cohen *et al.* (2019), the emergence of business accelerators began in the United States, with the pioneers Y Combinator, founded in Cambridge, Massachusetts, USA, in 2005, and Techstars, founded in 2006 in the so-called Silicon Valley, California, also in the USA.

Accelerators are organizations that are characterized by supporting the creation of new businesses for short periods of time, usually within three or six months, focusing on helping cohorts (groups or lots) of startups, with a new process of attracting risky investments by providing limited financial investment, as well as workspace, networking opportunities and mentors, who can be entrepreneurs, venture capitalists, angel investors or executives (Radojevich-Kelley & Hoffman, 2012; Cohen, 2013; Stayton & Mangematin, 2019).

ICE [Instituto de Cidadania Empresarial - Institute for Corporate Citizenship] (2017) has defined three criteria for the classification of an institution as an accelerator: (a) the way companies enter is carried out simultaneously, in groups; (b) the programs have a defined duration, which varies between 3 and 6 months; (c) at the end of the program, events to present companies are held to potential investors.

The support of accelerators is effective even without physical spaces of shared work (coworkings), as the most important factor of a program of this nature, according to Miller & Bound (2011), is the network of contacts that is formed and the support of experienced people, also called mentors. Access to mentoring is a very positive factor for entrepreneurs at the accelerators, providing them, especially in the initial stages of the business, with practical knowledge of management, marketing, technology, among others (Ribeiro *et al.*, 2015; Cohen *et al.*, 2019).

According to Hochberg (2015), the importance of incubators and accelerators goes beyond the enterprises they serve, as they have an impact on the inserted innovation ecosystem, generating synergy between local economic actors. In line with this last argument, Isenberg (2011) and Cohen *et al.* (2019) say that incubators and accelerators can be identified as important institutions to support the development of new technology-based businesses, playing a fundamental role in innovation ecosystems.

However, as asserted by Lange and Johnston (2020), it is necessary to highlight the differences, overlaps and complementarities between incubators and accelerators.

For Cohen and Hochberg (2014), incubators are institutions created for nascent companies to grow in a controlled environment, reducing market threats, thus obtaining time and resources that allow them to consolidate. On the other hand, for Bernthal (2015), accelerators force contact between enterprises and their target market as quickly as possible, so that adaptation and learning can be achieved through interactions with the competitive environment, as well as with their potential employees.

Table 1 summarizes the main differences between incubators and accelerators, according to Cohen (2013):

Table 1 – Main features of incubators and accelerators

Feature	Incubators	Accelerators
Program duration	1 to 5 years	3 to 6 months
Batch entry	No	Yes
Business model	Fees demanded. Aiming or not at profit.	Aim to prepare for investment; for-profit or non-profit
Selection	Non-competitive; continuous flux	Competitive and cyclic
Stage of the companies	Initial or advanced	Initial
Qualification	Corporate management, human resources, legal, etc	Seminars
Mentoring	Minimal, tactic	Intense, made by itself or others
In person?	Yes	Yes

Source: Adapted from Cohen (2013).

With the support of the consulted literature, it is stated that although incubators and accelerators have got features that distinguish them, there are also aspects that bring them together. The similarities between incubators and accelerators in this study have been called overlap and complementarity (Cohen & Hochberg, 2014; Maruyama, 2017; Cohen *et al.*, 2019).

In agreement with this perspective, Clayton, Feldman and Lowe (2018) assert that although incubators and accelerators can potentially bring unique resources to the companies served, these resources are complementary, with cases in which these resources duplicate (overlap), something not necessarily negative, as it engages efforts to address persistent challenges or innovation gaps.

Cohen and Hochberg (2014) and Maruyama (2017) argue that both incubators, which are more mature organizations, and accelerators, overlap in the aid and financing of nascent innovative enterprises. However, such overlap raises the question of determining what the role of each of these

actors is within an innovation ecosystem, as a way of guiding the application of investor resources, decision making by entrepreneurs and the formulation of public policies aimed at fostering innovative entrepreneurship (Dee, Gill, Weinberg, & McTavish, 2015).

According to Silva (2017), accelerators have boosted the activity of incubators, potentializing the skills and resources necessary for the success of nascent businesses. In a certain way, a complementary aspect between incubators and accelerators is considered the ideal stage of maturity of the companies in which each one tends to specialize, as pointed out by Ribeiro *et al.* (2015). In the view of these authors, the incubators deliver resources aligned to the nascent stages of an enterprise and the accelerators seek to support the maturing phase of the business.

The complementarity between the performance of incubators and accelerators occurs to the extent that accelerators have the potential to improve business models of assisted enterprises, through intensive mentoring, mitigating the risks inherent in incipient businesses (Ribeiro *et al.*, 2015).

The incubators prepare new businesses with physical infrastructure, management support and qualification. The complement through the accelerators takes place in a later work, with the issues more linked to the relationship and access to venture capital suppliers (Maruyama, 2017; Freire, Torkomian, Neto, & Rodrigues, 2018).

Table 2 highlights the contributions made in the literature on the aspects related to the overlap and complementarity between incubators and business accelerators.

Table 2 – Aspects related to overlap and complementarity

Overlap	Complementarity
Same target audience: nascent innovative enterprises (Cohen, 2013; Maruyama, 2017)	Performance at different stages of maturity of nascent innovative enterprises (Freire <i>et al.</i> , 2018; Ribeiro <i>et al.</i> , 2015; Silva, 2017; Maruyama, 2017; Clayton <i>et al.</i> , 2018)
Similarity between the offered features (Dempwolf, Auer & D'Ippolito, 2014; Pauwels, Clarysse, Wright, & Van Hove, 2016; Clayton <i>et al.</i> , 2018)	
Difficulty in accurately defining the meaning of the terms incubator and accelerator (Maruyama, 2017; Dempwolf <i>et al.</i> , 2014; Pauwels <i>et al.</i> , 2016)	Complementary resources offered by incubators and accelerators (Freire <i>et al.</i> , 2018; Maruyama, 2017; Silva, 2017; Clayton <i>et al.</i> , 2018)

Source: Made by the authors.

Due to the difficulty of evaluating how incubators and accelerators overlap and complement each other (Lange & Johnston, 2020), in the perspective of the resources they offer to assisted enterprises (Huang *et al.*, 2019), in the next section the study addresses the Resource-Based View, theoretical lens used in this work to deepen the understanding of the resources and capacities offered by incubators and accelerators.

2.3 Resource-Based View

The Resource-Based View (RBV), also known as Resource-Based Theory, is a branch of Strategic Administration that goals to analyze the resources that a company has and its relationship with competitive advantage generation over its competitors, in a given industry or sector. It originated in the seminal studies of Penrose, from 1959 (Penrose & Penrose, 2009), which saw the firm as a set of resources, in contrast to the prevailing paradigm of the time that emphasized only products.

For Wernerfelt (1984), who is the first author to use the term Resource-Based View, resources are any strength or weakness of a given organization. The author gives as examples: brands, knowledge and technologies internally developed, specialized professionals, commercial contacts, machinery, efficient procedures and financial capital. According to Wernerfelt, the question that one seeks to answer with this theory is: “Under what circumstances will a resource lead to high returns over longer periods of time?” (Wernerfelt, 1984, p. 172).

For Barney (1991), resources are all the assets, capabilities, knowledge and information that allow a company that owns them to gain competitive advantages over its competitors. According to the author, resources can be grouped into three types: (1) physical capital – facilities, machinery, equipment, geographic location and access to raw materials; (2) human capital, which consists of both managerial and operational manpower, and their training, experiences, relationships and insights; and (3) organizational capital, which can be understood as the processes, formal and informal decision structures, coordination and control systems, as well as the relationships established internally and externally by the company.

Later, still with regard to the classification of resources and capacities, Barney & Hesterly (2011, p. 58) included, alongside physical, human and organizational resources, the financial ones, which characterize “money, from any source, that companies use to create and implement strategies”.

The Resource-Based View can be used as a relevant tool for analyzing sources of sustainable competitive advantage, with resources themselves being the main variable of interest (Mahoney & Pandian, 1992; Peteraf, 1993; Barney, 2001), especially for new businesses, highlighting which resources generate value and how such resources can be managed with a view to building sustainable competitive advantages (De Medeiros Júnior, Añez, de Vasconcelos, & de Oliveira, 2009).

The perspective of complementary resources and capabilities can also be achieved through VBR analysis. Moreno, da Silva, Ferreira and Filardi (2019) have used the VBR approach to assess value generation through complementary resources and capabilities. The authors have been able to evidence the investment in information technology associated with business intelligence (Business Intelligence and Analytics - BI&A), as well as pointing out the reasons for frustrating results in investing in information technology in terms of gains in business intelligence.

For the analysis of resources and their relationship with the generation of sustainable competitive advantage, Barney & Hesterly (2011) have presented four criteria that allow defining

whether a given resource of a company is useful to generate sustainable competitive advantage. The four criteria for verifying the resource are: value; rarity; ability to be imitated by competitors; and whether the company has organizational capacity to take advantage and deploy the resource, in order to implement a superior performance strategy.

The four criteria listed above make up the so-called VRIO Model (Value, Rarity, Inimitability, Organization). Table 3 presents each of these criteria with their respective guiding questions.

Table 3 – Guiding questions for the VRIO model

Criteria for analyzing the resource	Guiding questions
Value	Does the resource allow the company to create and execute a strategy that leads to superior performance?
Rarity	Is the resource controlled by a small number of competing companies in the same industry?
Imitation Difficulty	How difficult is it for companies competing in the same industry to obtain this same resource?
Organization	Is the company able to organize its processes and policies so that it can transform this resource into an input for the effective creation of sustainable competitive advantage?

Source: Adapted from Barney & Hesterly (2011).

The VRIO model criteria, in this way, can be considered cumulatively when analyzing a given resource in the context of the organization. The more criteria it fulfills, the greater the importance of the resource for competitive performance (Barney & Hesterly, 2011).

2.4 Resources provided by incubators and accelerators

It is possible to distinguish the resources offered by the incubators between tangible and intangible ones. Table 4 highlights, briefly, the main characteristics of the resources delivered by the incubators.

Table 4 – Resources provided by business incubators

Resource	Features
Tangible ones	Flexible space for companies with subsidized costs; shared infrastructure and equipment.
Intangible ones	Administrative services, support for business development in the management areas, with access to consultants and support from specialists in the legal, accounting, strategic, finance, marketing and people areas, as well as support for obtaining financial investment via funding notices.

Source: Grimaldi & Grandi (2005); Chandra & Fealey (2009).

As evidenced by Table 4, incubators provide a relatively controlled and safe context for incubated companies to develop with adequate support (Chandra & Fealey, 2009). According to

ANPROTEC (2016), the most modern incubators can deliver the construction of networked relationships, connecting the incubated company to the innovation ecosystem in which it operates.

With regard to the resources offered by the accelerators, Casemiro, de Paula, Siena and André (2014), when dealing with the objectives of these organizations, state that the accelerators arose with the aim of creating the ideal system for the development, growth and insertion in the nascent companies, so that these can be consolidated.

Therefore, the accelerators propose to help in the construction of a team prepared to deal with risks, in tune with the business idea, and oriented towards the business generated from the same idea, either through prototypes or through product/services development. (Casemiro *et al.*, 2014). Cohen (2013) corroborates this view, stating that the acceleration programs provide support in modeling and creating the first products, in the knowledge and discovery of customer profiles, and offering financial support as well as their own team, in a way these enterprises may have greater chances of success.

According to theoretical framework regarding incubators and accelerators, it has been possible to build Table 5, in which it is sought to list the main resources offered, both by incubators and accelerators.

Table 5 – Resources offered by business incubators and accelerators

Types of resources	Resources offered by incubators	Resources offered by accelerators
Physical	Physical structure for the functioning of companies (ANPROTEC, 2016; Bruneel <i>et al.</i> , 2012)	Shared workspaces (Cohen, 2013; Radojevich-Kelley & Hoffman, 2012; Miller & Bound, 2011)
	Flexible space and shared infrastructure (Grimaldi & Grandi, 2005; Bruneel <i>et al.</i> , 2012; Chandra & Fealey, 2009; Lalkaka & Abetti, 1999)	
Human	Management support (ANPROTEC, 2017; Grimaldi & Grandi, 2005; Lalkaka & Abetti, 1999; Chandra & Fealey, 2009)	Management support (Radojevich-Kelley & Hoffman, 2012; Miller & Bound, 2011)
	Qualification and Consultancy (ANPROTEC, 2017; Grimaldi & Grandi, 2005; Lalkaka & Abetti, 1999; Chandra & Fealey, 2009)	Management knowledge (Radojevich-Kelley & Hoffman, 2012)
	Coaching (Bruneel <i>et al.</i> , 2012)	Intensive mentoring with experienced professionals (Cohen, 2013; Radojevich-Kelley & Hoffman, 2012; Silva, 2017; Miller & Bound, 2011; Ribeiro <i>et al.</i> , 2015)
Organizational	Administrative services (Grimaldi & Grandi, 2005);	Acceleration Methodology (Cohen, 2013; Miller & Bound, 2011)
	Incubation Methodology - CERNE Model (ANPROTEC, 2016)	Acceleration Methodology (Ribeiro <i>et al.</i> , 2015; Cohen, 2013)
	Networking (Gomes & Marcondes, 2016; Storopoli <i>et al.</i> , 2012; Botelho <i>et al.</i> , 2014; Grimaldi & Grandi, 2005)	Networking opportunities (Cohen, 2013; Ribeiro <i>et al.</i> , 2015; Radojevich-Kelley & Hoffman, 2012)
	Proximity to universities and research centers (ANPROTEC, 2016; Silva, 2017; Aranha, 2016);	Contact with the market (Bernthal, 2015; Casemiro, 2014; Cohen, 2013)
Financial	Subsidized Costs (Lalkaka & Abetti, 1999)	Supply of seed money (Cohen, 2013; Miller & Bound, 2011)
	Support for fundraising (Grimaldi & Grandi, 2005)	Presentation to qualified investors (Cohen, 2013; Radojevich-Kelley & Hoffman, 2012; Pauwels <i>et al.</i> , 2016; Miller & Bound, 2011)

Source: Made by the authors.

To sum up, it is possible to state that, based on the literature consulted for this research, despite the differences between incubators and accelerators, both act by offering resources to assisted companies. This way, incubators and accelerators achieve their main objective, namely the development and consolidation of technology-based companies, enabling the development of their innovation ecosystem.

3 Methodology

This research follows a qualitative orientation, in an exploratory and descriptive perspective (Gil, 2017), in which its findings have been triangulated through the perceptions of people interviewed and other sources, aiming to promote theoretical interpretations and analytical generalizations about the investigated theme (Yin, 2015), due to a certain phenomenon in a contemporary context (Godoy, 1995; Creswell & Poth, 2016).

The investigation method adopted in this research has been the case study, due to the flexibility provided by this method, to the varied evidence collection strategies that can be shared by the method (Yin, 2015), and also for allowing the understanding of a contemporary phenomenon in its social context (Ghauri, 2004).

Besides the effort to build the theoretical reference framework that has guided the work of this research (Vergara, 2009), the following strategies have been used to collect evidence: 1) document analysis: through the analysis of websites and files provided by organizations consulted and 2) semi-structured interviews: performed with incubators and accelerators managers as well as those of assisted enterprises.

The interviews were divided into two stages: (1) preliminary interviews and (2) main interviews. Preliminary interviews were performed with managers from four support environments for innovative businesses, comprising two accelerators and two business incubators, selected for convenience and also working in Minas Gerais. After applying the preliminary interviews, the interview script and analysis categories were refined.

The set of technology-based or mixed incubators have been investigated, according to Dornelas' definition (2002), and accelerators from companies in the state of Minas Gerais, which had, during the research, 22 incubators and 10 accelerators (RMI, 2018; SIMI, 2018).

The way of selecting the participants was made by convenience, being selected those professionals who made themselves available to contribute to the study. Eighteen interviews took place, seven of which with incubator managers, three accelerator managers and eight enterprise managers who were (graduated) or have been assisted. Despite the fact that the selection of subjects took place by convenience, it has been possible to achieve a diversification of the profiles of the managers of incubators, accelerators and assisted enterprises interviewed, as well as theoretical saturation (Eisenhardt, 1989).

Table 6 shows the codes for identifying each manager interviewed for incubators and accelerators, the category of each organization, whether it is public or private, and whether these organizations are linked to teaching and research institutions.

Table 6 – Incubator managers participating in the study

Code	Category	Linked to a teaching and research institution?
INC-PUB-01	Public	Yes – Federal University
INC-PUB-02	Public	Yes – Federal University
INC-PUB-03	Public	Yes – Vocational School
INC-PUB-04	Public	Yes – Federal University
INC-PRI-01	Private	No
INC-PRI-02	Private	Yes – Private College
INC-PRI-03	Private*	Yes – Private College
ACE-PUB-01	Public	No
ACE-PRI-01	Private	No
ACE-PRI-02	Private	No

Note: *Non-profit.

Source: Made by the authors.

Out of the eight managers interviewed for assisted enterprises, seven have been linked to incubators, two of which already graduated. An important aspect to be mentioned is that from the managers of the assisted enterprises interviewed, four have been able to undergo the experience of working in the relationship with both incubators and accelerators, thus providing a unique perspective for this research. Table 7 provides further details of the enterprises that contributed to the study.

Table 7 – Assisted enterprises participating in the study

Code	Status	Institution	Took part in incubation and acceleration?
EMP-INC-01	Incubated	INC-PRI-03	No
EMP-INC-02	Incubated	INC-PRI-03	Yes
EMP-INC-03	Graduated	INC-PRI-02	No
EMP-INC-04	Incubated	INC-PUB-02	Yes
EMP-INC-05	Incubated	INC-PUB-01	No
EMP-INC-06	Graduated	INC-PUB-01	Yes
EMP-INC-07	Incubated	INC-PRI-01	No
EMP-AC-01	Accelerated	ACE-PRI-01	Yes

Source: Made by the authors.

The data collected through documentary research have been analyzed based on the adequacy to the standard. According to Yin (2015), comparing an empirically verified pattern with a predetermined one based on the literature review, it is possible to assess the adherence of the theoretical framework to the evidence emanating from the research data collection.

The semi-structured interviews have been treated using content analysis procedures. The ATLAS.ti 8[®] software has been used as an instrument to support the analysis of the interviews. The software's resources made it possible to group the respondents' statements into a set of pre-established codes, based on the analysis categories obtained from the framework of this work.

The analysis categories worked on in the interviews were obtained through the support literature for this research, mirrored in Table 5, "Resources offered by business incubators and accelerators".

4 Data analysis and discussion

Minas Gerais innovation ecosystem is made up of a series of organizations, of regional, state and national scope, which interact with each other aiming at promoting economic development based on science, technology, entrepreneurship and innovation (SIMI, 2018).

4.1 Minas Gerais incubators and accelerators

According to the database from Rede Mineira de Inovação (RMI – Minas Gerais Innovation Network) and Sistema Mineiro de Inovação (SIMI - Minas Gerais Innovation System), there are 22 technology-based incubators and 10 accelerators in operation in the state. Out of the incubators, 12 are public, 10 linked to federal universities and two to federal institutes. Among private incubators, which are 10 in Minas Gerais, four are non-profit (RMI; 2018, SIMI; 2018). Regarding Minas Gerais accelerators, according to data from RMI and SIMI, the state has registered 16 organizations, of which only one is public and the vast majority, a total of 15, set in the state capital city, Belo Horizonte (RMI; 2018, SIMI; 2018).

It is worth mentioning the scarcity of consolidated and structured information on the set of accelerators in Minas Gerais. The only source of information in this regard was obtained through the Innovation Map, on the SIMI portal (SIMI, 2018).

Through semi-structured interviews, it has been possible to build the profile of the incubators, accelerators and enterprises participating in the study. The results are described in Tables 8, 9 and 10:

Table 8 – Profile data of Minas Gerais researched incubators

Does it have more than one (pole) unit?	Yes	No	DK/DA*	
	14%	86%	0%	
Operating time (in years)	0 to 5	5 to 10	More than 10	
	14%	29%	57%	
Any technological basis?	Yes	No	DK/DA	
	100%	0%	0%	
Multisector?	Yes	No	DK/DA	
	86%	14%	0%	
Number of incubated enterprises	0 to 5	5 to 10	More than 10	DK/DA
	14%	57%	14%	14%
Number of graduated enterprises	0 to 5	5 to 10	More than 10	DK/DA
	0%	14%	57%	29%
Program Duration (in years)	Up to 2	2 to 3	More than 10	DK/DA
	29%	57%	14%	0%
Does it have pre-incubation?	Yes	No	DK/DA	
	57%	29%	14%	
Does it have post-incubation?	Yes	No	DK/DA	
	29%	29%	43%	

Note: *DK – doesn't know/DA – didn't answer.

Source: Made by the authors.

As it can be seen from Table 8, all the incubators consulted in this research were technology-based, with 57% of them operating for 10 years or more, and an incubation period for companies, mostly up to three years.

Table 9 – Profile data of the researched accelerators in Minas Gerais

Does it have more than one (pole) unit?	Yes	No	DK/DA*	
	14%	86%	0%	
Operating time (in years)	0 to 5	5 to 10	More than 10	
	14%	29%	57%	
Any technological basis?	Yes	No	DK/DA	
	100%	0%	0%	
Multisector?	Yes	No	DK/DA	
	86%	14%	0%	
Number of incubated enterprises	0 to 5	5 to 10	More than 10	DK/DA
	14%	57%	14%	14%
Number of graduated enterprises	0 to 5	5 to 10	More than 10	DK/DA
	0%	14%	57%	29%
Program Duration (in years)	Up to 2	2 to 3	More than 3	DK/DA
	29%	57%	14%	0%
Does it have pre-incubation?	Yes	No	DK/DA	
	57%	29%	14%	
Does it have post-incubation?	Yes	No	DK/DA	
	29%	29%	43%	

Note: *DK – doesn't know/DA – didn't answer.

Source: made by the authors.

As expected, accelerators offer a program with a faster duration (Radojevich-Kelley & Hoffman, 2012; Cohen, 2013; Clayton *et al.*, 2018), with 67% of the investigated organizations leading companies for up to six months (Table 9).

Table 10 – Profile Data of Researched Enterprises

Operating time (in years)	0 to 5		5 to 10		More than 10		DK/DA*	
		5	63%	2	25%	0	0%	1
Sector of activity	IT		Services		Agribusiness		Others	
	4	50%	2	25%	2	25%	0	0%
No. of products launched on the market	None		1		More than 1		DK/DA	
	2	25%	4	50%	1	13%	1	13%
Number of collaborators	0 to 5		6 to 10		More than 10		DK/DA	
	4	50%	2	25%	0	0%	2	25%

Note: *DK – doesn't know/DA – didn't answer.

Source: Made by the authors.

Regarding the incubators and accelerators clients, that is, the assisted companies, most of them have less than five years to operate in their respective market, or 63% of the projects investigated.

4.2 Resources offered by Minas Gerais incubators and accelerators: analysis based on the VRIO model

Through the analysis of documents and reports of the interviewees, it has been sought to verify in this study what Minas Gerais incubators and accelerators have delivered as physical, human, financial and organizational resources to the assisted companies. Thus, Table 11, following the proposal of Barney & Hesterly (2011), presents the physical resources that have been diagnosed in the study, expressed by incubators and accelerators managers, as well as by the linked entrepreneurs, categorized according to the VRIO model.

Table 11 – Analysis of physical resources by the VRIO Model

Environment	Physical Resources	Value	Rarity	Difficulty to Imitate
Incubators	Physical structure for the functioning of companies	X		
	Flexible space and shared infrastructure	X		
	Access to modern laboratories and equipment from Teaching and Research Institutions*	X	X	
Accelerators	Shared workspaces (<i>coworkings</i>)	X		

Note: *This resource emerged from the interviews.

Source: made by the authors.

It has not been possible to evidence whether the physical structure for the functioning of companies (offices, meeting rooms, auditoriums, internet access, among others), as well as the existence of spaces for shared use by incubators, are rare resources or difficult to imitate, insofar as most of the managers interviewed stated that this is an existing resource in their incubators, as can be seen from the interview fragments transcribed below:

In terms of physical resources, we have ordinary stuff, such as space, water, light, things like these. It has the support of the incubator's own secretaries. This is the most basic part (INC-PUB-04). Concerning structural features, I think it is more a matter of space. It has got all those shared spaces, meeting room, office, that part of internet, computer. On this infrastructure side, it is even reasonable. I think it fits what we have seen (INC-PUB-03).

In contrast, access to laboratories (e.g., digital manufacturing) and other modern equipment from the Teaching and Research Institutions have been perceived only among private incubators, denoting the rarity of resources. It cannot be said that they are resources that are difficult to imitate, since it has not been perceived in the interviewees' statements that it has been difficult to obtain such resources. The reports mentioned below reinforce this perspective.

All laboratories are available. All auditoriums are available. The classrooms, the inverted rooms. (...) Ah, we have FabLab too, which is our prototyping laboratory also available to our entrepreneurs to prototype anything (INC-PRI-02).

We have the ideation laboratory, environment for ideation, creativity, also equipped with projectors, desks, benches, and some equipment. And we have got FabLab, which is a digital prototyping environment, which serves the standards of the Fab Foundation (INC-PRI-03).

The "FabLabs", mentioned above by interviewees INC-PRI-02 and INC-PRI-03, can be understood as digital manufacturing laboratories, as they operate with computer-controlled equipment and tools, such as 3D printers, which aim to produce prototypes and proofs of concept of products, in several possible scales.

Among the accelerators, it has been considered that shared work spaces (*coworkings*) are not rare or difficult to imitate, as it has been possible to observe from the interviewed managers' statements that this resource is provided by all of them. The physical resources alleged by the interviewed managers converge with the perspectives offered by Grimaldi & Grandi (2005), Chandra & Fealey (2009), Radojevich-Kelley & Hoffman (2012), Bruneel *et al* (2012), Cohen, 2013 e Cohen *et al* (2019).

With regard to human resources, Table 12 presents them, respecting the model adopted for this research.

Table 12 – Analysis of Human Resources by the VRIO Model

Environment	Human Resources	Value	Rarity	Difficulty to Imitate
Incubators	Managerial support provided by the incubator team	X		
	Qualification / Consulting	X		
	Mentoring*	X		
Accelerators	Management support provided by the accelerator team	X		
	Mentoring	X		X
	Qualification / Consulting*	X		

Note: *This resource emerged from the interviews.

Source: Made by the authors.

Among the incubator managers interviewed, managerial support has not been configured as a rare resource or difficult to imitate, because, in one way or another, all managers claimed to have these resources and believe they offer them to those incubated ones. Similarly, the mentoring resource, which, although not identified in the theoretical framework as something typical of incubators, was mentioned by the interviewees.

Regarding the accelerators, all the interviewed managers mentioned the existence of their own management support team, which is not a rare or difficult resource to imitate, in the same way as qualification and consultancy (resources not identified in the theoretical framework, which emerged from the evidence). Only mentoring, due to its personalized character and aligned with the methodology of each program, can be considered as resources that are difficult to imitate. The personalized character of mentoring is highlighted in the following perception:

This methodology that we use to monitor entrepreneurial (risk) is also a bit of coaching. And we also have a mentor bank, but our entrepreneurs still don't understand the difference between mentor and consultant. So, there are some companies here that have a mentor and are not aware, they think this person is a consultant (INC-PRI-02).

The organizational resources perceived by the interviewees have also been checked. Table 13 gathers these resources from the perspective of incubators.

Table 13 – Analysis of Organizational Resources by the VRIO Model

Environment	Organizational Resources	Value	Rarity	Difficulty to Imitate
Incubators	Administrative services	X		
	Incubation Methodology - Cerne Model	X		
	Networking/Integration with the innovation ecosystem	X		
	Proximity to universities and research centers	X	X	X
	University Seal*	X	X	X
Accelerators	Assistance in business modeling	X		
	Incubation Methodology	X	X	X
	Networking opportunities	X		
	Contact with the market	X		

Note: *This resource emerged from the interviews.

Source: Made by the authors.

Among the incubator managers interviewed, it has not been shown that administrative services, networking and integration with the ecosystem are rare or difficult to imitate. Most managers stated that their incubator has and offers such resources, being very similar to each other.

The resources related to the proximity to the university, research centers and the university seal, which can be considered an extension of the first, have been consistently identified as valuable, and it can be inferred that they are rare and difficult to imitate, since they are specific of each of the universities.

With regard to accelerators, the speeches of the interviewed managers converged consistently with the literature (Cohen, 2013; Ribeiro *et al.*, 2015; Radojevich-Kelley & Hoffman, 2012), mainly with regard to the aid resources in modeling business opportunities, networking opportunities and contact with the marketplace.

Organizational resources are fundamental aspects of an acceleration program, and are presented by all managers. Only the incubation methodologies have shown, according to the evidence, the characteristics of rarity and difficulty of imitation, due to the fact that they are developed by each program in a unique way, adapted to their needs. The entrepreneur EMP-INC-05 mentions that this was a reality in his case:

And this is one of the main factors that made us try to enter the [incubator], having the seal, because the three of us [partners] are all young, we didn't have so much baggage back in 2013, 2014 to get credibility in the marketplace, so I think that was very important.

The proximity to the university, as highlighted by Aranha (2016) and Silva (2017), in order to take advantage of the resources that come from it, such as laboratories, student labor and access to knowledge, was pointed out by the manager INC- PUB-04 and the entrepreneur EMP-INC-07 as one of the most valuable resources for the performance of the incubated companies.

Look, I think that what generates more value for companies is the fact that they are in the university environment. I think that's it. Being in the university environment opens some doors, for example, for research, internships, students, manpower that you wouldn't have in other places, understand? (INC-PUB-04).

Look, the resources that we think are most important would be this exchange of knowledge, right? Through students, internship, internship partnership... this one for me is the key. You don't even need an investment, understand? Only with manpower, knowledge exchange (EMP-INC-07).

With regard to financial resources, Table 14 presents those that were mentioned by the interviewed managers, categorized according to the VRIO model.

Table 14 – Analysis of Financial Resources by the VRIO Model

Environment	Financial resources	Value	Rarity	Difficulty to Imitate
Incubators	Subsidized costs	X		
	Support for capturing funding notices	X	X	
Accelerators	Supply of seed capital	X		
	Shareholding (<i>equity</i>)	X		
	Access to qualified investors	X		

Source: Made by the authors.

With regard to incubators, the most of the managers interviewed mentioned the provision of infrastructure and services in a subsidized manner, that is, with prices below the market. Thus, it is not considered a rare resource or difficult to imitate. Support for attracting funding notices was mentioned only by managers of private incubators, denoting a rarity of this resource. However, it cannot be shown that this is a resource that is difficult to be imitated by other incubators. Among the accelerators, all managers affirmed to be seeking access to investors. Therefore, it is not a rare resource or difficult to imitate.

As for capital, seed and equity, although each item was mentioned by only one respondent, it has not been possible to realize that these are rare resources or difficult to imitate, since they are not specific to these institutions.

4.3 Overlap and complementarity in the performance of incubators and accelerators

Table 15 illustrates how the concepts obtained in the theoretical framework of overlap and complementarity are related to the interviewees' perceptions.

Table 15 – Analysis of the Overlap and Complementarity aspects

Relationship	Characteristics	Source	Main perceptions of respondents
Overlap	Same target audience: nascent innovative enterprises	Cohen, 2013; Maruyama, 2017	It is common for enterprises to participate in both programs, even simultaneously
	Similarity of the resources offered	Dempwolf <i>et al.</i> , 2014; Pauwels <i>et al.</i> , 2016; Clayton <i>et al.</i> , 2018	Seen as positive by the accelerators; Seen as negative by incubators
	Difficulty in accurately defining the meaning of the terms incubator and accelerator	Maruyama, 2017; Dempwolf <i>et al.</i> , 2014; Pauwels <i>et al.</i> , 2016; Clayton <i>et al.</i> , 2018	May lead to the misdirection of immature enterprises to accelerators
Complementarity	Performance in different maturity stages of nascent innovative enterprises	Freire <i>et al.</i> , 2018; Ribeiro <i>et al.</i> , 2015; Silva, 2017; Maruyama, 2017; Clayton <i>et al.</i> , 2018	Seen as natural and desirable, given the distinct characteristics of incubators and accelerators; Roles need better definition
Complementarity	Complementary resources offered by incubators and accelerators	Freire <i>et al.</i> , 2018; Maruyama, 2017; Silva, 2017	Incubators: business structuring, technological product development, support from Universities; Accelerators: contact with the market and qualified investors

Source: Made by the authors.

According to the interviewees' perceptions, the overlap is seen as existing and, in a certain way, inevitable. However, for most incubator managers, it is seen as negative, in order to undermine the incubation process and the definition of the roles of incubators and accelerators in the ecosystem. This perception is related to the reflections of Clayton *et al* (2018). Acceleration program managers, on the other hand, tend to see the overlapping of resources in a positive way, since it reinforces the knowledge obtained in the entrepreneur's home program and enables integration between these ecosystem players. These perceptions are reflected by the interview fragments transcribed below:

An accelerator's view of an incubator is still obscure as well as an incubator's view of an accelerator. And of the investors too. Each of them does not know what the other does and consequently, because they do not know what the other does, they cannot understand what the person will look for in it when he leaves that other process. If a person doesn't know what the other one offers, one does not know what he or she will complement (INC-PRI-02).

For me, there is indeed an overlap of content, events, lectures, but I don't see it in a negative way, I think that every event you go to, you learn something new. So, it depends a lot on the entrepreneur's vision, the entrepreneur him or herself, and then we will talk a little bit about pride, about ego, because one thinks everything has been seen and learnt. Look, this way, I end up seeing it in its overlap, I don't think it's bad, but I end up seeing an overlap of events and content, even from partners (ACE-PRI-01).

Both groups reported problems related to the understanding of the role of each environment in the entrepreneurial ecosystem, which can lead to the wrong direction of an enterprise, in the case of

immature companies that participate in acceleration programs, as illustrated by the INC- PRI-03 words: “what do I think can happen too? Companies that have been accelerated in a way that was not prepared for business [...] the incubator may also be able to provide this management support”.

Among the interviewees, the perception is that there is complementarity between incubators and accelerators. This complementarity is reflected both in the level of maturity of the projects and in the resources offered to them.

In the first aspect, it has been found that the majority view is that the ideal for a technology-based enterprise is that it first passes through an incubator, where it shall be provided with a minimal structure, so that the company can establish itself and begin to develop its first products, and after this phase, it can move more safely to an acceleration program. However, it has been possible to evidence managers, both from incubators and accelerators, indicating that the processes can go in parallel, as long as the entrepreneur is able to do so successfully, in order to intensify and streamline their training and the development of their company. It has been noted that the transition from the incubator to the accelerator also leads to a change in mentality on the part of the entrepreneurs, more focused on the market.

In terms of the resources offered, it has been observed that in the managers' perception, incubators should focus on providing physical structure, management support, and mainly, on the development of technologies that entrepreneurs will use in their first products. Preferably, such support should rely on the structure offered by Universities and other teaching and research institutions, to which most incubators are linked. In turn, accelerators are seen as sources of resources more linked to the marketing aspect of the enterprises, that is, how to validate business ideas and products with potential customers, as well as develop sales techniques, through mentoring, network, among other resources.

5 Concluding remarks

The aim of this study is to analyze Minas Gerais innovation ecosystem, limited to incubators and accelerators, from the perspective of the resource-based view, in order to promote a better understanding of the resources offered by accelerators and incubators from Minas Gerais, and how these organizations are distinguished and complement each other.

With a comprehensive literature review and support of the case study method, in which the instruments of evidence gathering have been used, interviews and document analysis, it has been possible to achieve the desired objective.

Regarding physical resources, it has been found that incubators are similar in offering basic infrastructure to assisted enterprises, with emphasis on resources other than private incubators, which are also used by accelerators, such as *coworkings* and prototyping laboratories.

As for human resources, incubators have shown a tendency to add mentoring to the more traditional set of knowledge training resources (qualification and consultancy), thus getting closer to the performance of accelerators, which have mentoring as one of their most valuable resources.

In relation to the provision of organizational resources, it is evident that for incubators the resource that generates greater uniqueness, therefore, with potential for generating with competitive advantage, is proximity to the university. Among the investigated accelerators, it has been noticed that the acceleration methodologies specific to each program are configured as rare resources and difficult to imitate, with potential for competitive advantage.

With regard to financial resources, it has been found that the focus of the incubators from Minas Gerais covered in this study is the provision of their services at subsidized costs. Minas Gerais accelerators, on the other hand, work both in the direct offering of capital, either by means of financial contribution or shareholding in the enterprises, or by enabling the contact of accelerated companies with potential investors.

In general, the main characteristics of incubators and accelerators, with regard to the resources they offer to assisted enterprises, are in line with what is observed in the literature on the subject. However, there is evidence that Minas Gerais incubators are moving in the direction of offering typical accelerator resources, such as mentoring, strengthening the entrepreneurs' network with the ecosystem and workspaces. However, this movement has been observed more forcefully by private incubators.

Regarding the overlap between the incubators and accelerators in Minas Gerais, it has been evident, based on the interviewees' perception, that it exists. It is considered somewhat negative by incubator managers, as it can cause losses to the incubation process, due to the difficulty in understanding the functions performed by each mechanism. This fact can lead to the misdirection of immature enterprises towards accelerators. Accelerator managers, on the other hand, tend to see this overlap positively, insofar as an enterprise can take advantage of the knowledge of both types of programs, intensifying and accelerating the development of the business.

The complementarity between incubators and accelerators is seen as natural and desirable, given the distinct characteristics of incubators and accelerators. It has been found that managers believe that incubators should work with enterprises in the initial phase, offering business structuring, technological product development, and the support of universities. Accelerators, on the other hand, would have the function of strengthening contact with the market and with potential qualified investors. However, it can be inferred that the roles of each of the mechanisms need to be better defined, which prevents this complementarity from being put into practice more effectively, generating greater synergy within Minas Gerais innovation ecosystem.

As limitations of this study, mention is made of how difficult the access to key subjects for conducting the research, documents, and the very subjectivity of the interviewees' perceptions are. In order to mitigate access limitations, managers of incubators and accelerators of different profiles have been sought, as well as entrepreneurs supported by these programs, thus generating an overview of these

actors in Minas Gerais innovation ecosystem. In addition, the varied profile of the interviewees has shown, to a certain extent, a lot of convergence in the collected perceptions, demonstrating that those which have been found are saturated.

It is understood that the issue does not end in the present research, with some chance for further study, notably longitudinal studies that can capture how incubators and accelerators apply their organizational capabilities, aiming at promoting sustainable competitive advantages for themselves and their enterprises, based on its resources set. It is also suggested, with future research, the application of quantitative methods that can establish relationships between the resources obtained by companies in incubators and accelerators and objective indicators of competitive advantage, which allow to assess the impact of these resources on the performance of the enterprises.

Finally, it is hoped that this study can contribute to the professional practice of incubators and accelerators managers, as well as to a better understanding of the roles played by these organizations in the development of innovative technology-based companies, by all the actors involved in Minas Gerais innovation ecosystem.

References

- ANPROTEC (2016). Associação Nacional de Entidades Promotoras de Empreendimentos Inovadores. Estudo de impacto econômico: segmento de incubadoras de empresas do Brasil / *Associação Nacional de Entidades Promotoras de Empreendimentos Inovadores*. – Brasília, DF: ANPROTEC: SEBRAE, 2016.
- Aranha, J. A. S. (2016). Mecanismos de geração de empreendimentos inovadores. Mudanças na organização e na dinâmica dos ambientes e o surgimento de novos atores. *ANPROTEC–Tendências*. Brasília, DF: ANPROTEC.
- Arantes, J. T. (2014). Pesquisa mapeia principais atores e fluxos do sistema brasileiro de inovação. Agência FAPESP. São Paulo.
- Audy, J., & Piqué, J. (2016). Dos parques científicos e tecnológicos aos ecossistemas de inovação. *Desenvolvimento social e econômico na sociedade do conhecimento*. ANPROTEC–Tendências. Brasília, DF: ANPROTEC.
- Barney, J. & Hesterly, W. S (2011). *Strategic management and competitive advantage*. England: Pearson Prentice Hall.
- Barney, J. B. (1991). Firm resources and sustained competitive advantage. *Journal of management*, 17(1), 99-120.
- Barney, J. B. (2001). Is the resource-based “view” a useful perspective for strategic management research? Yes. *Academy of management review*, 26(1), 41-56.
- Berenthal, B. (2015). Investment accelerators. *Stan. JL Bus. & Fin.*, 21, 139.

- Botelho, L. D. L. R., Thiele, J., Macedo, M., Trindade, E. P., Bastos, R. C., & Gauthier, F. A. O. (2014). Reflexões sobre o papel das universidades empreendedoras e os desafios da implantação de incubadoras tecnossociais. *Anais do XIV Colóquio Internacional de Gestão Universitária*. Universidade Federal de Santa Catarina. Florianópolis, SC, Brasil, 14.
- Bruneel, J., Ratinho, T., Clarysse, B., & Groen, A. (2012). The Evolution of Business Incubators: Comparing demand and supply of business incubation services across different incubator generations. *Technovation*, 32(2), 110-121.
- Casemiro, P., de Paula, W., Siena, O., & André, C. (2014). Orientação Empreendedora e Aceleração de Negócios: Fatores, Processos e A Consolidação de Negócios Digitais. *Anais do Encontro de estudos sobre empreendedorismo e gestão de pequenas empresas*, Goiânia, GO, Brasil, 8.
- Chandra, A., & Fealey, T. (2009). Business incubation in the United States, China and Brazil: A comparison of role of government, incubator funding and financial services. *International Journal of Entrepreneurship*, 13, 67.
- Clayton, P., Feldman, M., & Lowe, N. (2018). Behind the scenes: Intermediary organizations that facilitate science commercialization through entrepreneurship. *Academy of Management Perspectives*, 32(1), 104-124.
- Cohen, S. (2013). What do accelerators do? Insights from incubators and angels. *Innovations: Technology, Governance, Globalization*, 8(3-4), 19-25.
- Cohen, S., & Hochberg, Y. V. (2014). Accelerating startups: the seed accelerator phenomenon. *SSRR*, V.1.
- Cohen, S., Fehder, D. C., Hochberg, Y. V., & Murray, F. (2019). The design of startup accelerators. *Research Policy*, 48(7), 1781-1797.
- Creswell, J. W., & Poth, C. N. (2016). *Qualitative inquiry and research design: Choosing among five approaches*. Sage publications. Thousand Oaks, California, USA.
- De Medeiros Júnior, J. V., Añez, M. E. M., de Vasconcelos, I. F. G., & de Oliveira, F. P. S. (2009). Visão baseada em recursos dinâmicos: estudo das contribuições da área de Dinâmica de Sistemas (DS) para a Teoria da Visão Baseada em Recursos (VBR). *Revista Ibero Americana de Estratégia*, 8(1), 122-138.
- Dedehayir, O., Mäkinen, S. J., & Ortt, J. R. (2018). Roles during innovation ecosystem genesis: A literature review. *Technological Forecasting and Social Change*, 136, 18-29.
- Dee, N., Gill, D., Weinberg, C., & McTavish, S. (2015). What's the difference? *London, UK, National Endowment for Science Technology and the Arts - NESTA*, Disponível em: https://media.nesta.org.uk/documents/whats_the_diff_wv.pdf. Acesso: 13/05/2019.
- Dempwolf, C. S., Auer, J., & D'Ippolito, M. (2014). Innovation accelerators: Defining characteristics among startup assistance organizations. *Small Business Administration*, October, 1-44.
- Dornelas, J. C. A. (2002). Planejando incubadoras de empresas. *Rio de Janeiro: Campus*.
- Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of management review*, 14(4), 532-550.
- Etzkowitz, H., & Leydesdorff, L. (2000). The dynamics of innovation: from National Systems and "Mode 2" to a Triple Helix of university-industry-government relations. *Research policy*, 29(2), 109-123.



- Etzkowitz, H., & Zhou, C. (2017). Hélice Tríplice: inovação e empreendedorismo universidade-indústria-governo. *Estudos avançados*, 31(90), 23-48.
- Faria, A. F. D., Sediyaama, J. A. S., Almeida, A. F. D., Serpa, C. V., & Lage, A. C. D. A. (2017). Estudo dos ambientes de inovação de Minas Gerais: empresas, incubadoras de empresas e parques tecnológicos. http://www.centevufv.br/Recursos/Imagens_CK/files/EstudoAmbInova%C3%A7%C3%A3o-MG.pdf. Acesso em, 12(01), 2017.
- Freire, C. D., Torkomian, A. L. V., Neto, M. S. & Rodrigues, L. (2018). Incubadoras e Aceleradoras: Um Estudo de Caso comparativo sob a perspectiva da Visão Baseada em Recursos. *Anais do X Encontro de Estudos sobre Empreendedorismo e Gestão de Pequenas Empresas*. Campinas: GALOÁ. Brasil.
- Ghauri, P. (2004). Designing and conducting case studies in international business research. *Handbook of qualitative research methods for international business*, 1(1), 109-124.
- Gil, A. (2017). *Como elaborar projetos de pesquisa*. São Paulo: Atlas.
- Godoy, A. S. (1995). Pesquisa qualitativa: tipos fundamentais. *Revista de Administração de empresas*, 35(3), 20-29.
- Gomes, M. D., & Marcondes, R. C. (2016). O desenvolvimento de micro e pequenas empresas: o caso da Incubadora Tecnológica de Guarulhos. *REGE-Revista de Gestão*, 23(3), 264-273.
- Gomes, R. A. D. O. S., & Teixeira, C. S. (2018). As tipologias de habitats de inovação: uma análise da legislação vigente do sul do Brasil sob luz do novo marco legal de ciência, tecnologia e inovação. *REAVI-Revista Eletrônica do Alto Vale do Itajaí*, 7(11), 10-19.
- Grimaldi, R., & Grandi, A. (2005). Business incubators and new venture creation: an assessment of incubating models. *Technovation*, 25(2), 111-121.
- Hochberg, Y. V. (2016). Accelerating entrepreneurs and ecosystems: The seed accelerator model. *Innovation Policy and the Economy*, 16(1), 25-51.
- Huang, H., Chen, J., Yu, F., & Zhu, Z. (2019). Establishing the enterprises' innovation ecosystem based on dynamics core competence—The case of China's high-speed railway. *Emerging Markets Finance and Trade*, 55(4), 843-862.
- ICE. Instituto de Cidadania Empresarial. O Panorama das Aceleradoras e Incubadoras no Brasil. Junho 2017. Disponível em: https://www.galidata.org/assets/report/pdf/GALI_Brazil_LandscapeStudy_PORT_Summary.PDF. Acesso em: 19/05/2018.
- Isenberg, D. (2011). The entrepreneurship ecosystem strategy as a new paradigm for economy policy: principles for cultivating entrepreneurship. *Babson Entrepreneurship Ecosystem Project, Babson College, Babson Park: MA*.
- Jackson, D. J. (2011). What is an innovation ecosystem? *National Science Foundation*, 1(2), 1-13.
- Koslosky, M. A. N., de Moura Speroni, R., & Gauthier, O. (2015). Ecosystems de inovação: uma revisão sistemática da literatura. *Revista ESPACIOS*. 36(3), 13.
- Lalkaka, R., & Abetti, P. (1999). Business incubation and enterprise support systems in restructuring countries. *Creativity and innovation management*, 8(3), 197-209.

- Lange, G. S., & Johnston, W. J. (2020). The value of business accelerators and incubators—an entrepreneur’s perspective. *Journal of Business & Industrial Marketing*, 35(10), 1563-1572.
- Mahoney, J. T., & Pandian, J. R. (1992). The resource-based view within the conversation of strategic management. *Strategic management journal*, 13(5), 363-380.
- Maruyama, F. M. (2017). *Incubar ou acelerar? Análise sobre o valor entregue para as startups pelas incubadoras e aceleradoras de negócios*. Tese de doutorado. Universidade de São Paulo.
- Miller, P., & Bound, K. (2011). The startup factories. *NESTA*. Disponível em: <http://www.nesta.org.uk/library/documents/StartupFactories.pdf>. Acesso: 12/05/2019.
- Moreno, V., da Silva, F. E. L. V., Ferreira, R., & Filardi, F. (2019). Complementarity as a Driver of Value in Business Intelligence and Analytics Adoption Processes. *Revista Ibero-Americana de Estratégia*, 18(1), 57-70.
- Munroe, T.; Westwind, M. (2008). Silicon Valley: ecología de la innovación. Malaga, España: *Euromedia Comunicación*, p. 46-91.
- Pauwels, C., Clarysse, B., Wright, M., & Van Hove, J. (2016). Understanding a new generation incubation model: The accelerator. *Technovation*, 50-51, 13-24.
- Penrose, E., & Penrose, E. T. (2009). *The Theory of the Growth of the Firm*. Oxford university press.
- Peteraf, M. A. (1993). The cornerstones of competitive advantage: a resource-based view. *Strategic management journal*, 14(3), 179-191.
- Plonski, G. A. (2012). Empreendedorismo inovador sustentável. *Parcerias Estratégicas*, 15(31), 153-158.
- Radojevich-Kelley, N., & Hoffman, D. L. (2012). Analysis of accelerator companies: An exploratory case study of their programs, processes, and early results. *Small Business Institute Journal*, 8(2), 54-70.
- Reynolds, P. D., Bygrave, W. D., Autio, E., & Arenius, P. (2004). *GEM 2003 global report*. Babson Park, MA: Babson College.
- Ribeiro, A. T. V. B., Plonski, G. A., & Ortega, L. M. (2015). Um fim, dois meios: aceleradoras e incubadoras no Brasil. In *ALTEC CONGRESSO LATINO-IBEROAMERICANO DE GESTÃO DA TECNOLOGIA* (Vol. 16).
- RMI – Rede Mineira de Inovação – Associados: *Incubadoras de Empresas*. Disponível em: <http://www.rmi.org.br/rmi/associados/incubadora-de-empresas;jsessionid=p909zarr22tr>. Acesso em 03/07/2018.
- Schot, J., & Steinmueller, W. E. (2018). Three frames for innovation policy: R&D, systems of innovation and transformative change. *Research Policy*, 47(9), 1554-1567.
- Sebrae. Sobrevivência das Empresas no Brasil. Outubro de 2016. Disponível em: <http://www.sebrae.com.br/Sebrae/Portal%20Sebrae/Anexos/sobrevivencia-das-empresas-no-brasil-relatorio-2016.pdf>. Acesso em 25/04/2018.
- Silva, S. A. (2017). Condicionantes para a criação de vantagens competitivas para incubadoras de empresas de base tecnológica: uma análise a partir da resource-based view e da abordagem das capacidades dinâmicas. *Tese de doutorado*. UFMG.

- SIMI – Sistema Mineiro de Inovação – *Mapa da Inovação*. Disponível em:
<http://www.simi.org.br/mapa/minas?type=Aceleradoras#region>. Acesso em 03/07/2018.
- Stayton, J., & Mangematin, V. (2019). Seed accelerators and the speed of new venture creation. *The Journal of Technology Transfer*, 44(4), 1163-1187.
- Storopoli, J. E., Binder, M. P., & Maccari, E. A. (2013). Incubadoras de empresas e o desenvolvimento de capacidades em empresas incubadas. *Revista de ciências da Administração*, 15(35), 36-51.
- Teixeira, C. S., Almeida, C. G., & Ferreira, M. C. Z. (2016). Habitats de inovação: alinhamento conceitual. *Florianópolis: Perse*.
- Theodoraki, C., Messeghem, K., & Rice, M. P. (2018). A social capital approach to the development of sustainable entrepreneurial ecosystems: an explorative study. *Small Business Economics*, 51(1), 153-170.
- Un, C. A., & Rodríguez, A. (2018). Local and global knowledge complementarity: R&D collaborations and innovation of foreign and domestic firms. *Journal of International Management*, 24(2), 137-152.
- Vergara, S. C. (2009). *Métodos de coleta de dados no campo*. São Paulo: Atlas.
- Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic management journal*, 5(2), 171-180.
- Yin, R. K. (2015) *Estudo de Caso: Planejamento e Métodos*. Bookman Editora.