



A MODEL OF INNOVATION PROCESS IN LIGHT OF THE THEORY OF THE GROWTH OF THE FIRM, BY EDITH PENROSE, AND OF RESOURCE-BASED VIEW

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Abstract

Objective: To analyze the innovation process in the light of the RBV and The Theory of the Growth of the Firm, by Edith Penrose.

Methodology: A Systematic Literature Review was carried out using the Methodi Ordinatio. The Social Network Analysis technique was performed to determine which theoretical contexts the studies were based on. Similarity Analysis was also carried out to identify the relationship between the elements of the focal approaches and the innovation process.

Originality/relevance: The Penrose study is considered by many researchers to be the antecedent of what was later called Resource-Based View, however, most of these studies did not fully explain the contribution of Penrose's theory in the specifics of the theoretical view. Although research on innovation has been based on theoretical approaches in the field of strategy, there have been no analyses that systematized the innovation process by integrating the Penrose theory and RBV.

Main results: The studies that analyzed innovation from the RBV and the Theory of the Growth of the Firm emphasized the maintenance of competitive advantage as a result of its dynamic capabilities, as well as access to and use of organizational knowledge.

The authors identified heterogeneous innovation resources and imperfectly mobile, such as user-technology interactions, trajectory-dependent capabilities, specialized assets, R&D capabilities, and network ties.

Theoretical contributions: The study revealed that through the continuous execution of the innovation process, unique core competencies (e.g., R&D experience) are developed to improve heterogeneous and imperfectly mobile innovation resources.

Keywords: Innovation process. Resource-Based View. The Theory of the Growth of the Firm. Edith Penrose.

UM MODELO DO PROCESSO DE INOVAÇÃO À LUZ DA RESOURCE-BASED VIEW E DA TEORIA DO CRESCIMENTO DA FIRMA, DE EDITH PENROSE

Resumo

Objetivo: Analisar o processo de inovação à luz da Resource-Based View (RBV) e da Teoria do Crescimento da Firma, de Edith Penrose.

Metodologia: Revisão Sistemática da Literatura, com a utilização da Methodi Ordinatio; Emprego da técnica de análise de redes sociais, a fim de verificar em quais fundamentos teóricos os estudos se embasaram, bem como a aplicação da análise de similitude, para identificar a relação entre os elementos das abordagens teóricas e o processo de inovação.

Originalidade/relevância: O estudo de Penrose é considerado, por muitos pesquisadores, o precursor do que foi posteriormente denominada de visão baseada em recursos. Entretanto, a maioria desses estudos não explicou a contribuição da teoria de Penrose em suas especificidades. Ainda que pesquisas sobre inovação tenham se embasado em abordagens teóricas do campo de estratégia, não há registros de análises que sistematizaram o processo de inovação integrando a RBV e a teoria do crescimento da firma.

Principais resultados: Verificou-se que os estudos que analisaram a inovação com base na RBV e na teoria do crescimento da firma enfatizaram

a vantagem competitiva enquanto resultado de capacidades dinâmicas, acesso e utilização de conhecimentos organizacionais. Foram identificados recursos de inovação heterogêneos e imperfeitamente móveis, como as interações entre usuários e tecnologias, as capacidades dependentes da trajetória, os ativos especializados, as capacidades de pesquisa e desenvolvimento (P&D) e os laços de rede.

Contribuições teóricas: Com base nas teorias mencionadas, depreende-se que a contínua execução do processo de inovação desenvolve competências essenciais, como a experiência em pesquisa e desenvolvimento, bem como recursos de inovação heterogêneos e imperfeitamente móveis.

Palavras-Chave: Processo de inovação. Resource-Based View. Teoria do Crescimento da Firma. Edith Penrose.

UN MODELO DEL PROCESO DE INNOVACIÓN A LA LUZ DE LA VISIÓN DE LA EMPRESA BASADA EN RECURSOS Y LA TEORÍA DEL CRECIMIENTO DE LA FIRMA, POR EDITH PENROSE

Resumen

Objetivo: Analizar el proceso de innovación a la luz de la RBV y la Teoría del Crecimiento de la Firma, de Edith Penrose.

Metodología: Revisión sistemática de la literatura, utilizando la Methodi Ordinatio; Utilización de la técnica de análisis de redes sociales, con el fin de verificar en qué fundamentos teóricos se basaron los estudios, así como la aplicación del análisis de similitud, para identificar la relación entre los elementos de los enfoques teóricos y el proceso de innovación.

Originalidad/relevancia: Muchos investigadores consideran que el estudio de Penrose es el precursor de lo que más tarde se denominó Visión Basada en Recursos. Sin embargo, la mayoría de estos estudios no explicaron la contribución de la teoría de Penrose en sus detalles. Si bien la investigación sobre innovación se ha basado en enfoques teóricos en el campo de la estrategia, no existen registros de análisis que sistematizaran el proceso de innovación integrando la RBV y la Teoría del Crecimiento de la Firma.

Principales resultados: Se encontró que los estudios que analizaron la innovación basada en la RBV y la Teoría del Crecimiento de la Firma enfatizaron la ventaja competitiva como resultado de las capacidades dinámicas, acceso y uso del conocimiento organizacional. Se identificaron recursos de innovación heterogéneos e imperfectamente móviles, como interacciones entre usuarios y tecnologías, capacidades dependientes de la trayectoria, activos especializados, capacidades de investigación y desarrollo y vínculos de red.

Aportes teóricos: Con base en las teorías mencionadas, parece que la ejecución continua del proceso de innovación desarrolla competencias esenciales, como la experiencia en investigación y desarrollo, así como recursos de innovación heterogéneos e imperfectamente móviles.

Palabras clave: Proceso de innovación. Visión Basada en Recursos. Teoría del Crecimiento de la Firma. Edith Penrose.

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1 Introduction

Research on innovation management has been based on diverse theoretical approaches, such as Open Innovation (Chesbrough et al., 2006; Lv, 2014), Triple Helix (Etzkowitz & Leydesdorff, 2000; Schmidt et al., 2018), Transaction Cost Theory (Hsieh et al., 2016; Goedhuys & Sleuwaegen, 2013), Institutional Theory (Pérez et al., 2018; Wu et al., 2015). Furthermore, studies in the field of strategy have significantly contributed to research on innovation, through, for example, the Resource-Based View – RBV (Zang & Li, 2017; Feranita, 2017; Dyck & Silvestre, 2018).

A central issue in research related to strategic content has been the emphasis on creating and sustaining a position of competitive advantage at the firm level (Foss & Knudsen, 2003; Powell, 2001). This competitive advantage, according to the Resource-Based View, may arise from organizational resources (Barney, 1991; Peteraf, 1993), which enable organizations to support their strategies and develop concerning the market (Leiblein, 2011). Thus, it is proposed that the evaluation of resources must precede the formulation of the organizational strategy (Black & Boal, 1994).

Therefore, the innovation process, according to RBV assumptions, must be linked to the organization's resources to enable obtention and sustentation of a competitive advantage position, which is related to the existence of heterogeneity and immobility attributes of the company resources (Peteraf, 1993; Peteraf & Barney, 2003; Barney, 1991).

Note that the theoretical framework of the RBV is given in the study by Wernerfelt (1984), who coined the term "Resource-Based View". In addition, this view was influenced by previous research, such as the evolutionary theory of economic change, developed by Nelson and Winter (1982), and in the seminal study by Penrose (1959), who analyzed the role of resources in the growth of the firm.

Although Edith Penrose's Theory of the Growth of the Firm is considered by many researchers to be the precursor of what was later called Resource-Based View, most of these studies did not fully explain the contribution of Edith Penrose's theory to the specifics of the theoretical view; with emphasis on the relevant review by Rugman and Verbeke (2002), who made a broad analysis of this author's contribution to the RBV. Furthermore, there have been no analyses that systematized the innovation process by integrating the RBV and Penrose's Theory of the Growth of the Firm, as well as the strategic role of this process.

Based on the analysis of the innovation process in light of these theoretical approaches, this study contributes theoretically and practically to the academe and the market through a specific analysis of the innovation flow that enables the generation and maintenance of a competitive advantage position, as well as the effective growth of the organization.

Furthermore, the integration of RBV and Penrose's theory enables an analysis of sustaining competitive advantage as a result of the innovation process subordinated to dynamic capabilities, as well as access to and use of organizational knowledge.

Thus, this study aims to analyze the innovation process in the light of the RBV and the Theory of the Growth of the Firm, by Edith Penrose.

Initially, a theoretical review of the attributes of the RBV, the Theory of the Growth of the Firm, the evolution of the elements of the RBV, and the configuration of dynamic capabilities is presented to support further analysis of the innovation process. Following the exposition of the methodological procedures for carrying out a Systematic Literature Review, the results are presented and discussed. Finally, a theoretical model is proposed to specify the innovation process in the light of RBV and Penrose's theory.

2 Theoretical framework

2.1 Resource-Based View assumptions

Research on strategic management process has been based on environmental aspects that influence access to superior income and sustain a superior competitive position.

In this sense, Foss and Knudsen (2003) explain that a firm has a competitive advantage when it executes a value creation strategy not implemented in parallel by its competitors (whether current or potential). Furthermore, this competitive advantage is considered sustainable when the execution and the benefits of this same strategy are not duplicated by competitors (Barney, 1991; Foss & Knudsen, 2003).

Therefore, the sustainability of competitive advantage is not necessarily linked to a specific period, but rather to the inability of competitors to replicate the strategy. Hence, sustainable competitive advantage encompasses the aspect of disparities in the results obtained by firms in a given sector, whether related to average cost differentials or even to profits kept in equilibrium over time (Foss & Knudsen, 2003).

The resources, which are tangible and intangible assets controlled by the organization (Barney et al., 2001), are related to organizational performance and sustainability (Peteraf, 1993; Wernerfelt, 1984); however, the availability and attractiveness of resources do not, by themselves, ensure the attainment and maintenance of a superior competitive position (Wernerfelt, 1984). So, organizations must access them and use them judiciously (Peteraf, 1993; Sirmon et al., 2007).

In this sense, the Resource-Based View proposes that the development and performance of firms are linked to a specific set of attributes related to internal resources (Barney, 1991; Peteraf, 1993). Therefore, the RBV, as exposed by Foss (1997), is based on two aspects, namely: i) the heterogeneity of resources as a source of asymmetry between firms, and ii) maintaining superior heterogeneous resources as a way of sustaining competitive advantage.

The RBV researchers investigate the elements of the theoretical view based on market imperfections, assuming that the condition of imperfect resource markets is necessary for heterogeneity between production factors to incur, and for the existence of a superior competitive advantage position

to be possible (Barney, 1986; Mahoney & Pandian, 1992). Therefore, it is these distinctive and imperfectly mobile resources that enable the achievement of so-called “Ricardian Rent” (which are the above-average returns obtained through valuable and restrictive resources beyond their real cost) (Barney, 1986; Peteraf & Barney, 2003; Mahoney & Pandian, 1992).

From this perspective, the RBV assumes that there are production factors susceptible to an inelastic supply and that their income and control can last over a relatively extensive period (Barney, 2001; Peteraf & Barney, 2003); this aspect of inelasticity in the offer of certain superior resources enables those firms that hold them to obtain prominent profits, and that they will not promote the expansion of the supply of superior resources in the market, thus favoring the achievement of a position of sustainable competitive advantage (Barney, 2001; Peteraf, 1993).

Therefore, the RBV assumes that a firm can be heterogeneous with the resources controlled by it, and the resources can be imperfectly mobile thus, the heterogeneity attribute can persist throughout time.

2.2 Heterogeneity and immobility of resources

One of the integrating aspects among the assumptions of the post-1980 RBV and the study by Penrose (1959) is the agreement of the heterogeneous condition of firms. Although *ex-post*, they will eventually become distinct, it is believed that companies can start their productive activities in the face of homogeneous characteristics, thus, allowing for a broader analysis of the attributes that promote a firm's growth and more expressive returns at the expense of its competition.

Penrose (1959) observed that if there are different profitable opportunities in the use of available resources, the capacities to maximize profits do not occur in the external conditions of demand and supply, but the internal environment of the firms.

In this aspect, the author argues that there are resources with heterogeneous characteristics that allow the firm to use them in different means and ends, such as administrative services (related to the knowledge and performance of the administrative team, with an emphasis on experience obtained internally, which, according to the understanding of Grant (1991) enables the achievement of competitive advantage because its conception takes place over time) and business services (related to the behavior of the entrepreneur, to which the author takes up a Schumpeterian interpretation and specifies the entrepreneur as an innovative agent from the standpoint of the firm and not the economy as a whole; specifically, the author lists the following qualities of business services: the ability to mobilize financial resources, versatility, ambition, and business sense) (Penrose, 1959).

Among the specific attributes of a firm, the knowledge obtained and expanded is highlighted, which contributes to the unique character of the company (Penrose, 1959; Mahoney & Pandian, 1992). In this way, Penrose (1959) typifies two types of knowledge; the first, called objective knowledge, is conceptual knowledge, related to the market, prices, customers, etc. This modality, due to its

characteristic of wide availability, can be transferred to all firms, and, therefore, it is not characterized as a specific resource. The second modality of knowledge is linked to the firm's experiences and specific managerial capacity, which translate into unique conditions, arising from the history of activities performed, which are not necessarily available on the market and, non-transmittable to other firms, since they are linked to the set of individuals in the specific context of the company.

In this sense, experience and managerial capacity are linked to the historical conditions of the organization, thus trajectory dependent, which, according to Barney (1991), enables imperfect imitability.

The immobility of resources is, therefore, a necessary condition and a significant determining element for sustaining a superior competitive position (Foss & Knudsen, 2003). This is because if the resources that enable the company to implement a value creation strategy are perfectly mobile, these resources can be obtained by competing firms, thus ceasing to be a source of competitive advantage for the focal firm (Barney, 1991; Peteraf & Barney, 2003).

This factor (immobility of resources), according to Peteraf (1993) is linked to the condition in which a given resource is available in the market, however its most expressive value is related to the specific use by a company; thus, the resource is considered valuable within the specific context of a particular firm. Denominated as specialized assets, these are resources that have more expressive economic value when used with the other assets of the company; thus, as long as the resource does not have other equivalent purposes and at least one of the assets that make up the resource portfolio is specific to the firm, the mobility of the asset will be considered limited (Peteraf, 1993).

Furthermore, the resource can be seen as imperfectly mobile due to the significant transaction cost related to its transfer (Williamson, 1975; Rumelt, 1987; Peteraf, 1993). Imperfectly mobile resources can limit access or use by competing companies, thus remaining under the control of a given company in the long term, consequently providing opportunities to sustain a competitive advantage position.

Grant (1991) suggests that imperfect mobility can derive from the following sources: a) geographic immobility (the costs involved in relocating certain assets, such as equipment, highly specialized employees, among others, can make it impossible to mobilize these resources in relation to those companies that already detain them); b) company-specific resources (where the value of some resources can be strictly linked to a particular company, such as the firm's reputation); c) immobility of capabilities (involves not only the know-how of a given employee, but also the know-how interactively related to the entire team, thus, as inferred by Nelson and Winter (1982), even if the company sells its intangible resources, its division of the specific capacities related to the management team will not be possible); and d) imperfect information (the condition of firms that already own a given resource to accumulate, over time, information about the productivity and use of this asset, enables superior knowledge to the detriment of competing firms).

2.3 Isolation mechanisms ex post to competition

Sustaining a competitive advantage position takes place under the condition that these superior resources are not widely available to competing companies, since, as stated by Richardson (1997), the profit opportunity that is known to all and subject to be widely exploited, does not qualify as a profit opportunity for any specific firm. Therefore, there must be factors that limit the access of competing firms to these resources.

Resources with the potential to generate significant returns are concurrent to the condition that the firms that own them can influence the costs and complexities for competing companies to acquire them (Mahoney & Pandian, 1992; Peteraf, 1993).

These protections and influences that inhibit or prevent access to resources by competing companies, called by Wernerfelt (1984) as resource position barriers, are attributes that determine the general degree of attractiveness of a resource, that is, the capacity of the company to prevent access of other firms to a given resource is a necessary (but not sufficient) condition for it to be considered a highly attractive resource. In this sense, the author suggests that firms have access to resources that are not held by other companies, and few can develop them.

The studies by Dierickx and Cool (1989), Rumelt (1984) and Barney (1991) are relevant for analyzing the aspects that limit competing firms concerning their condition of imitating superior resources. Thus, these authors specify the analysis by presenting the aspects that enable the company's resources to fit in as imperfectly imitable assets.

The expression “isolation mechanisms” was introduced by Rumelt (1984) when referring to the factors that enable firms to protect themselves in terms of imitability. In this sense, they are essential in supporting the sustainability of the firm's competitive advantage and superior incomes, therefore, these means of inhibiting or even preventing the imitability of superior resources explain (ex-post) the stability of incomes and the distinction between companies (Mahoney & Pandian, 1992).

Thus, the heterogeneous character of the firm is seen as an endogenous aspect, due to the imperfect imitability of the firm's superior resources (Lippman & Rumelt, 1982; Mahoney & Pandian, 1992).

Rumelt (1984) presents the following categories of isolation mechanisms: causal ambiguity, specialized assets, switching costs, consumer and producer learning, team skills, exclusive resources, information asymmetries, property rights over resources (patenting of superior resources), reputation and image, legal restrictions on entry.

Furthermore, Dierickx and Cool (1989) argue that the sustainability of a company's advantageous position is linked to the process of asset accumulation and the condition under which these assets can be imitated. According to the authors, some attributes determine the degree of imitability of assets, namely: a) diseconomies of time compression, b) mass efficiency of assets, c) interconnectivity of assets, and d) causal ambiguity.

The first element (time compression diseconomies) is the expansion of costs for competitors who seek to have access to certain strategic resources held by the company in a short time; thus, there is the existence of lack of economy because the agile use of these resources implies more significant costs than would be incurred if its conception were made over a long period.

The mass efficiency element is related to the significant influence of broad access to certain resources in the condition of the firm to additionally integrate more of these assets; in other words, in the context where the company already has ample availability of a certain resource, its acquisition or development becomes more basic and requires lower costs.

The third attribute (asset interconnectivity) is the relationship between the set of resources held by the company, which can lead to interdependence and complementarity between them, thus, the development of a certain asset can be related to the properties of other extra assets.

Finally, the causal ambiguity element results from the inability of competing firms to identify and control the company's relevant variables, therefore, it becomes significantly complex to determine which assets play important roles for the company and its accumulation process, resulting in the impracticable imitability of these actions (Dierickx & Cool, 1989).

Barney (1991), in turn, recognizes that resources can be seen as imperfectly imitable under the following circumstances: a) unique historical conditions, b) causal ambiguity, and/or, c) social complexity.

The first aspect (unique historical conditions) is linked to the “Path Dependence” theoretical approach (David, 2001; Arthur et al, 1987), suggesting that the company's performance depends on the path that it follows throughout its history, thus, if a firm strategically accesses significant resources through a specific and unique trajectory, it will be able to explore these resources for the execution of strategies, and these cannot be replicated by other companies, since it will not be possible to access them without undertaking the necessary trajectory.

In the case of causal ambiguity, Barney (1991) argues that competing firms must have an imperfect understanding of the link between the strategic resources controlled by the firm and the competitive advantage arising from these resources.

Finally, social complexity is related to social phenomena that develop in a significantly complex way, which generates a significant limitation of competing companies with regard to their imitability, for example, the interpersonal relationships between managers, organizational culture, the company's tradition, the reputation established with customers and suppliers (which is also related to the firm's historical conditions).

The findings of Dierickx and Cool (1989) corroborate the analysis of Barney (1991) about social complexity and unique historical conditions as attributes that are difficult to imitate. The authors sustain that the firm's specific human capital (as R&D capacity) results from the accumulation of assets over time based on the company's set of actions and policies, therefore, difficult to imitate.

In this aspect, the individual processes that involve the administration of human resources are likely to be imitated, however, the set of routines and management model (which are established over time) can characterize a unique asset of the company and enable the development of specific human capital factors (Barney, 2001).

It should be noted that Penrose (1959) recognized that there are certain assets controlled by the firm that have the potential of preventing the entry of new competitors, namely: patent protection for certain products and processes; commercial brands that ensure customer differentiation and loyalty; non-reproducible or non-renewable factors of production; knowledge of specific production processes under the confidentiality of the firm itself; and, finally, the experience of services provided by individuals that make up the staff.

The author demonstrated, however, that with access restriction on competing companies through artificial barriers (for example, legal control of technologies, price disputes, breadth of distribution channels, etc.), some attributes are considered fundamental for obtaining competitive advantage and may allow the firm to bar or even restrict the entry of other competing companies, such as, for example, the significant links of current consumers to certain brands, the superior performance of firms already present, and company-specific knowledge.

Therefore, the limitation of managers' capacities to manipulate all the properties that involve their organizations makes it possible for some firm resources to be imperfectly imitable, thus becoming possible sources of sustainable competitive advantage.

2.4 Consolidation of RBV properties

Rugman and Verbeke (2002) branched the RBV into two perspectives: descriptive and prescriptive. The first is linked to the characteristic feature of the resources, which allows specific combinations, hence prompting the condition of heterogeneity of the firm. The second (prescriptive) perspective results from the firm's deliberate development of means that prevent competing firms from accessing superior resources.

In this sense, the RBV assumes that organizations can be heterogeneous with regard to the resources they control and these resources can be imperfectly mobile (Wernerfelt, 1984; Barney, 1991; Grant, 1991; Peteraf, 1993).

Based on these assumptions, RBV researchers emphasize that organizations can obtain sustainable competitive advantage through superior resources that are not easily imitated by competing organizations. As Foss (1997) emphasizes, the long-term maintenance of superior heterogeneous resources is what promotes the generation and maintenance of the organization's competitive advantage.

Thus, the firm's goal in the context of RBV is to obtain superior incomes (in relation to competitors) and to sustain a position of competitive advantage (Rugman & Verbeke, 2002; Grant, 1991; Mahoney & Pandian, 1992).

Per these aspects, Barney (1991) presents attributes that must be inherent to the resources so that they are a source of sustainable competitive advantage, the so-called VRIN attributes, namely:

- a) **Valuable resources** (with the capacity to benefit from opportunities and minimize environmental threats; these resources enable the firm to implement strategies that are able to reproduce its efficiency and effectiveness).
- b) **Rare resources** (they do not currently or potentially have an expressiveness of competing firms that hold this kind of resources under their control);
- c) **Imperfectly imitable resources** (there is significant complexity or cost to imitate them, thus, they are those resources over which competing firms do not have their control nor are they able to obtain or reproduce them);
- d) **Non-replaceable resources** (there should be no strategically equivalent resources, that is, valuable resources that enable competing companies to execute the same strategies with different resources).

In Table 1, presented below, a summary of the properties involving RBV is shown.

Table 1 – Consolidation of RBV properties

	Proprieties da RBV	References
Main Assumptions	Firms can be heterogeneous with respect to the resources they control, and these resources can be imperfectly mobile.	(Barney, 1991) (Grant, 1991) (Mahoney & Pandian, 1992) (Peteraf, 1993) (Foss , 1997); (Barney, 2001); (Peteraf & Barney, 2003) (Foss & Knudsen, 2003)
Attributes that characterize resources as sources of sustainable competitive advantage	Valuable resources; Rare resources; Imperfectly imitable features; Non-Replaceable Features.	(Barney, 1991)
Isolation Mechanism	Different skills; Information asymmetries; Causal ambiguity; Property rights; Specialized assets; Transaction cost related to the transfer of resource; Consumer learning; Producer learning; Reputation with customers; Reputation with suppliers; Legal restrictions on entry; Time compression diseconomies; Mass efficiency of assets; Asset interconnectivity; Unique historical conditions; Social complexity; Company tradition; Existing interpersonal relationships; Links to the brand; Non-reproducible or non-renewable production factors; Firm experiences; Specific managerial capacity; Imperfect information; Geographical immobility; Behavior of the businessman.	(Penrose, 1959) (Rumelt, 1984) (Dierickx & Cool, 1989) (Barney, 1991) (Grant, 1991) (Mahoney & Pandian, 1992) (Peteraf, 1993)

Source: Prepared by the authors.

2.5 Evolution of RBV elements and dynamic capabilities configurations

As discussed above, the studies by Rumelt, Wernerfelt, Barney, Peteraf, Grant, among other researchers, advanced investigations in the field of strategy, highlighting the characteristics of the organization's resources that enable the creation and maintenance of a competitive advantage position, with emphasis on the specificities of resources and mechanisms that favor their imperfect mobility.

However, researchers such as Mahoney and Pandian (1992) highlighted the argument of Penrose (1959) when pointing out that an organization obtains superior returns not due to having better resources, but because of its distinct competence in making better use of those resources. In this sense, the origin

of competitive advantage is in the competence for the creation, evolution, and recombination of the organization's resources (Eisenhardt & Martin, 2000).

Thus, a wide range of investigations emerges that highlight these competencies; with emphasis on the studies by Prahalad and Hamel (1990), Teece et al., (1997), Eisenhardt and Martin (2000), which significantly contributed to the scientific knowledge about the essential competencies and dynamic capabilities, which were relevant to the advancement of the resource-based view.

According to this line of research, sustainable competitive advantage is linked to the construction and exploitation of fundamental skills that can be implemented in various markets (Grant, 1996; Prahalad & Hamel, 1990).

The core competencies, which, as understood by Reed and DeFillippi (1990), are the specific skills of the organization and the superior way in which they are used, must be imperfectly imitable to enable the maintenance of competitive advantage. In this sense, Grant (1996) emphasized that knowledge is one of the most significant strategic resources for obtaining sustainable competitive advantage.

As the RBV theorists assume, control over scarce resources is a source of superior returns. Therefore, access to and control over knowledge and know-how become fundamental strategic issues (Teece et al., 1997). Therefore, organizations must have mechanisms that promote the imperfect imitability of relevant knowledge, otherwise, its value will be appropriated by other organizations (Fiol, 1991).

This criterion is in line with the emphasis on tacit knowledge defended by researchers in the field of strategy. This, in the form of know-how, skills, and practical knowledge of the members of the organization is related to production activities, which require specific knowledge from various members of the company; and, as suggested by Teece et al. (1997), provide greater potential for contributions to the organization's strategy.

As tacit knowledge, by its nature, is not codified, its observation takes place through application and is obtained through practice; thus, the transfer of such knowledge is uncertain, and requires significant time and high costs (Kogut & Zander, 1992). A significant proportion of tacit knowledge is organization-specific and enables the company to appropriate the value of such knowledge (Grant, 1996).

It is argued, therefore, based on the research of Reed and DeFillippi (1990), that competencies that have characteristics that are based on tacit knowledge can generate causal ambiguity and, thus, foster barriers to imitation.

For competencies to be complexly imitable, there must be an integration between new and current knowledge; this was named combinative capacity by Kogut and Zander (1992). According to the authors, competitive knowledge advances from the current information and know-how held by the organization. In this sense, the value of competencies is related to the combination with those already appropriated through the company's evolutionary trajectory (Teece et al., 1997).

New knowledge must be complementary to, not substitute for, the organization's current knowledge. Therefore, the organizational processes built along the company's evolutionary path are related to its superior performance.

It is emphasized that competitive advantage originates in the integration of knowledge, and not in knowledge itself; first, because of the interdependence between them (Leonard-Barton, 1992) second, because the knowledge is located with the members that make up the company, and such individuals can be transferred between organizations (Grant, 1996; Kogut & Zander, 1992).

Essential competencies, as Prahalad and Hamel (1990) argue, must be based on the coordination of skills and technology flows, enabling the complex imitability of such competencies.

It is worth noting that organizations integrate an environment in medium or fast transformation. The importance of dynamic capabilities is emphasized so that companies can integrate, build and reconfigure their competencies to deal with such transformations (Teece et al., 1997; Eisenhardt & Martin, 2000). Therefore, the manipulation of knowledge resources becomes critical for the performance of organizations (Grant, 1996; Kogut, 2000).

The expression "dynamics" is related to the organization's capacities to renew its competencies to adapt to changes in the organizational environment; that is, the company's capacities to reconfigure its abilities and resources according to the changes in the environment in which it operates are highlighted (Eisenhardt & Martin, 2000; Teece et al., 1997; Grant, 1996).

Teece et al. (1997) argue that the learning process, fostered through repetition and experimentation, is as relevant as the integration of competencies, which enables the organization's activities to be carried out more efficiently, favoring the identification of new business opportunities. According to the authors, this process is collective and involves the joint contribution of organizational actors to understand complex problems.

The learning process must be related to the organization's previous trajectory; therefore, it is linked to trajectory dependence. As highlighted by Kogut and Zander (1992), as the company moves away from its competence base, its probability of obtaining expressive returns goes back to that of an initial operation.

Therefore, the essence of strategic competencies and capabilities is linked to the processes shaped by the evolutionary path of the organization. Thus, the relevant opportunities are close to the company's current capabilities and resources.

As highlighted by Teece et al. (1997), the superior returns of the organization are related not only to its assets but also to its capacity to reconfigure itself.

That said, in markets that are part of an environment with high-speed changes, the dynamics of reconfiguration of capacities are different from a moderately dynamic market (Eisenhardt & Martin, 2000). In such environments, new knowledge is expressively created in specific situations; thus, the use of initial tests, prototyping, and experimental actions are frequent.

In moderately dynamic markets, capabilities derive from routines and experiences accumulated over time (Nelson & Winter, 1982; Grant, 1996b; Leonard-Barton, 1992). In contrast, in rapidly changing markets, dynamic capabilities originate from new knowledge built from specific situations (Eisenhardt & Martin, 2000).

Therefore, sustainable competitive advantage arises from the configuration of resources developed from the dynamic capabilities of the organization and not from the resources or capabilities themselves.

2.6 Innovation process and the Resource-Based View

Innovation is related to the implementation of a new or significantly improved product, process, or organizational method (OECD, 2005), which may require access to elements widely available on the market, such as publicly accessible information (Zhang & Hartley, 2018), as well as physical and technological assets (Lv & Qi, 2019; Claudino et al., 2017), which are characterized as perfectly mobile attributes.

In this sense, if superior performance is based on such attributes, there will be a significant difficulty for the organization to appropriate the value of innovation and, thus, superior results will not be sustained. Therefore, appropriability is a relevant aspect in the development and execution of the innovation process.

When considering the resource-based view, especially from a dynamic perspective, the innovation process, especially concerning the combination of resources, as well as the development and reconfiguration of capabilities, can favor the achievement of sustainable competitive advantage (Rugman & Verbeke, 2002; Grant, 1996).

While some innovations result from the use of new knowledge, others are derived from the reconfiguration of knowledge already held by the organization (Henderson & Cockburn, 1994); thus, competitive advantage, as emphasized by Wernerfelt (1984) and Grant (1996), will be derived from the balance between the exploitation of existing resources and competences and the development of new ones.

For the innovation process to make it possible to obtain superior performances, organizations must expand their set of resources and competencies, integrating them with those that already exist. This conception recaptures the emphasis given by Penrose (1959) on the company's growth process based on new combinations of resources.

Based on the RBV proposal on the organization's need to access complexly imitable resources, innovation will provide superior performance, in the context in which it integrates a greater range of relevant competencies the trajectory of the organization (Reed & DeFillippi, 1990; Teece et al., 1997). Such integration, in addition to favoring the imperfect mobility of skills developed over time, can foster

a set of complementary skills that contribute to the development of innovations beyond those initially intended (Leonard-Barton, 1992).

As suggested by Prahalad and Hamel (1990), organizations can be understood not only as portfolios of products or businesses but also as a portfolio of competencies. Thus, the innovation process must relate to the organization's competency base; otherwise, as emphasized by Kogut and Zander (1992), it will not benefit from dependence on the company's trajectory, and the possibility of obtaining higher returns will be analogous to the operations initially carried out.

It should be noted that basing the organization's actions on its set of competencies will enable the expansion of the innovation domain (Prahalad & Hamel, 1990). For example, with the development of new products, the company will partially distance itself from its current competencies, integrating new competencies (Leonard-Barton, 1992). Therefore, innovation must be the result of the company's combinative capacity to provide new purposes based on existing knowledge (Kogut & Zander, 1992).

That said, the innovation process based on the reconfiguration of the organization's competencies will favor sustainable growth, since each new competence will be integrated into those already held by the company, and this integration, in addition to being imperfectly mobile, will allow the maximization of capacity when to innovation. Therefore, for the execution of the innovation process, the indication of Prahalad and Hamel (1990) on the conception of the company as a set of competencies is emphasized.

Studies such as those by Grimpe and Kaiser (2010) aimed to investigate the advantages and disadvantages of outsourcing R&D activities. Prahalad and Hamel (1990) had already highlighted that outsourcing favors a certain speed for the development of competitive products. However, the authors stressed that such action contributes inexpressively to the formation of competencies that sustain superior results and, therefore, would not result in the development of specific skills of the company.

Effective new product development processes involve the participation of diverse sources of knowledge, such as the skills of various members and departments of the organization (Eisenhardt & Martin, 2000); such combination of skills makes imitation complex (Reed & DeFillippi, 1990) and, therefore, favors the maintenance of competitive advantage.

Therefore, the ability to develop new products will be a strategic asset of the company as a cumulative result of the trajectory traveled over time (Dierickx & Cool, 1989). Therefore, as emphasized by Teece et al. (1997) such development will only be advantageous when it is based on the organization's existing capabilities.

2.7 Innovation process and endogenous resources to open innovation

Several studies have investigated the influences of access to external resources and knowledge to foster innovation, for example, research on innovation networks (Najafi-Tavani et al., 2018).

Open innovation researchers emphasize that sharing and exposing knowledge can favor inter-firm collaboration and increase the value of innovation (Chesbrough et al., 2006). The resource-based view emphasizes the importance of the organization having mechanisms to minimize the imitability of superior resources and, thus, benefiting in the long term from the innovation. Integrating both theoretical approaches that may, at first, seem incompatible, demands a broader understanding of exposing or hiding organizational resources and knowledge.

It should be noted that RBV theorists also integrated external relationship routines as a source of superior performance. Powell et al. (1996) found that knowledge gained through external relations maximized R&D performance. Barney et al. (2001) emphasized the relevance of network ties as an intangible resource.

Thus, the appropriation of resources and endogenous knowledge from such external sources becomes essential to support the superior performance of innovation.

In dynamic organizational environments, knowledge quickly becomes outdated; in this way, innovation processes involving external sources of knowledge help companies to remain up-to-date and competitive in the markets (Singh et al., 2019). However, according to the open innovation proposal, such sharing involves input and output of knowledge to intensify innovation (Chesbrough et al., 2006).

Thus, the knowledge and resources end genes of open innovation will be complexly imitable and will favor sustainable competitive advantage, if these are combined with the organization's core competencies; thus, the company will benefit from trajectory dependence and such knowledge will be specialized assets of the organization.

Next, Barney et al. (2001) emphasized that the ties undertaken to access such knowledge and resources will be socially complex and, therefore, imperfectly imitable.

Such complexity can be explained by the relational view. First, inter-organizational relationships will favor the learning and adequacy of the organization's resources (Dyer & Singh, 1998), as well as the assets accessed through such relationships, when combined with existing assets, will result in more expressively valuable resources and difficult to imitate (Lavie, 2006).

As organizations intensify relationships, they foster informal governance mechanisms, such as trust and reputation, which safeguard and minimize the risks of future relationships (Yu et al., 2006; Putnam, 1993; Górriz-Mifsud et al., al., 2016). Such mechanisms, as emphasized by Dyer and Singh (1998), are dependent on the organization's trajectory and are specifically linked to exchange relationships between certain partners. Therefore, the complex imitability of resources will be linked more expressively to the nature of the relationship than to the resources themselves (Lavie, 2006).

So, it is suggested that the organization access resources endogenous to open innovation, however, for these to be appropriated by the company, it is essential that it fosters long-term relationships dependent on the trajectory, as well as integrate resources and knowledge to internal assets. Furthermore, that such resources enable the development of new competencies related to the organization's essential capabilities.

3 Methodology

In the present study, a Systematic Literature Review (SLR) was carried out using explicit and rigorous criteria to identify, evaluate and synthesize the literature on a given topic (Cronin et al., 2008). In this sense, an SLR was conducted to analyze how the innovation process is studied in the light of the RBV and the Theory of the Growth of the Firm, by Edith Penrose.

Scientific articles were analyzed, specifically theoretical-empirical articles, using the publication of the study by Penrose as a time frame (1959) to identify the evolution of publications that cover the two theoretical approaches as the foundation of studies that deal with innovation.

Bibliometric studies and articles published in event proceedings were excluded from the analysis. As a source of academic production, the following databases were used: Web of Science, Scopus, and EBSCO, for this the following keywords and commands were presented: ("resource-based view" AND (Penrose OR "theory of the growth of the firm") AND "innovation").

From the databases presented and using these keywords, 97 articles were initially selected. Four filters were used to select the articles. The first sought to eliminate articles published in journals without an impact factor, duplicate articles, as well as bibliometrics or derivatives of event proceedings. The index used to measure the impact factor was the SJR (Scientific Journal Rankings). After the first filter, 30 articles were eliminated.

The second filter sought to ensure greater rigor as to the relevance of the study. For this, the MethodiOrdinatio Index (InOrdinatio) proposed by Pagani et al. (2015) was adopted. In this methodology, three aspects are considered: journal impact factor, year of publication, and the number of citations of the article. The MethodiOrdinatio is based on the following equation:

$$\text{InOrdinatio} = (\text{FI} / 1000) + \alpha * [10 - (\text{YearRes} - \text{YearPub})] + (\Sigma \text{Ci})$$

where FI refers to the impact factor of the journal (the SJR index was used); the Greek letter α refers to the weight (between 1 and 10) given to the year of publication of the article. In this study, the maximum weight was assigned considering that the analysis of the evolution of publications was performed; finally, Ci is the number of citations of each article, quantitative obtained through the Google Scholar page (although the databases in which the articles were searched provide the number of citations for each article, they use different metrics, causing divergences in the number of citations, thus, we chose to access the number of citations through Google Scholar to use the same metric).

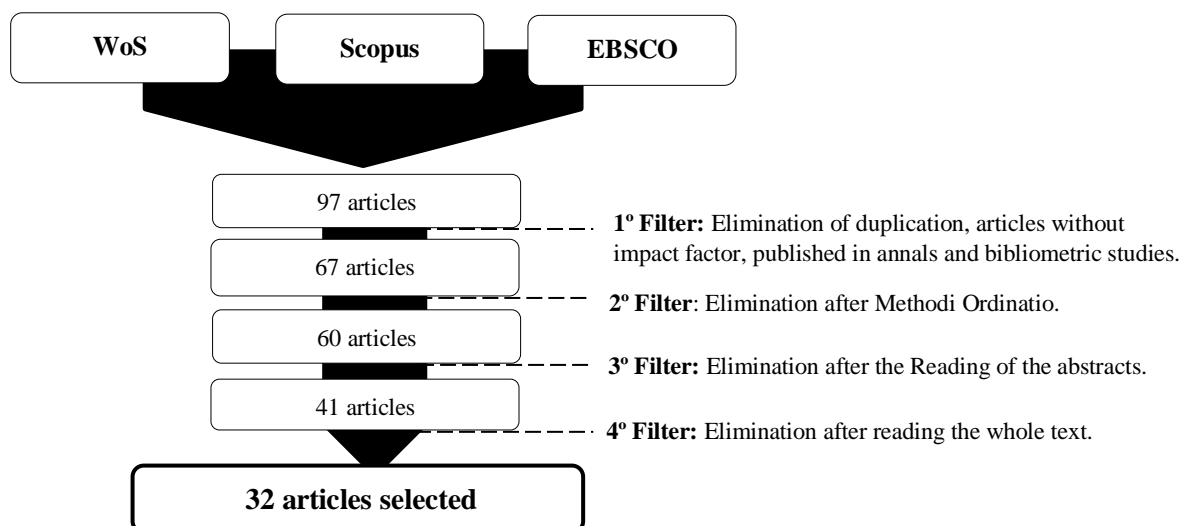
From the consolidation of information, the MethodiOrdinatio calculation was done for each selected article. The authors Pagani et al. (2015) recommend the determination of a cut-off line for the selection of articles with greater relevance. Thus, 7 articles were excluded, which presented results of

InOrdinatio below 20. This selection considered that works with an index below 20 had less relevance, mainly in terms of the number of citations when considering the period of publication.

The third filter corresponded to the reading of abstracts, and the fourth, the reading of full articles. Thus, the alignment with the objectives of this study was analyzed. Three criteria were considered: whether the article was theoretical-empirical research, whether the study was based on the RBV and Edith Penrose's Theory of the Growth of the Firm, and whether aspects related to innovation were investigated. After the third filter, 19 articles were excluded from the analysis; and, based on the fourth filter, 9 articles were eliminated. At the end of the filtering process, 32 articles were selected for analysis.

Figure 1 illustrates the article selection flow.

Figure 1 – Article selection flow



Source: Prepared by the authors.

Social Network Analysis (SNA) was used, supported by the UCINET software, to identify the theoretical approaches that were used in addition to the RBV and the Theory of the Growth of the Firm, as well as to analyze which theoretical contexts the studies were based.

The first measure used was the *nDegree*, which measures, through direct relationships, the central position of each theory and theoretical approach. The second measure was *nBetweenness*, to measure the intermediate position exercised by different theories and theoretical approaches, enabling the verification of approaches used with greater diversification.

From these two measures, theoretical contexts are central in studies that deal with the RBV, Theory of the Growth of the Firm, and Innovation were identified.

To support the interpretation of research results, the Iramuteq 0.7 software was used. This software helped in the organization and analysis of textual data. For this, a similarity analysis was

performed, enabling a better understanding of the relationships between the analyzed articles and the two focal theoretical approaches.

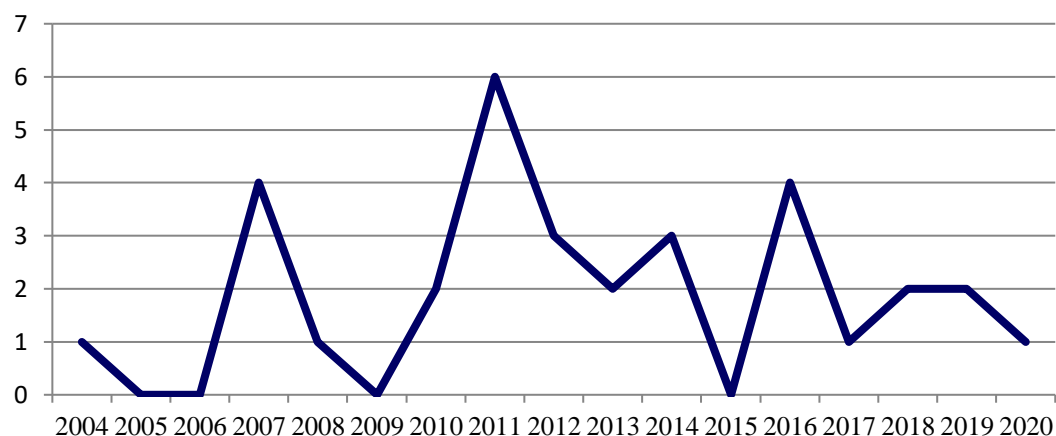
Finally, a theoretical model on the innovation process is presented, integrating the RBV and the Theory of the Growth of the Firm.

4 Results

4.1 Evolution of publications over time

As illustrated in Figure 2, it is observed that the number of research related to innovation based on the RBV and the Theory of the Growth of the Firm has fluctuated over time.

Figure 2 – Evolution of publications



Source: Prepared by the authors.

The greatest number of publications occurred in 2007, 2011, and 2016, with 44% of the articles published in these three years.

In 2011, the peak of publications, the American Council of Advisors on Science and Technology presented the report "Ensuring American Leadership in Advanced Manufacturing". Furthermore, in section 102 of *America Competes Reauthorization Act of 2010*, a Technology Committee was established, responsible for planning and coordinating programs and activities in advanced manufacturing research and development as well as integrating industry, federal agencies, and research centers to identify and reduce regulatory, logistical and tax barriers, as well as to facilitate the transfer of intellectual property and technology based on academic research.

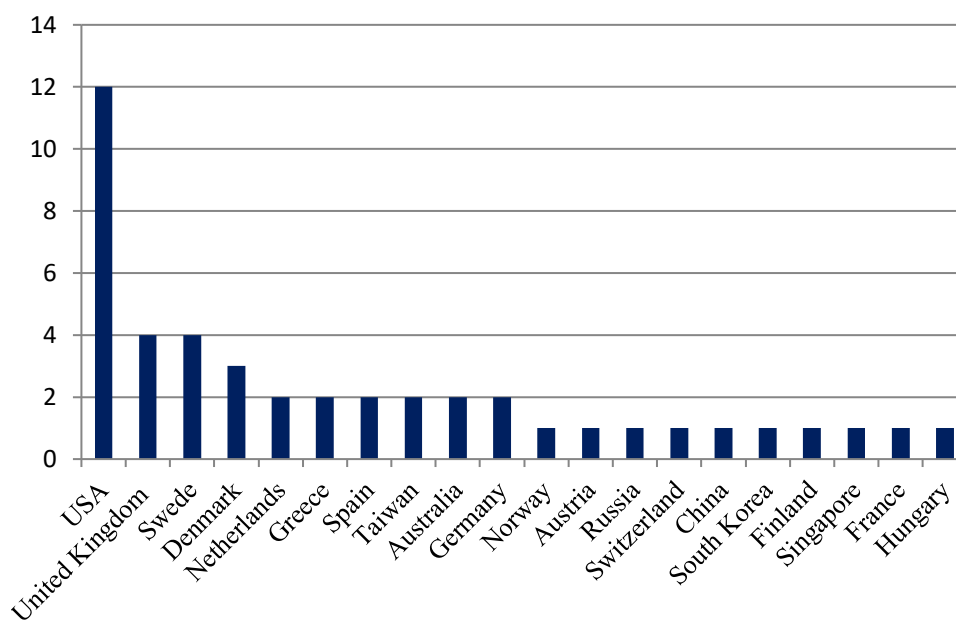
It can be deduced that from this regulation, the need for studies on innovation in the light of the organization's resources has increased. Researchers have expanded their investigations into the innovation process based on the RBV and the Theory of the Growth of the Firm.

4.2 Authors' country of origin

Figure 3 shows the countries of origin of the authors who investigated innovation from the two focal theoretical approaches of the present study. The total number of countries of origin of the surveyed scientific production was equal to 20. The countries with a predominance of publications were the USA (38%), the United Kingdom (13%), and Sweden (13%).

This result corroborates previous findings, which deal with the institution of the Technology Committee in the US context and the report on American leadership in advanced manufacturing, which demonstrates that the US government has followed a policy to ensure the development of the innovation capacity of national organizations. In addition, as noted by Puangpronpitag (2019), in the context of the United Kingdom, there is an incentive to build links between universities, government, and companies to favor the development of innovation.

Figure 3 – Countries of origin of scientific production



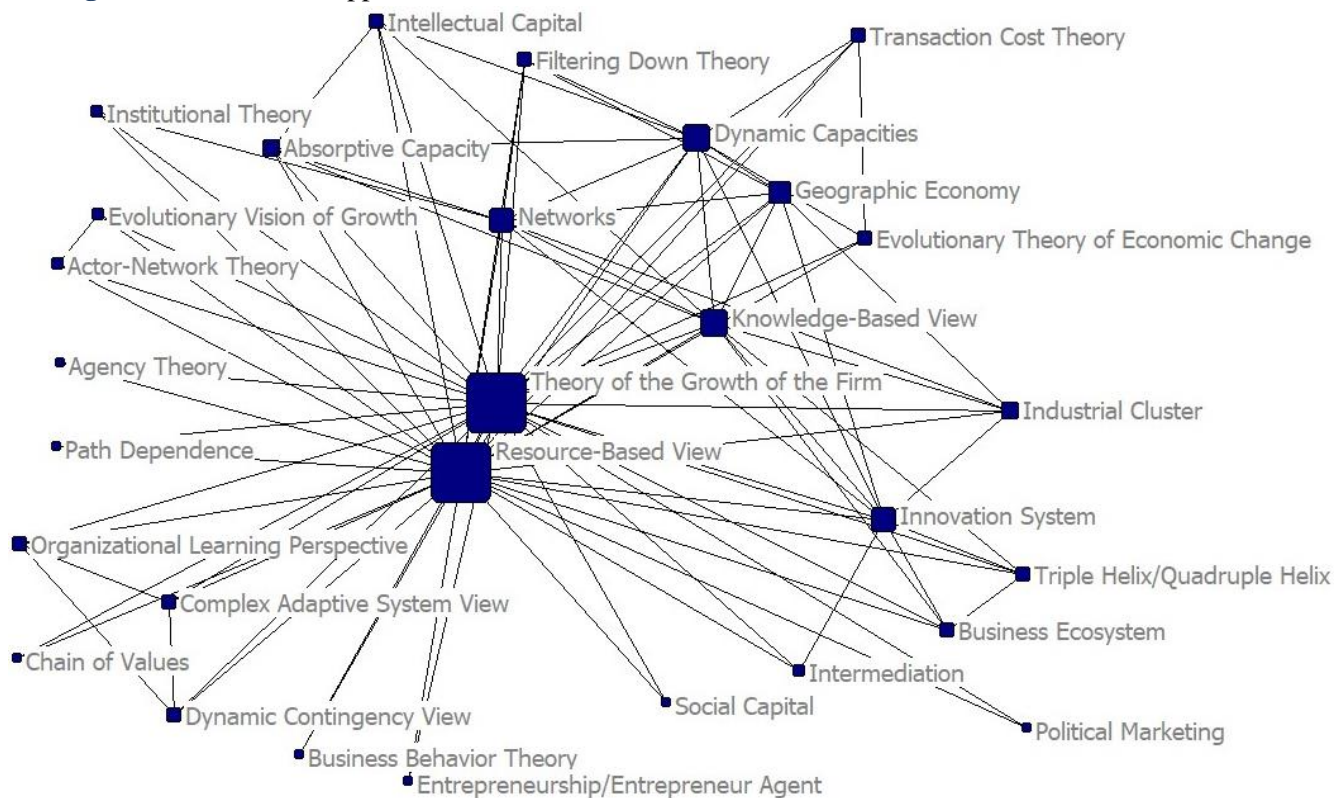
Source: Prepared by the authors.

And in Sweden, a program was implemented, called the Swedish Strategic Innovation Program (SIP), which works in the coordination of actors, networks, and institutions to increase the country's international competitiveness and address major national challenges; Innovation partnership programs were launched and, in 2016, the Swedish innovation agency was especially responsible for supporting these programs. It should be noted that the explicit motivation of Swedish innovation policies was to promote the integration of skills and experiences (from industry, academe, and the public sector), encouraging interaction and collaboration across sector boundaries (Grillitsch et al., 2019).

4.3 Complementary theoretical approaches

Figure 4 shows the network formed by theories and theoretical approaches that supported the studies in this systematic review.

Figure 4 – Theoretical approaches network



Source: Elaborated by the authors.

It is observed from the network, that a range of theoretical approaches supported the studies together with the RBV and the Theory of the Growth of the Firm, totaling 27 theoretical approaches. To more clearly identify which approaches are central in the analyzed context, the centrality measures of the main theoretical approaches are presented in Table 2 below (as the purpose is to identify the main theoretical approaches, only the approaches that presented the highest measures of centrality are expressed in the table below).

Table 2 – Measures of centrality of the main approaches

Main Theoretical Approaches	nDegree	nBetweenness
Dynamic Capabilities	1.143	0,018
Knowledge-Based View	1.071	0,014
Networks	0,964	0,011
Economic Geography	0,857	0,002
Innovation Systems	0,679	0,012
Capacity of Absorption	0,357	0,001
Intellectual Capacity	0,321	0,000

Source: Prepared by the authors.

It is noteworthy that, in addition to the RBV and the Theory of the Growth of the Firm (which were the theoretical bases of the analyzed articles), the theoretical approaches Dynamic Capabilities, Knowledge-Based View, Networks, Economic Geography and Innovation Systems were the main theoretical foundations of the analyzed studies.

Both the Dynamic Capabilities theoretical approach and the Knowledge-Based View are derivatives of the RBV. These approaches emphasize the different capabilities of the organization as a source of competitive advantage, which was one of the findings presented in the study by Penrose (1959), which points out the company's essential competencies as specific resources of the organization, therefore, imperfectly mobile.

In this sense, the rapid advancement of information and technology requires the organization to have the ability to respond quickly and effectively to market demands (Too, 2012). Thus, the development of dynamic capabilities, which refer to the company's ability to renew its resource base to face a constantly changing environment and sustain its superior performance (Teece et al., 1997; Danneels, 2010), expands the possibility of the adequate development of innovation (Eisenhardt & Martin, 2000).

Therefore, the organization's performance is linked to the origin, use, and deployment of the body of knowledge held by the company – aspects that are emphasized by the Knowledge-Based View. Such knowledge can be created, acquired, applied, and disseminated by organizations to expand their capacity for innovation (Mardani et al., 2018; Huang & Li, 2009). Thus, heterogeneous and imperfectly mobile knowledge relevant to the innovation process, in addition to expanding the organization's innovative capacity, is crucial to sustain its competitive advantage position.

Next, the Networks and Innovation System theoretical approaches investigate the influences of different actors from the public and/or private sector in the innovation process, which can influence the production and dissemination of knowledge and effective resources for the development of innovation. Economic Geography investigates the actors related to the territory, based on local cooperation and innovation. Hence, business arrangements, collective resources integrated into industrial districts (Wouden & Rigby, 2019; Lorentzen, 2007), the concentration of suppliers in an area, and knowledge and technology flows (Kottaridi & Lioukas, 2011) are investigated.

Based on these last three theoretical approaches, it is understood that the development of innovation is a process that involves knowledge and resources that may lie outside the organization's boundaries, which makes access to external resources and knowledge crucial (Cantner et al., 2011). Thus, it is understood that organizations can expand their capacity for innovation through relationships undertaken with different actors, providing access to knowledge and resources held by interrelated actors directly or indirectly (Ahuja, 2000; Gulati, 1998; Rivera et al., 2010).

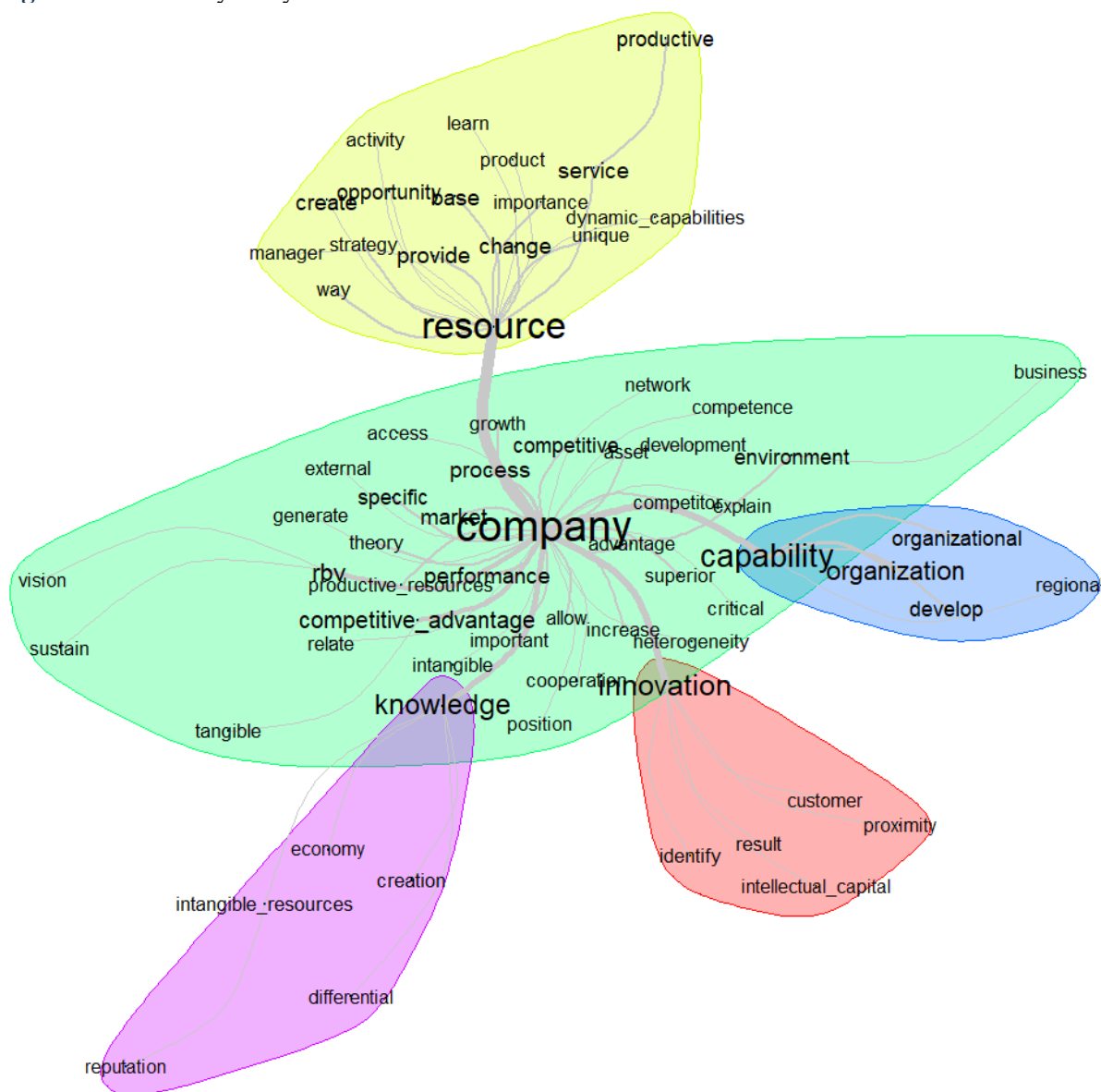
From the identification of the main complementary theoretical approaches, it can be deduced that the studies that investigate innovation based on the RBV and the Theory of the Growth of the Firm

emphasize the essential capabilities and the relationship with actors that expand access to significant resources for the development of innovation.

4.4 Similarity analysis

In Figure 5, the similarity analysis derived from the results of the surveys on innovation, RBV, and the Theory of the Growth of the Firm is presented.

Figure 5 – Similarity analysis



Source: Elaborated by the authors.

The words that had the highest incidence in the analyzed results were company, resource, capacity, innovation, and knowledge. In the first group, here called strategic, in which the word "company" is central, focal elements of studies in the field of strategy are integrated, such as competitive advantage, performance, sustain, growth, competitor, vision, position, and heterogeneity. Furthermore,

from the centrality of the strategic group, emphases are derived from the innovation process, from the RBV, and the Theory of the Growth of the Firm.

It is observed that in the second group, entitled "resources", dynamic capabilities are included. Thus, when investigating the innovation process in the light of RBV and Penrose's theory, researchers emphasize the importance of such capabilities so that organizations can integrate, build and reconfigure their competencies to deal with market transformations.

In continuity, the third group, called "capabilities", the words 'develop' and 'organization' are encompassed. It is argued, therefore, that the innovation process should emphasize the development of capabilities, especially combinative capabilities, thus, there will be the promotion of trajectory-dependent competencies, favoring their complex imitability.

The fourth group, entitled "knowledge", emphasizes the characteristic of an intangible resource. Therefore, as discussed above, knowledge, especially those of a tacit nature, are expressively relevant and with the integration of new knowledge to existing ones, the organization has the possibility of creating and sustaining a competitive advantage.

Finally, the fifth group, called "innovation", in addition to being part of the strategic group, encompasses the terms intellectual capital and customer. Therefore, it is assumed that the innovation process must be based on the demands of customers and for such a process to result in the generation of sustainable competitive advantage, it must be based on their intellectual capacities, especially those derived from dynamic capabilities.

Integrating the previous analysis on the main theoretical approaches used in a complementary way, it is argued that the studies that analyzed innovation from the RBV and the Theory of the Growth of the Firm focused on sustaining the organization's competitive advantage as a result of its dynamic capabilities, as well as the access and use of organizational knowledge. This innovation process is discussed below.

5 Discussion

5.1 The innovation process in light of the RBV and the Theory of the Growth of the Firm

Innovations, particularly in terms of resource combinations, as pointed out by Rugman and Verbeke (2002), can be significant for obtaining and sustaining superior returns.

When considering the main assumptions of the RBV (heterogeneity and immobility of company resources) and the attributes that characterize resources as sources of sustainable competitive advantage, value, rarity, inimitable and non-substitutable (Peteraf, 1993; Peteraf & Barney, 2003; Barney, 1991), some assets are framed as factors of easy replicability (for example, simple technological resources), however, some resources are expressively complex and involve numerous aspects that make their replication impracticable, such as, for example, significant cooperation and highly complex organizational routines.

The potential source of sustainable competitive advantage in relation, for example, to technological resources, may not necessarily be associated with the various technologies held by the company (which can be readily transferred or replicated by other firms), but rather with the interactions between skilled users and multiple technologies (Barney et al., 2001).

The exploitation of resources held by the company together with the development of new ones will provide opportunities for reaching a position of sustainable competitive advantage (Mahoney & Pandian, 1992). Many companies seek to gain an advantage by introducing new products; however, as Penrose (1959) argues, this advantage tends to be temporary, as novelties may be introduced into the market by other firms.

Thus, many companies seek to minimize the possibility of imitation of new products through patents or an active product innovation policy. However, Penrose (1959) argues that this sustainable position involves not only product innovations but also production techniques, marketing, and administration; therefore, relationships with suppliers, clientele, consolidated brands, and qualified labor are resources that demand a considerable cost and require a significant amount of time for other firms to develop, causing a high uncertainty as to the achievement of this initiative.

In this perspective, Peteraf (1993) understands that if the innovation is limited to a complex set of technologies accessible to other firms, then its patenting will not distance the competition and, thus, the resource will be perfectly mobile, not originating, in this way, to sustainable competitive advantage. In this case, the author suggests that the firm develop other specialized resources not available in the market, such as, for example, reputation with regard to technology, path-dependent capabilities, development of specialized assets; thus, the innovation process will be imperfectly mobile, providing opportunities to obtain a sustainable competitive advantage.

The development of studies, in addition to expanding the possibilities of innovating products and processes, can accelerate the production of new knowledge, which, as presented by Penrose (1959), can constitute specific resources of the firm, which are difficult to transfer; therefore, they can be part of the firm's unique set of core competencies, which are means to obtain a competitive advantage position (Prahalad & Hamel, 1990; Mahoney & Pandian, 1992).

This new knowledge may not even be directly useful to the previously required innovations, however, it may provide advantages in absolutely new factors (Penrose, 1959), since the firm's specific human capital (such as R&D capacity) results from the accumulation of assets over time from the set of company actions, thus difficult to imitate (Dierickx and Cool, 1989; Barney, 1991).

Therefore, the outsourcing of the R&D process, even with the condition of being characterized as a relevant means of obtaining external knowledge, needs to be balanced with the internal activity, since the possible gains obtained with this external R&D process must be compared to losses resulting from the dilution of specific resources of the organization (Grimpe & Kaiser, 2010).

New opportunities for growth and sustaining a competitive advantage position are related not only to market conditions but also to the firm's internal resources (Penrose, 1959; Mahoney & Pandian,

1992); therefore, the generation and offer of new products are linked to productive services and knowledge available in the firm (Penrose, 1959), such as intangible organizational capital (for example, strategic alliances and network ties as means to access assets that are necessary for the firm), which are firm-specific resources that are difficult to imitate (Barney et al., 2001).

The possibility of introducing new products and accessing new markets minimizes the effects imposed by the current demand for the firm's products, being more significantly linked to the restrictions imposed by the internal resources available to it.

Faced with cyclical and seasonal fluctuations in demand, which have caused constant underutilization of available resources by the firm, companies can innovate and diversify the supply of products, to allow full use of available resources (Penrose, 1959). Therefore, unused resources are a stimulus to innovate and a source of competitive advantages, making diversification an important means to face environmental uncertainties, since different kinds of products are subject to different types of risks.

Thus, diversification represents a response to economic opportunities given the nature of the resources available by the company (Mahoney & Pandian, 1992), becoming more expressively feasible through the development of broad innovations. In this way, the stimulus to innovation can originate from the purpose of a firm to use its existing resources more efficiently and, thus, innovation should not be conducted randomly, but related to the nature and potential of the available resources (Penrose, 1959).

It is then important that organizations maximize their innovation capabilities, to expand the alternatives for accessing and using their resources (Li & Atuahene-Gima, 2001; Jean et al., 2017) and, thus, reduce the effects of conditions imposed by cyclical fluctuations and face environmental uncertainties (Penrose, 1959).

Considering the perspective of Penrose (1959) regarding the firm as a wide collection of resources, and that its growth is linked to the portion of resources that does not have their full potential used, there may be an incentive to innovation to expand the use of available resources. Therefore, the firm's growth results from the efficient use and use of its internal resources, and, considering that competitive competition is at the core of the activities of large companies, there is a need for these firms to engage in the constant development of research and broad innovations.

Penrose (1959) argues that if positional barriers are not exercised by large firms given the performance of small firms, there may be a reduction in the capacity of these smaller firms to expand; however, these restrictions can be overcome through the development of products that have conditions to replace those already available on the market.

Thus, if the opportunities for economic expansion of a given sector are at a rate of growth higher than the conditions for large companies to take full advantage of them, and these companies do not have the means to prevent the entry of small companies, there will be the possibility of a continuous increase in the number smaller competitors, as well as the possibility of some of them to become large firms.

Penrose (1959) called these opportunities the “interstices of the economy” – which are created by limiting the rate of expansion of firms. Thus, large companies identify the opportunities that they believe are more profitable, leaving the other opportunities available.

Interstices appear as an opportunity for firms to expand the production of certain products and enter new sectors.

In this sense, companies that can keep up with the interstices of the economy through the creation of new products and technologies, especially in anticipation of other firms, will be able to enjoy a dominant position in the sector. Therefore, as Penrose (1959) emphasizes, firms that seek to access important interstice opportunities, as well as maintain an advantageous competitive position concerning other competitors, should foster innovations with regard to products and production and marketing processes, in a way that they are able to take advantage of the relevant and profitable opportunities in the interstice.

To consolidate heterogeneous and imperfectly mobile innovation resources, characterized as valuable, rare, complexly imitable, and non-replaceable, therefore, with the potential to generate sustainable competitive advantage, the list of identified resources that have such characteristics is presented in Table 3 (according to theorists of RBV and Penrose's approach).

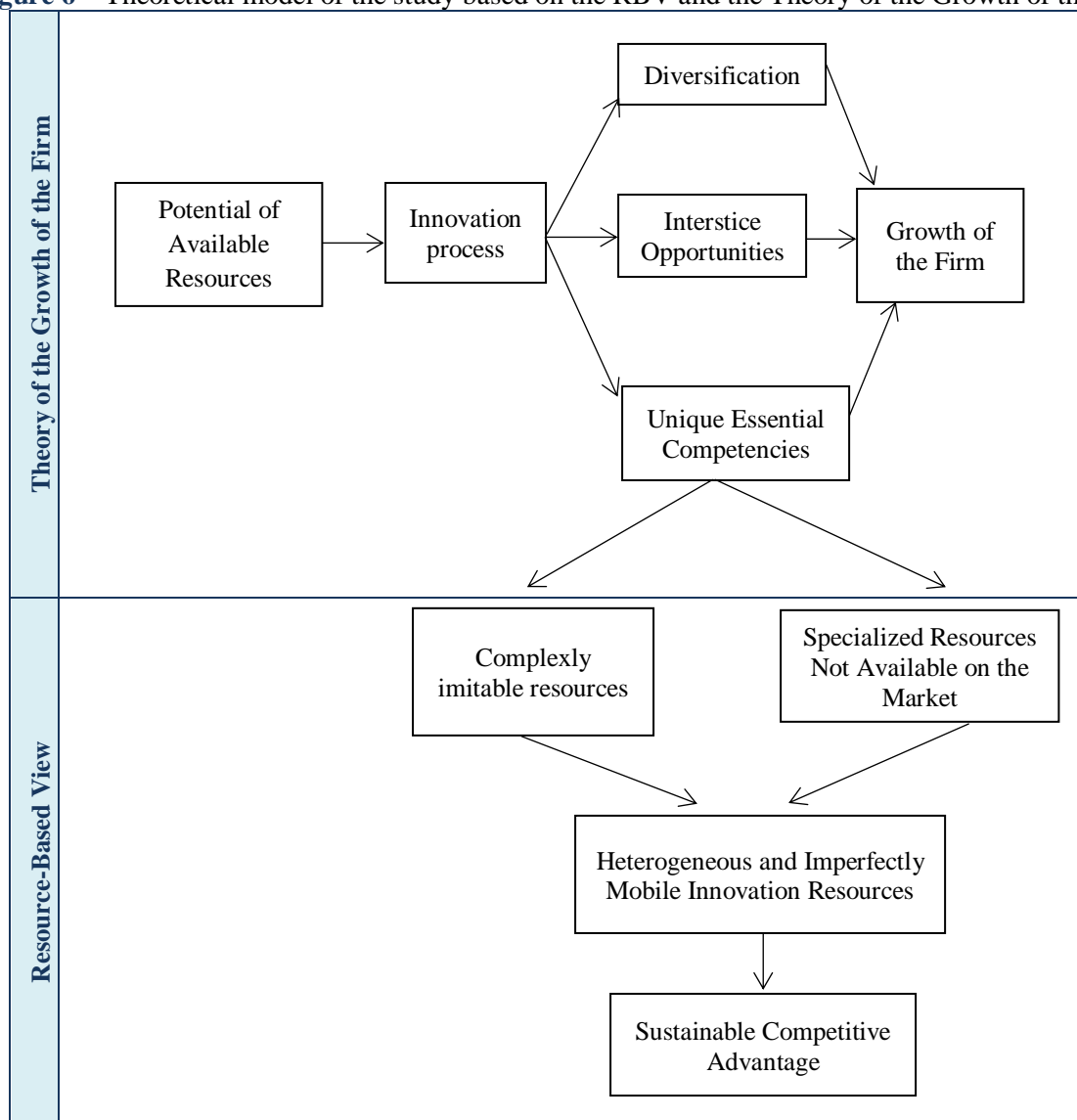
Table 3 – Heterogeneous and imperfectly mobile innovation resources

Heterogeneous and Imperfectly Mobile Innovation Resources	References
Interactions between users-technologies; Relationships with suppliers; Customer relationships; Consolidated brands; Specific capabilities of employees; Reputation with regard to technology; Path-dependent capabilities; Development of specialized assets; R&D capabilities; Experience of managers; Partnerships and network ties.	(Penrose, 1959) (Peteraf, 1993) (Barney et al., 2001) (Grimpe & Kaiser, 2010)

Source: Prepared by the authors.

In Figure 6, below, a theoretical model based on the RBV and the study by Edith Penrose is presented, as a way of specifying the innovation process from these theoretical perspectives.

Figure 6 – Theoretical model of the study based on the RBV and the Theory of the Growth of the Firm



Source: Prepared by the authors.

The concepts of the elements of the proposed theoretical model are presented in Table 4 below.

Table 4 – Main concepts

Concepts	
Potential of Available Resources	Portion of resources that do not have their full potential used and that can be used for other purposes.
Innovation Process	Activity flow related to the development or improvement of products, processes, or organizational methods.
Diversification	Expansion of the company's operations through operations in different sectors and/or markets.
Interstice Opportunities	Opportunities created due to the limited expansion condition of market organizations.
Unique Essential Competencies	Organization-specific skills derived from collective learning and the integration of diverse knowledge and technologies.
Growth of the Firm	Increased organization size accompanied by interconnected series of internal changes.
Complexly imitable resources	Resources that have attributes such as unique historical conditions, causal ambiguity, social complexity, which result in their complex or impractical imitability by other actors.
Specialized resources not available on the Market	Organization-specific resources that have more significant economic value when used in conjunction with other company assets.
Heterogeneous and Imperfectly Mobile Innovation Resources	Resources related to the innovation activity that have unique characteristics and are not easily imitated or replicated by competing companies.
Sustainable Competitive Advantage	Circumstance in which the company can generate greater economic value than its competitors, and this advantage remains over time.

Source: Prepared by the authors.

The theoretical model presented in Figure 6 illustrates, from the RBV and the Theory of the Growth of the Firm perspectives, the innovation process capable of generating a sustainable competitive advantage position, as well as the organization's growth.

As shown, the innovation process must be based on the potential of the available resources, that is, as the resources have attributes that are difficult to divide, these will enable the organization to use them for different purposes, therefore, such resources held by the company will have the potential to the development of broad innovations.

The innovation process, based on the potential of resources, in addition to providing opportunities for diversification and taking advantage of interstices, will enable the organization to develop unique essential competencies, derived from the execution of the stages of the innovation process.

Such competencies are considered unique because the set of resources and knowledge is specific to the organization, built over an extensive period, therefore, complexly imitable. Thus, such competencies, due to their heterogeneous and imperfectly mobile characteristics, will have the potential to generate and sustain a competitive advantage position, as well as to promote the organization's growth.

Therefore, it is suggested that organizations develop and base their operations on the unique essential competencies derived from the innovation process since such competencies will have the potential to originate a position of sustainable competitive advantage.

6 Conclusion

Through theoretical analysis, a broader complementarity of Edith Penrose's study in the innovation process was observed, in addition to the elements commonly pointed out in research based on the RBV.

The studies that analyzed innovation from the RBV and the Theory of the Growth of the Firm focused on sustaining the organization's competitive advantage as a result of its dynamic capabilities, as well as the access and use of organizational knowledge.

The study revealed that, for the innovation process to have the potential to generate sustainable competitive advantage and enable the firm's growth, it must be based on the potential of the available resources, and, through the continuous execution of the innovation process, it must develop unique essential competencies (such as R&D experience) to develop heterogeneous and imperfectly mobile innovation capabilities. Furthermore, the innovation process can make it possible to reach interstice opportunities and diversify the range of products and services offered by the company, thus resulting in an effective growth cycle.

It should be noted that the unique core competencies derived from the innovation process result in complexly imitable specialized assets, characterized as heterogeneous and imperfectly mobile innovation resources, which will have the potential to generate sustainable competitive advantage.

Therefore, it is inferred that, for the innovation process to be able to sustain a position of competitive advantage, as well as enable the firm's growth, it must be based on the organization's essential competencies, favoring the development of heterogeneous and imperfect resources mobile, such as user-technology interactions, trajectory dependent capabilities, specialized asset development, R&D capabilities, alliances, and network ties; furthermore, that this process originates from the potential of the resources available by the organization.

It is important to emphasize that the present study was limited to the Theory of the Growth of the Firm as an analytical emphasis of Edith Penrose's study. Other relevant works by the researcher such as "Profit sharing between producing countries and oil companies in the Middle East." and "Foreign investment and the growth of the firm" were not the focus of the study.

Based on what was presented, the following suggestions for future studies are proposed: that the theoretical model of the study be empirically tested; that future studies expand the investigation into the role of the innovation process in the development of unique essential competencies; to study the influence of the innovation process on interstice opportunities; finally, to specifically analyze each of the heterogeneous and imperfectly mobile innovation resources presented in Table 3 and their influences in sustaining a superior competitive position.

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