



## THE EFFECTS OF ORGANIZATIONAL LEARNING AND ABSORPTION CAPACITY ON THE PERFORMANCE OF PRODUCT INNOVATION IN SMALL AND MEDIUM-SIZED ENTERPRISES

*OS EFEITOS DA APRENDIZAGEM ORGANIZACIONAL E DA CAPACIDADE DE ABSORÇÃO NO DESEMPENHO DA INOVAÇÃO DE PRODUTO EM PEQUENAS E MÉDIAS EMPRESAS*

*LOS EFECTOS DEL APRENDIZAJE ORGANIZACIONAL Y LA CAPACIDAD DE ABSORCIÓN EN EL DESEMPEÑO DE LA INNOVACIÓN DE PRODUCTOS EN LAS PEQUEÑAS Y MEDIANAS EMPRESAS*

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### Abstract

**Objective:** Verify the moderating role of absorptive capacity in the relationship between organizational learning and the performance of product innovation in small and medium-sized companies (SMEs).

**Methodology:** The research has a descriptive quantitative approach using the survey method and questionnaires applied to 233 owners of small and medium-sized companies (SMEs). Data were analyzed using the Smart-PLS software using the structural equation modeling technique.

**Originality:** The research used a quantitative and descriptive approach to investigate product innovation performance in the SMEs' field. Investigations into the performance of innovation in SMEs are still a limited and little-explored field in Brazil (Manthey et al., 2017; Davila, Varvakis, North, 2019). Another prominent factor was that the absorptive capacity does not act as a moderator in the relationship between organizational learning and product innovation performance, which goes against the assumptions present in the literature.

**Main results:** The results showed that organizational learning influenced positively the performance of product innovation in the investigated companies, as well as organizational learning positively impacted absorption capacity. However, the moderating role of absorption capacity in the relationship between organizational learning and product innovation performance has not been confirmed in the field of study of the investigated SMEs.

**Theoretical/methodological contributions:** The research showed that the capacity of absorption in the investigated SMEs could not moderate, affecting the direction or intensity of product innovation

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performance. This fact represents a counterpoint to the previously published literature that advocates a positive relationship between AC and innovation.

**Social/management contributions:** The purpose of this study was to obtain more information on how SMEs absorb knowledge and transform it to improve the performance of innovations. The understanding of practices to develop the knowledge absorption capacity in SMEs is still configured as a "black box" to be explored.

**Keywords:** Absorptive capacity. Organizational learning. Performance of product innovation. Small and medium enterprises. Structural equation modeling.

### Resumo

**Objetivo do estudo:** Verificar o papel moderador da capacidade absorptiva na relação entre a aprendizagem organizacional e o desempenho da inovação de produtos em pequenas e médias empresas (PMEs).

**Metodologia:** A pesquisa possui abordagem quantitativa descritiva com uso do método survey e aplicação de questionários em 233 proprietários de pequenas e médias empresas (PMEs). Os dados foram analisados no Software Smart-PLS com a técnica de modelagem de equações estruturais.

**Originalidade:** A pesquisa investigou o desempenho da inovação de produto no campo de estudo nas PMEs usando uma metodologia de natureza quantitativa com abordagem descritiva. As investigações sobre o desempenho da inovação em PMEs ainda é um campo limitado e pouco explorado no Brasil (Manthey, et al., 2017; Davila, Varvakis, North, 2019). Outro fator de destaque foi o fato de a capacidade de absorção não atuar como moderadora na relação entre a aprendizagem organizacional e o desempenho da inovação de produto, o que se contrapõem aos pressupostos presentes na literatura.

**Principais resultados:** Os resultados mostraram que a aprendizagem organizacional influencia positivamente no desempenho da inovação de produtos nas empresas investigadas, bem como a aprendizagem organizacional impacta positivamente a capacidade de absorção. No entanto, não se confirmou o papel moderador da capacidade de absorção na relação entre a aprendizagem organizacional e o desempenho da inovação de produtos no campo de estudo das PMEs investigadas.

**Contribuições teórico-metodológicas:** A pesquisa apontou que a capacidade de absorção, nas PMEs investigadas, não é capaz de moderar, afetar a direção ou a intensidade, do desempenho da inovação de produto. Isto representa um contraponto à literatura até então publicada que defende uma relação positiva entre a CA e o desempenho da inovação.

**Contribuições sociais/gerenciais:** O presente estudo teve por finalidade a obtenção de maiores informações sobre como as PMEs absorvem conhecimentos e os transformam para melhorar o desempenho de inovações. A compreensão das práticas para desenvolver a capacidade de absorção de conhecimento em PMEs ainda se configura como uma "caixa preta" a ser explorada.

**Palavras-chave:** Capacidade de absorção. Aprendizagem organizacional. Desempenho da inovação de produto. Pequenas e médias empresas. Modelagem de equações estruturais.

### Resumen

**Objetivo del estudio:** Verificar el papel moderador de la capacidad de absorción en la relación entre el aprendizaje organizacional y el desempeño de la innovación de producto en las pequeñas y medianas empresas (PyME).

**Metodología:** La investigación tiene un enfoque descriptivo cuantitativo utilizando el método de encuesta y cuestionarios aplicados a 233 propietarios de pequeñas y medianas empresas (PYMES). Los datos se analizaron utilizando el software Smart-PLS utilizando la técnica de modelado de ecuaciones estructurales.

**Originalidad:** La investigación investigó el desempeño de la innovación de producto en el campo de estudio en PYMES utilizando una metodología de carácter cuantitativo con enfoque descriptivo. La investigación sobre el desempeño de la innovación en las pymes es todavía un campo limitado y poco explorado en Brasil (Manthey, et al., 2017; Davila, Varvakis, North, 2019). Otro factor destacado fue el hecho de que la capacidad de absorción no actúa como moderador en la relación entre el aprendizaje

organizacional y el desempeño en innovación de producto, lo que contradice los supuestos presentes en la literatura.

**Principales resultados:** Los resultados mostraron que el aprendizaje organizacional influyó positivamente en el desempeño de la innovación de productos en las empresas investigadas, así como el aprendizaje organizacional impactó positivamente la capacidad de absorción. Sin embargo, no se ha confirmado el papel moderador de la capacidad de absorción en la relación entre el aprendizaje organizacional y el desempeño de la innovación de productos en el campo de estudio de las PYMES investigadas.

**Aportes teóricos/metodológicos:** La investigación mostró que la capacidad de absorción, en las PyME investigadas, no es capaz de moderar, afectar la dirección o intensidad del desempeño de la innovación de producto. Esto representa un contrapunto a la literatura publicada anteriormente que aboga por una relación positiva entre CA e innovación.

**Aportes sociales/gerenciales:** El propósito de este estudio fue obtener más información sobre cómo las pymes absorben el conocimiento y lo transforman para mejorar el desempeño de las innovaciones. La comprensión de las prácticas para desarrollar la capacidad de absorción de conocimiento en las PYMES aún se configura como una “caja negra” por explorar.

**Palabras clave:** Capacidad de absorción. Aprendizaje organizacional. Desempeño de la innovación de productos. Pequeñas y medianas empresas. Modelos de ecuaciones estructurales.

## 1 Introduction

In a scenario where instability and change prevail, generating innovation is essential for small and medium-sized companies (SMEs). Such ability offers added value to the product/service and the customer (Cassol, Cintra, Ruas & Oldoni, 2016; McDowell, Peake, Coder & Harris, 2018). The development and implementation of knowledge-based resources guided by organizational learning processes become relevant for companies to obtain sustained competitive advantage and profitability (Cohen & Levinthal, 1990). However, absorption capacity (AC) becomes necessary because it assesses its ability to identify, assimilate, transform and exploit valuable external knowledge for its processes or operations to obtain a competitive advantage (Escribano; Fosfuri & Tribo, 2009).

Innovation in SMEs is conceived as an individual and collective learning process that aims to find new ways of solving problems, depending on the company's capacity to absorb knowledge. New knowledge is developed, distributed, and used (Alegre & Chiva, 2008). Thus, organizational learning processes would be at the origin of the development of specific AC capabilities (acquisition, assimilation, transformation, and application) (Lane; Koka & Pathak, 2006; Camisón & Forés, 2010; Sun & Anderson, 2010; Gebauer, Worch, & Truffer, 2012).

We observed that the speed of response and the ability to adapt to market demands allow SMEs to take advantage of their "size" advantages through innovation (Leal-Rodríguez & Albort-Morant, 2016; Rosenbusch & Brinckmann, 2011). Recent studies indicate that innovative activities are particularly challenging for small and medium-sized enterprises

(SMEs) due to their severe financial constraints and information asymmetries (Barbaroux, 2014; Limaj & Bernroider, 2019).

The organizational learning capacity might not be enough to achieve high levels of product innovation performance. The company needs to have other organizational capabilities (Fernández-Mesa, Alegre-Vidal, Chiva-Gómez & Gutiérrez-Gracia, 2013), for example, the capacity to absorb knowledge. Although previous research has revealed a strong correlation between absorptive capacity and organizational learning, CA's moderating role in facilitating product innovation performance has not been thoroughly examined in the context of SMEs (Martínez-Sánchez, Vicente-Oliva, & Pérez-Pérez, 2020). Investigations on the performance of innovation in SMEs are still a limited and little-explored field in Brazil (Manthey, Verdinelli, Rossetto & Carvalho, 2017; Davila, Varvakis, North, 2019).

SMEs differ in their response and susceptibility to pressure from the external environment and, as such, the specific focus on organizational learning and innovative performance of SMEs is very critical (Chang; Hughes & Hotho, 2011; Tian, Dogbe, Pomegbe, Sarsah & Otoo, 2021). Thus, this research seeks to answer: *What is the influence of absorptive capacity on the relationship between organizational learning and product innovation performance in SMEs?* In this perspective, the research objective was to understand if the absorption capacity can enhance organizational learning and, consequently, increase product innovation performance in small and medium-sized companies.

To reach the aim, we used a quantitative survey with questionnaires applied to a sample of 233 owners of small and medium-sized companies located in the western mesoregion of Santa Catarina. Data were analyzed using the technique of structural equation modeling using the SmartPLS software. The main results of the research verified the positive influence of organizational learning on the absorption capacity (H1) and the performance of product innovation (H2). The positive impact of absorptive capacity on the performance of product innovation was also confirmed (H3). However, hypothesis H4 was rejected, noting that AC does not affect the direction or strength of the relationship between organizational learning and product innovation performance in the investigated SMEs. The study contributes to developing a better understanding of how organizational learning capacity impacts the product innovation performance of SMEs and how this relationship is moderated by absorptive capacity.

This article is structured from the presentation of introductory chapters, concluded here, theoretical review, and development of research hypotheses. The third chapter presents the

method and the descriptions of the variables. Later the results and discussions are exposed. Finally, the study's final considerations are outlined.

## 2 Literature review and hypothesis development

Organizational learning plays a vital role in problem-solving, generation/construction of new projects, and appropriation of knowledge (March & Olsen, 1975; Pedler, Burgoyne & Boydell, 1991; Schön & Argyris, 1996; Kim, 1998). The organizational learning capacity is understood from the tangible and intangible resources that a company has and is characterized as a set of skills to obtain a competitive advantage (Alegre & Chiva, 2008).

Organizations need organizational learning to successfully launch new products or services on the market to meet customer requirements and thus obtain better performance and sustainable competitive advantage (Baker & Sinkula, 2002). Thus, the survival of a company depends on its ability to innovate and learn.

Innovation explores knowledge developed within the company and manifests itself through new or improved products, services, or processes (Gronum; Verreyne & Kastle, 2012). On the other hand, product innovation is a process that includes technical design, research and development (R&D), manufacturing, management, and commercial activities involved in the commercialization of a new (or improved) product (Alegre & Chiva, 2008). Thus, the literature in recent years has made efforts to understand ways to measure the success and failure of new products (Cooper & Kleinschmidt, 1995; Valle; Fernandez & Avella, 2003; Alegre, Lapiedra & Chiva, 2006).

For companies to achieve a positive performance in innovation, it is necessary to understand the dynamics of innovation, a clear definition of the processes that comprise it, and the application of tools to measure it (Hannachi, 2015). However, considering the variety of forms of innovation, initiatives aimed at measuring its performance become very limited due to the lack of equivalence standards. There is a consensus in the literature on the need to adopt a multidimensional approach to measure innovation performance, that is, that it does not only consider financial and objective data (Bakar & Ahmad, 2010; Dewangan & Godse, 2014; Hannachi, 2015; Manthey et al., 2016). In this sense, the present study was based on the subjective understanding of product innovation performance considering its multidimensional format.

The organizational learning process consists of acquiring, disseminating, and using knowledge and is closely related to product innovation performance (Argote, McEvily &

Reagans, 2003; Lemon & Sahota, 2004; Alegre & Chiva, 2008). Scuotto, Del Giudice & Carayannis (2017) investigated 215 small and medium-sized companies from different sectors, both knowledge-intensive and labor-intensive, and found that AC positively affects the innovation performance of SMEs. They also found that innovation performance is related to the process of acquiring external knowledge (Palacios-Marques; Soto-Acosta & Merigó 2015). Moreover, it may be limited because companies cannot independently assess the value of external knowledge (Del Giudice and Maggioni 2014; Carayannis; Depeige & Sindakis, 2014).

Alternatively, Maes and Sels (2014) suggest that small companies may be more adept at implementing innovations due to their reduced bureaucratic processes. However, researchers generally agree that innovation capabilities derive from stocks of knowledge, sharing, and systematization within the company (Maes & Sels, 2014; Roxas et al., 2014), and innovation is a robust predictor of performance in the context of SMEs (Dibrell et al., 2008; Rosenbusch; Battisti & Deakins, 2011). Thus, we propose the first research hypothesis:

***Hypothesis 1a:*** *Organizational learning positively influences product innovation performance.*

To prevent organizational learning from being confused with competence development, this study explores the relationship between organizational learning and innovation within a broad framework, bringing to light the role of knowledge absorption capacity (CA). Absorption capacity (Cohen & Levinthal, 1990) is a learning perspective that has received considerable attention in the organizational literature (Lane et al., 2006; Leal-Rodríguez, Ariza-Montes, Roldan & Leal-Millan, 2014; Huang, Lin, Wu & Yu, 2015).

Some works defend the recursive relationship between Organizational Learning (OL) and absorption Capacity (AC) processes. Therefore, OL processes would be at the origin and development of specific AC capabilities (acquisition, assimilation, transformation, and application) (Lane et al., 2006; Camison & Forés, 2010; Sun & Anderson, 2010; Gebauer et al., 2012). The absorptive capacity (AC) is constituted by a construct that expresses the capacities to appropriate external knowledge, assimilates it to internal knowledge, and transforms and applies them in its products or processes. being structured in the form of routines or practices of work (Zahra & George, 2002; Torodova & Durisin, 2007; Camison & Forés, 2010; Gonçalves, Vieira & Pedrozo, 2014). Thus, AC enables the company to recognize the value of

knowledge and apply it, enhancing innovation, constituting a critical success factor (Wegner & Maehler, 2012; Duchek, 2015).

To sustain their competitive advantage in a highly competitive landscape, SMEs need to learn effectively despite their limited resources. The ability to successfully access and use knowledge is at the heart of absorptive capacity (Saad, Kumar & Bradford, 2017). In the context of SMEs, the absorptive capacity drives the links with other companies (Muscio, 2007; De Jong & Freel, 2010), which can be enhanced by the learning practices present in the company's routines. Thus, the second research hypothesis investigates:

***Hypothesis 2: Organizational learning positively influences absorptive capacity.***

Absorptive Capacity is treated as a corporate model in companies, defined as a set of strategic organizational routines and processes that enable companies to acquire, assimilate, transform and apply knowledge to create dynamic capabilities (Zahra & George, 2002). AC is configured in two stages: i) Potential Absorption Capacity, which comprises the processes of acquisition and assimilation of external knowledge; and ii) Realized Absorptive Capacity, which comprises the process of transforming external knowledge into procedures, practices, routines, projects, prototypes and other internal instruments and the process of applying this knowledge in innovation. This model is supported by several studies (Lane et al., 2006; Todorova & Durisin, 2007; Sun & Anderson, 2010; Gebauer et al., 2012; Patterson & Ambrosini, 2015). To improve their performance, companies must simultaneously develop and manage all ACAP dimensions (Zahra & George, 2002). As the objective of AC is to apply information acquired externally for commercial purposes (Cohen & Levinthal, 1990), AC helps to generate competitive advantage (Zahra & George, 2002; Lane et al., 2006). Thus, the absorptive capacity is linked to the company's ability to access and use the knowledge that is dependent on the sources of knowledge and complementarity and on the company's previous experience available to mobilize, or not, the acquisition of knowledge.

It becomes common for companies to filter the external environment and collect market knowledge from all possible sources (Laursen & Salter, 2006) to improve their performance. Furthermore, the absorption capacity improves a company's performance characterized as an SME (Flatten, Greve, & Brettel, 2011; Tzokas, Kim, Akbar & Al-Dajani, 2015). However, there is still a contradiction among researchers about the role of absorptive capacity in improving the innovative performance of an SME (Bougrain & Haudeville, 2002; Lund Vinding, 2006;

Chandrashekar & Bala Subrahmanya, 2017). With that, we propose the third research hypothesis:

***Hypothesis 3: Absorptive capacity positively influences product innovation performance.***

Over the past 20 years, the focus on innovation has replaced traditional cost-oriented business models, triggering exponential growth in the innovation literature. New topics have emerged (Keupp, Palmié & Gassmann, 2012) to understand innovation performance measures. Thus, product innovation performance surveys are derived from studies on the performance of new products and innovation performance (Cooper & Kleinschmidt, 1995; OECD, 1999; Alegre, Chiva & Lapiedra, 2005; Terziovski, 2010; Camisón & Forés, 2015; Hannachi, 2015).

Absorptive capacity can serve as an internal moderation mechanism to help firms process new external knowledge. Consequently, the market knowledge process partially generates the combined effect of organizational learning and absorptive capacity in innovation (Hernandez-Perlines, 2018). The absorptive capacity of an individual and sharing knowledge among members is critical for companies (Cohen & Levinthal, 1990). Thus, organizations must develop mechanisms and practices that support or promote the creation of organizational knowledge, establishing a climate conducive to learning (Gomes & Wojahn, 2017) and the development of innovation results (Jiménez-Jiménez & Sanz-Valle, 2011).

As a result, innovation seems to depend on the company's learning capacity, through which new knowledge is developed, distributed, and used (Alegre & Chiva, 2008). The ability to learn has been considered a critical point in an organization's innovation (Jerez-Gómez, Céspedes-Lorente & Valle-Cabrera, 2005). Some considered the organization's absorptive capacity to be a possible moderator for several determinants of innovation success (Elbashir, Collier & Sutton, 2011; Moilanen, Ostbye & Woll 2014). Thus, the fourth hypothesis of this study proposes:

***Hypothesis 4: The absorptive capacity acts as a moderator in the relationship between organizational learning and product innovation performance.***

### 3 Method

This study carried out quantitative research through a survey in small and medium enterprises (SMEs). This type of research aims to obtain data on the different characteristics, actions, or opinions of a target population (Freitas, Oliveira, Saccol & Moscarola, 2000) to validate the research hypotheses. The research is characterized by a cross-section, as data collection was carried out in a single moment, describing and analyzing the variables in that context.

#### 3.1 Population and sample

The population corresponds to small and medium-sized enterprises (SMEs) in the trade and services sectors located in the western region of Santa Catarina. Which comprises the microregions of São Miguel do Oeste, Chapecó, Xanxerê, Joaçaba, and Concórdia.

The definition of small and medium-sized business refers to a business company, a simple partnership, an individual limited liability company, and entrepreneurs duly registered in the Registry of Commercial Companies or Civil Registry of Legal Entities (Complementary Law No. 123 of 2006). Many academic studies use quantitative criteria for the evaluation of SMEs, thus avoiding difficulties inherent in the evaluations and comparisons in the sample. Among the quantitative criteria used to classify SMEs, gross revenue (turnover) or the number of employees are used (Leone, 1991). In this research, we chose to use the number of employees criterion to classify companies, as proposed by the Micro and Small Business Support Service (SEBRAE, 2016). The sample consisted of commercial and service SMEs with up to 99 employees.

**Table 1**

*Definition of the size of establishments according to the number of employees*

Size	Commerce and Services
Micro enterprise (ME)	Up to 9 employees
Small business (SB)	From 10 to 49 employees
Medium-sized company	From 50 to 99 employees
Big companies	Over 100 employees

Source: Sebrae (2016).

For the present study, a population of 32,341 SMEs were identified through the Board of Trade of the State of Santa Catarina and SEBRAE/SC (2016). The sample was probabilistic

since all individuals had the same chance of being chosen, considered a representative sample. We estimated the minimum sample size for the research using the free G\*Power 3.1.9 software suitable for research using PLS (Faul; Ferdfelder; Buchner & Lang, 2009). We parameterized the tool with statistical power at 0.8, effect size at 0.15, and  $\alpha$  at 5% (Hair Jr, Sarstedt, Hopkins, & Kuppelwieser, 2014), obtaining a minimum sample of 68 respondents. However, to have a more consistent model, it is appropriate to double or triple this value (Ringle, Silva & Bido, 2014), requiring a minimum sample of 204 respondents. The initial number of questionnaires collected was 250, but 17 questionnaires were discarded because the companies were not classified as SMEs (due to the number of employees declared). Thus, 233 questionnaires were validated, and this is the final research sample. All survey respondents acted as managers or owners for the investigated companies.

### *3.2 Scales used*

#### 3.2.1 Independent variable

The independent variable of this research is the organizational learning construct and its dimensions from the study by Alegre and Chiva (2008) and validated in Brazil by Padilha, Wojahn, Gomes, and Machado (2016). Such dimensions were used and tested in other studies (Liao & Wu, 2009; Jyothibabu, Farooq & Pradhan, 2010; Camps; Alegre & Torres, 2011; Camps & Luna-Arocas, 2012; Mbengue & Sané, 2013). The dimensions were considered valid and reliable as a way to determine the propensity to learn in companies.

The independent variable focuses on the individual, is composed of its five dimensions: i) experimentation; ii) risk propensity; iii) interaction with the external environment; iv) dialogue; and v) participatory decision-making, totaling 18 variables, as shown in Table 2. For this purpose, the Likert Scale was used, with points ranging from 1 to 7, with one corresponding to "Strongly Disagree" and seven correspondings to "Strongly Agree."

**Table 2**

*Research Indicators Organizational Learning*

Dimension	Code	Variables
Experimental	AOE1	People working at the institution are supported when they come up with new ideas.
	AOE2	Initiatives often receive favorable responses so that employees feel encouraged to generate new ideas.
	AOE3	Changing the way you do things is valued in the organization.
	AOE4	Changing the way things are made done is easy in the organization.
Risk Propensity	AOPR1	People are encouraged to face new and unknown situations
	AOPR2	People are allowed to take risks as long as they do not harm the organization.
	AOPR3	It is difficult to get resources for projects that involve new and unfamiliar situations.
	AOPR4	People can make decisions even if they don't have all the information they want.
Interaction with external environment	AOIA1	It is part of the institution's staff to collect, bring and report information about what is happening outside the institution.
	AOIA2	There are systems and procedures for receiving, collecting and sharing information from the outside into the organization.
	AOIA3	People are encouraged to interact with the environment: competitors, customers, technology institutions, universities, suppliers, etc. (one or all).
Dialogue	AOD1	People are encouraged to communicate.
	AOD2	There is free and open communication within the work teams.
	AOD3	Leaders facilitate communication within the organization.
	AOD4	Cross-functional work teams are common in the organization.
Participatory decision making	APTD1	Leaders often involve employees in important decisions.
	APTD2	The institution's policies are significantly influenced by the point of view of its employees.
	APTD3	People feel involved in the main decisions of the organization.

Source: Padilha et al. (2016).

3.2.2 Dependent variable

The variable that depends on the research is product innovation performance, being composed of five dimensions that consider the performance of product innovation in terms of performance: i) financial; ii) market; iii) technical; iv) expected by the customer; and v) strategic, as shown in Table 3. The instrument has 14 variables, and the Likert Scale was used, with points ranging from 1 to 7, with one corresponding to "Strongly Disagree" and seven correspondings to "Strongly Agree." The questionnaire is original from Hannachi's (2015) study and validated in Brazil by Manthey et al. (2016).

**Table 3**

*Research indicators product innovation performance*

Dimension	Code	Variables
Performance Market Product Innovation	IDM1	Sales of innovative products are greater than those provided by the rest of the products.
	IDM2	Innovative products have achieved the goals set in terms of sales.
	IDM3	Compared to other products, innovative products have achieved superior results in terms of market share.
	IDM4	Innovative products have achieved the goals in terms of market share.
	IDM5	Innovative products have allowed entry into other markets.
Customer performance product innovation	IDC1	Customers are satisfied with the performance of innovative products.
	IDC2	Compared to other products, customer complaints about innovative products are lower.
	IDC3	Innovative products have increased customer loyalty.
Strategic Performance Product Innovation	IDE1	Innovative products give the company a competitive advantage.
	IDE2	Innovative products have achieved all the established goals.
	IDE3	Innovative products have enhanced the company's reputation.
Technical performance product innovation	IDT1	The quality of innovative products is better than the rest of the products.
	IDT2	Innovative products are launched on time.
	IDT3	Innovative products are launched within budget development goals.

**Source:** Manthey et al., (2016).

3.2.3 Moderating variable

The moderation effect occurs when a variable affects the direction or strength of the relationship between an independent and a dependent variable. Moderation is also called the conditional effect (Baron & Kenny, 1986; Prado, Korelo & Da Silva, 2014). In this research, we chose to test the moderation effect because the objective of the research is to understand if AC enhances organizational learning to increase product innovation performance in the investigated SMEs.

The moderating variable in this research is the absorptive capacity composed of four dimensions: i) acquisition, ii) assimilation, iii) transformation and iv) application, containing 14 variables as shown in Table 4. The Likert scale was used, with points ranging from 1 to 7, with one corresponding to "Strongly Disagree" and seven correspondings to "Strongly Agree." The original questionnaire was proposed by Flatten et al. (2011) and adapted and validated for Brazilian companies by Engelman, Fracasso, Schmidt, and Muller (2016).

**Table 4**

*Research indicators absorptive capacity*

Dimension	Cod.	Variables
Acquisition	CA1	Our company searches daily for relevant information in the sector.
	CA2	Our managers encourage employees to look for information sources in the sector.
	CA3	Our managers expect employees to handle information beyond the sector.
Assimilation	CAS1	In our company, ideas and concepts are communicated between the different areas.
	CAS2	Our managers emphasize support between areas of the company to solve problems.
	CAS3	Our managers demand periodic meetings between the areas to exchange new developments, problems and achievements.
	CAS4	In our company there is a fast flow of information between areas.
Transformation	CT1	Our employees have the ability to structure and use the knowledge collected.
	CT2	Our employees use new knowledge as well as prepare this knowledge for other purposes and to make it available.
	CT3	Our employees are successful in articulating existing knowledge with new insights.
	CT4	Our employees are able to apply new knowledge in their practical work.
Application	CAP1	Our managers support prototype development.
	CAP2	Our company regularly reconsiders technologies and adapts them according to new knowledge.
	CAP3	Our company has the ability to work more effectively through the adoption of new technologies

Source: Engelman et al., (2016).

*3.3 Data analysis procedure*

For data analysis, the SPSS software was used to generate descriptive analysis, which sought to understand the profile of the participating companies. Then, assumption tests were performed to perform Confirmatory Factor Analysis (CFA), being necessary to verify compliance with the normality and reliability assumptions of the research (Hair, Black, Babin, Anderson & Tatham, 2005).

Initially, we performed the analysis of the reliability, convergent validity, and discriminant validity of the Smart-PLS 2.0 software model. Subsequently, we performed the Structural Equation Modeling (SEM) test and the moderation test. As for the use of SmartPLS software, we rely on Hair, Ringle, and Sarstedt (2011), who explained that the program provides estimates and parameters that maximize the explained variance (R<sup>2</sup> values) of the studied models.

SEM allows us to analyze the relationship between multiple variables simultaneously, whether latent or observed (Hair et al., 2009), in addition to identifying the causal relationship between the variables. Structural equation modeling with partial least squares estimation (PLS-

SEM) in social and behavioral sciences is an excellent possibility for evaluating relationships between constructs, significantly increasing the number of articles published using this method (Souza Bido & Silva, 2019).

## 4 Results presentation

### 4.1 Sample profile

When analyzing the profile of respondents, as shown in Table 5, we observe a balance between gender (male and female). Concerning the age group, 84.5% of respondents are over 35, representing a group of young entrepreneurs. Which corroborates the level of education in which 76.4% of respondents have completed higher education and postgraduate studies. Considering the profile of the companies, it appears that 58% have been active in the market for more than six years.

**Table 5**

#### *Sample Profile*

Variable	Attribute	Frequency	%
Gender	Female	105	45,1
	Male	128	54,9
Age	Until 25	52	22,3
	From 26 to 30	86	36,9
	From 31 to 35	59	25,3
	From 36 to 40	28	12,0
	From 41 a 45	4	1,7
	Over 46	4	1,7
	Education Level	Complete high school	11
Incomplete higher education		44	18,9
Complete Higher Education		119	51,1
Postgraduate		59	25,3
Years in the company	Between 1 and 2 years	19	8,2
	Between 3 and 5 years	79	33,9
	Between 6 and 10 years	74	31,8
	More than 11 years	61	26,2

**Source:** Resource Data (2020).

### 4.2 Analysis of the structural model

First, the factor analysis was carried out using the normality tests. Thus, the following tests were carried out: Kolmogorov-Smirnov, Kaiser-Meyer-Olkin (KMO), and Bartlett's Sphericity in the SPSS Software. After the tests, it was verified that the data are standard, having

a p-value of 0.000. The results of the statistical parameters of the KMO test were within the desired range, with a level of 0.913. Bartlett's sphericity was less than 0.100, which once again allows us to confirm the possibility and adequacy of the factor analysis method for data processing.

For the adjustment analyses of the measurement models and the structural model, the SmartPLS Software was used. The SmartPLS algorithm has been configured for seven completion criteria. Path-based weighting was the parameterized system, providing a higher  $R^2$  and  $f^2$  value relative to endogenous VL. The number of iterations was set to 300, and the initial weights for external indicators were set to 1.0.

The first aspect analyzed is the Convergent Validities, which is obtained through the AVE (Average Variance Extracted) analysis in which the values must be greater than 0.5 (Hair et al., 2014) to admit that the model converges to a satisfactory result. In this way, the betas of the measurable variables were verified. The path betas smaller than 0.7 were observed. It was necessary to exclude the AOIA2 variable (there are systems and procedures to receive, collect and share information from the outside to the inside of the organization) of the Interaction with the External Environment dimension of the Organizational Learning construct. Thus, the AVEs of all constructs were more significant than 0.5.

The second stage of the analysis refers to observing Internal Consistency values (Cronbach's alpha - AC) and Composite Reliability (CC). Thus, AC values between 0.60 and 0.70 are considered adequate in exploratory research, while CC values of 0.70 and 0.90 are considered satisfactory (Hair et al., 2014). Table 6 shows the Convergent Validity, Internal Consistency, and Composite Reliability adequate in all constructs and dimensions of the research.

**Table 6**

*Goodness-of-fit values of the MEE model after the elimination of VOs with smaller factor loadings*

1° order constructs	2° order constructs	N° of Itens	AC	CC	AVE
Absorptive Capacity	Acquisition	3	0,843	0,906	0,762
	Assimilation	4	0,911	0,938	0,790
	Transformation	4	0,871	0,911	0,720
	Application	3	0,902	0,939	0,836
Organizational Learning	Dialogue	4	0,843	0,895	0,680
	Experimental	4	0,915	0,940	0,797
	Interaction with external environment	2	0,618	0,838	0,721
	Risk Propensity	4	0,818	0,879	0,647
	Participatory Decision Making	4	0,867	0,919	0,790
Product Innovation Performance	Market Performance	5	0,888	0,918	0,693
	Customer Performance	3	0,703	0,835	0,629
	Strategic Performance	3	0,764	0,864	0,680
	Technical Performance	3	0,824	0,895	0,740
Absorptive Capacity		14	0,949	0,956	0,611
Organizational Learning		18	0,956	0,961	0,594
Product Innovation Performance		14	0,939	0,947	0,561

Source: Resource Data (2020).

The third step is the assessment of Discriminant Validity, which seeks to verify whether the constructs or VL are independent of each other (Hair, Black, Babin, Anderson & Tatham, 2005). In this research, the Fornell-Larcker criterion was used, which aims to compare the square roots of the AVE values of each construct with the (Pearson) correlations between the constructs (latent variables) (Henseler, Ringle & Sinkovics, 2009; Hair et al., 2014). Discriminant validity indicates the extent to which latent variables are independent of each other (Hair et al., 2014). It was found that all AVE values are higher than the other correlations presented, which indicates a discriminant validity between the constructs, as shown in Table 7.

**Table 7**

*Correlation values between VL and square roots of AVE values on the main diagonal (grayed out)*

VL	AP	AQ	AS	CP	EP	MP	TD	DI	EX	IEE	RP	PDM	TR
Application (AP)	0,914												
Acquisition (AQ)	0,850	0,873											
Assimilation (AS)	0,864	0,843	0,889										
Customer Performance (CP)	0,651	0,600	0,635	0,793									
Strategic Performance (EP)	0,788	0,706	0,704	0,766	0,825								
Market Performance (MP)	0,747	0,667	0,695	0,771	0,798	0,832							
Technical Performance (TP)	0,648	0,587	0,636	0,720	0,703	0,729	0,860						
Dialogue (DI)	0,808	0,721	0,755	0,615	0,781	0,714	0,592	0,824					
Experimental (EX)	0,840	0,780	0,831	0,579	0,717	0,671	0,591	0,821	0,893				
Interaction with the External Environment (IEE)	0,697	0,625	0,713	0,565	0,665	0,678	0,565	0,733	0,705	0,849			
Risk Propensity (RP)	0,750	0,692	0,747	0,609	0,708	0,672	0,697	0,744	0,784	0,701	0,804		
Participatory Decision Making (PDM)	0,778	0,714	0,797	0,608	0,712	0,680	0,671	0,833	0,806	0,706	0,779	0,889	
Transformation (TR)	0,647	0,530	0,575	0,631	0,668	0,674	0,512	0,593	0,473	0,569	0,526	0,530	0,848

Source: Research data (2020).

With the Discriminant Validity, the measurement model adjustments were completed, and the structural model analysis was performed. The first analysis of this second moment is the evaluation of Pearson's coefficients of determination ( $R^2$ ) in which the portion of the variance of the endogenous variables is evaluated, which is explained by the structural model, indicating the quality of the adjusted model (Ringle et al., 2014). For the area of social sciences, it suggests that  $R^2 > 2\%$  is classified as a small effect,  $R^2 > 13\%$  as a medium effect, and  $R^2 > 26\%$  as a significant effect (Cohen, 1988). According to Table 8, it appears that all constructs have a significant effect.

**Table 8**

*Pearson coefficients of determination (R<sup>2</sup>)*

1° First order constructs	2° Order constructs	R <sup>2</sup>
Absorptive Capacity	Acquisition	0,847
	Assimilation	0,912
	Transformation	0,875
	Appication	0,903
Organizational Learning	Dialogue	0,843
	Experimental	0,915
	Interaction with external environment	0,641
	Risk Propensity	0,828
	Participatory decision making	0,870
Product Innovation Performance	Market Performance	0,891
	Client Performance	0,704
	Strategic Performance	0,768
	Technical Performance	0,825
Absorptive Capacity		0,955
Organizational Learning		0,959
Product Innovation Performance		0,941

Source: Research Data (2020).

In the second stage of assessing the quality of fit of the model, the Predictive Relevance (Q<sup>2</sup>) or Stone-Geisser Indicator was verified, which assesses the accuracy of the adjusted model, in which evaluation criteria should be values greater than zero (Hair et al., 2014). Furthermore, the effect size (f<sup>2</sup>) or Cohen's indicator, a value that is obtained by including and excluding constructs from the model (one by one), values between 0.02 and 0.15 are considered small, values between 0.15 and 0.35 are considered medium, and values above 0.35 are considered significant (Hair et al., 2014). Table 9 shows the predictive relevance (Q<sup>2</sup>) and effect size (f<sup>2</sup>) of all indicators in the model.

**Table 9**

*Values of predictive validity (Q<sup>2</sup>) and effect size (f<sup>2</sup>) indicators*

1st and 2nd Order Constructs	CV RED (Q <sup>2</sup> )	CV COM (f <sup>2</sup> )
Absorptive Capacity	0,438	0,526
Acquisition	0,592	0,478
Assimilation	0,652	0,598
Transformation	0,387	0,501
Application	0,710	0,589
Organizational Learning		0,512
Dialogue	0,547	0,448
Experimental	0,648	0,606
Interaction with external environment	0,461	0,201
Risk Propensity	0,483	0,402
Participatory decision making	0,630	0,519
Product Innovation Performance	0,372	0,469
Customer Performance	0,472	0,272
Strategic Performance	0,522	0,353
Market Performance	0,576	0,516
Technical Performance	0,523	0,443

**Source:** Resource Data (2020).

In the last stage of the research, the Student's t-test was done, which aims to understand the causal relationships between the constructs, thus certifying the significance of the relationships and confirming the research hypotheses. It is understood that the relationship is significant, and the hypothesis is confirmed when the relationship between values is above 1.96 (Hair et al., 2005). Thus, from the tests performed, the tests of the research hypotheses are presented as shown in Table 10.

**Table 10**

*Hypothesis test*

Structural Relationship	Hypothesis	Structural Coefficient	Standard error	T Test	P values	Hypothesis
Org. Learning -> Absorptive Capacity	H1 (+)	0,879	0,022	40,220	0,000	Confirmed
Org. Learning -> Performance Innovation. Product	H2 (+)	0,405	0,088	4,629	0,000	Confirmed
Absorptive Capacity -> Performance Innovation. Product	H3 (+)	0,510	0,082	6,238	0,000	Confirmed
Moderation effect 1 -> Performance Innovation. Product	H4 (+)	0,072	0,038	1,873	0,062	Rejected

**Source:** Resource Data (2020).

From the results of statistical tests, a discussion about the research findings and the theoretical support of other studies are proposed.

#### *4.3 Discussion of results*

The first hypothesis (H1) confirms the positive relationship between organizational learning and the ability to absorb knowledge in the environment of the investigated small and medium-sized companies. The literature provides insights into this relationship since the seminal article by Cohen and Levinthal (1989). However, there is a lack of empirical evidence, especially in SMEs (Koerich, Cancellier & Tezza, 2015; Cassol, Zanesco & Marietto, 2019). Among the resources and capabilities that can be resized, recycled, and adapted to new environmental challenges, we highlight the knowledge resource and the capacities to absorb, transform and apply it. In this way, we can infer that companies can use the appropriation and reconfiguration of knowledge available in the external environment to face periods of instability and change in the market by reconfiguring their internal processes and routines.

The second hypothesis (H2) confirmed the positive relationship between organizational learning and product innovation performance. Organizational learning enables companies to keep pace with the rapidly changing business environment (Mainert, Niepel, Lans, & Greiff, 2018). SMEs have gone through several challenges, such as a recent event called the COVID pandemic, and the sanitary restrictions imposed by governments.

The third hypothesis (H3) confirmed the positive relationship between absorptive capacity and product innovation performance. Since the origin of the term absorption capacity, scholars have been seeking to prove the importance of AC to leverage innovation in SMEs (Murovec & Prodan, 2009; Cepeda-Carrion, Cegarra-Navarro, & Jiménez-Jiménez, 2012; Jeon, Hong, Ohm, & Yang, 2015). Based on our results, we confirm that the absorption capacity is crucial for innovation performance in small and medium-sized companies. We can propose that the ability to absorb knowledge allows the company to acquire external knowledge and use it effectively, which affects the company's ability to innovate and adapt to the changing environment while remaining competitive.

In the last hypothesis (H4), we observe that AC did not affect the direction or strength of the relationship between organizational learning and product innovation performance in SMEs. This result is relatively surprising, as we did not identify research investigating the role of CA moderators in the relationship between organizational learning and innovation performance in SMEs. We can speculatively justify this result based on the study by

Naqshbandi and Tabche (2018). They point out that companies often show weak levels of absorptive capacity due to weak investment or limited research and due to inadequate qualification of their employees to engage in innovation-related activities effectively.

We can infer that the process of managing the acquisition of new knowledge and the development of organizational practices and routines in SMEs permeate the “slippery” characteristics of knowledge, such as its dynamic nature and intangibility (Koh & Gunasekaran, 2006). This intangible nature makes knowledge challenging to control (Jung-Erceg, Pandza, Armbruster, & Dreher, 2007), especially in small and medium enterprises. In light of this, the absence of a moderating role for absorptive capacity in this study can be explained since this study did not focus on researching companies that invested in research and development or that were knowledge intensive.

Our results bring new insights into understanding the CA configuration in SMEs located in developing economies. Given the absence of similar studies on the moderating role of AC in the relationship between organizational learning and innovation performance, it is not easy to relate this finding to other results. Han and Li (2015) investigated AC's moderating role in the relationship between intellectual capital and innovation performance in 217 Chinese small and medium enterprises. They found that the insignificant moderating effect indicates that intellectual capital is immune to the ACAP level. That is, no matter how strong or weak a company's ACAP is, intellectual capital is significantly related to innovative performance.

We note that the literature is not conclusive whether AC is moderating or mediating (Hsu & Wang, 2012). Further investigations on the configuration of AC in small and medium-sized companies from different sectors should be applied to understand the nuances of its influence on innovation performance. From a managerial point of view, companies must be aware of the best practices to access and assimilate external knowledge regarding the improvement of the production process.

## 5 Final considerations

This research proposed to verify the moderating role of absorptive capacity in the relationship between organizational learning and product innovation performance in small and medium-sized companies. Based on empirical data collected from SME managers, we verified the positive influence of organizational learning on the absorption capacity (H1) and product innovation performance (H2). The positive impact of absorptive capacity on the performance of product innovation was also confirmed (H3). However, our results showed that the

investigated SMEs' absorption capacity could not moderate the learning processes and the performance of product innovation (H4).

Based on our results, we can suggest that the CA processes incorporate aspects related to the configuration of the environment in which the company is located geographically, the network of relationships to which it belongs, the level of training of its employees, management models, and experience of their managers. This study aims to understand better how organizational learning capacity impacts SME product innovation performance and how this relationship is moderated by absorptive capacity.

The contribution to the literature on organizational learning capacity is made by providing evidence of the importance of certain organizational practices that catalyze their effects on SMEs. Organizational learning can be considered an essential determinant of product innovation performance. However, our findings question the role of knowledge absorption capacity in increasing product innovation performance in SMEs.

As practical implications, the results of this study can guide the management of small and medium-sized companies through the evidenced routines. Studies on absorptive capacity and innovation can help managers improve performance, especially in countries with intense economic changes, such as Brazil, where these changes quickly impact SMEs. Decision-making is based on the strategic information and, for this, the absorptive capacity can be decisive in influencing the performance of the product innovation.

We emphasize the possibility of social *desirability* bias: the bias of timely responses to management practices since individuals want to be seen favorably with their behavior (Leggett, Kleckner, Boyle, Dufield & Mitchell 2003; Krumpal, 2013). The survey was carried out with the managers/owners of the companies, which may imply a particularly favorable bias. The characteristic of SME businesses is that of family management, so there are no other options to be researched other than managers who tend to be the only social individuals, eventually, and the owners responsible for managing the business. Another limitation can be inferred from the specific geographic context, represented by small towns west of Santa Catarina. The findings may not represent the same reality of SMEs present in other regions of Brazil. Future studies can investigate AC considering the geographic context and researching SMEs present in large urban centers.

With respect to the importance of the AC construct in the performance of new companies, little is known about its characteristics in Brazilian companies. Theoretical-empirical studies that analyze the different configurations of AC present in SMEs operating in

Brazil are still relatively scarce, and empirical research that validates the theoretical dimensions of this construct is also rare. Indeed, this lack of theoretical and empirical references reduces the possibilities of employing AC in the management environment of small companies. However, they present opportunities for future research.

### References

- Alegre, J., & Chiva, R. (2008). Assessing the impact of organizational learning capability on product innovation performance: An empirical test. *Technovation*, 28(6), 315-326. <https://doi.org/10.1016/j.technovation.2007.09.003>
- Alegre, J., Lapiedra, R., & Chiva, R. (2006). A measurement scale for product innovation performance. *European Journal of Innovation Management*. 9(4) (2006), 333-346. <https://doi.org/10.1108/14601060610707812>
- Argote, L., McEvily, B., & Reagans, R. (2003). Managing knowledge in organizations: An integrative framework and review of emerging themes. *Management science*, 49(4), 571-582. <https://doi.org/10.1287/mnsc.49.4.571.14424>
- Bakar, L. J. A., & Ahmad, H. (2010). Assessing the relationship between firm resources and product innovation performance. *Business Process Management Journal*. 16(3), 420-435. <https://doi.org/10.1108/14637151011049430>
- Baker, W. E., & Sinkula, J. M. (2002). Market orientation, learning orientation and product innovation: delving into the organization's black box. *Journal of Market-focused Management*, 5(1), 5-23. <https://doi.org/10.1023/A:1012543911149>
- Barbaroux, P. (2014). From market failures to market opportunities: managing innovation under asymmetric information. *Journal of Innovation and Entrepreneurship*, 3(1), 1-15. <https://doi.org/10.1186/2192-5372-3-5>
- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), 1173.
- Bougrain, F., & Haudeville, B. (2002). Innovation, collaboration and SMEs internal research capacities. *Research Policy*, 31(5), 735-747. [https://doi.org/10.1016/S0048-7333\(01\)00144-5](https://doi.org/10.1016/S0048-7333(01)00144-5)
- Camisón, C., & Forés, B. (2010). Knowledge absorptive capacity: New insights for its conceptualization and measurement. *Journal of Business Research*, 63(7), 707-715. <https://doi.org/10.1016/j.jbusres.2009.04.022>
- Camisón, C., & Forés, B. (2015). Is tourism firm competitiveness driven by different internal or external specific factors?: New empirical evidence from Spain. *Tourism Management*, 48, 477-499. <https://doi.org/10.1016/j.tourman.2015.01.001>

- Camps, J., & Luna-Arocas, R. (2012). A matter of learning: How human resources affect organizational performance. *British Journal of Management*, 23(1), 1-21. <https://doi.org/10.1111/j.1467-8551.2010.00714.x>
- Camps, J., Alegre, J., & Torres, F. (2011). Towards a methodology to assess organizational learning capability: A study among faculty members. *International Journal of Manpower*, 32(5/6), 687-703. <https://doi.org/10.1108/01437721111158279>
- Carayannis, E. G., Depeige, A., & Sindakis, S. (2014). Dynamics of ultra-organizational co-opetition and circuits of knowledge: A knowledge-based view of value ecology. *Journal of Knowledge Management*, 18(5), 1020–1035. <https://doi.org/10.1108/JKM-06-2014-0249>
- Cassol, A., Cintra, R. F., Ruas, R. L., & Oldoni, L. E. (2016). Desenvolvimento da capacidade absorptiva em empresas incubadas e graduadas de Santa Catarina, Brasil. *Desenvolvimento em Questão*, 14(37), 168-201. <https://doi.org/10.21527/2237-6453.2016.37.168-201>
- Cassol, A., Zanesco, D., Martins, C. B., & Marietto, M. L. (2019). Capacidade absorptiva como moderadora da relação entre inovatividade organizacional e desempenho inovador de pequenas e médias empresas brasileiras. *Interciencia*, 44(1), 15-22.
- Cepeda-Carrion, G., Cegarra-Navarro, J. G., & Jimenez-Jimenez, D. (2012). The effect of absorptive capacity on innovativeness: Context and information systems capability as catalysts. *British Journal of Management*, 23(1), 110-129. <https://doi.org/10.1111/j.1467-8551.2010.00725.x>
- Chandrashekar, D., & Bala Subrahmanya, M. H. (2017). Absorptive capacity as a determinant of innovation in SMEs: A study of Bengaluru high-tech manufacturing cluster. *Small Enterprise Research*, 24(3), 290-315. <https://doi.org/10.1080/13215906.2017.1396491>
- Chang, Y.Y., Hughes, M. & Hotho, S. (2011). Internal and external antecedents of SMEs' innovation ambidexterity outcomes. *Management Decision*, 49(10), 1658-1676. <https://doi.org/10.1108/00251741111183816>
- Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences*. 2 ed. New York: Psychology Press.
- Cohen, W.; Levinthal, D. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 35(1), 128-152. <https://doi.org/10.2307/2393553>
- Cooper, R. G., & Kleinschmidt, E. J. (1995). Performance typologies of new product projects. *Industrial Marketing Management*, 24(5), 439-456. [https://doi.org/10.1016/0019-8501\(95\)00034-8](https://doi.org/10.1016/0019-8501(95)00034-8)
- Davila, G., Varvakis, G., & North, K. (2019). Influence of strategic knowledge management on firm innovativeness and performance. *BBR. Brazilian Business Review*, 16(3), 239-254. <https://doi.org/10.15728/bbr.2019.16.3.3>

- De Jong, J. P., & Freel, M. (2010). Absorptive capacity and the reach of collaboration in high technology small firms. *Research Policy*, 39(1), 47-54. <https://doi.org/10.1016/j.respol.2009.10.003>
- Del Giudice, M., & Maggioni, V. (2014). Managerial practices and operative directions of knowledge management within inter-firm networks: A global view. *Journal of Knowledge Management*, 18(5), 841–846. <https://doi.org/10.1108/JKM-06-2014-0264>
- Dewangan, V., & Godse, M. (2014). Towards a holistic enterprise innovation performance measurement system. *Technovation*, 34(9), 536-545. <https://doi.org/10.1016/j.technovation.2014.04.002>
- Duchek, S. (2015). Designing absorptive capacity? An analysis of knowledge absorption practices in German high-tech firms. *International Journal of Innovation Management*, 19(04), 1550044. <https://doi.org/10.1142/S1363919615500449>
- Elbashir, M. Z., Collier, P. A., & Sutton, S. G. (2011). The role of organizational absorptive capacity in strategic use of business intelligence to support integrated management control systems. *The Accounting Review*, 86(1), 155-184. <https://doi.org/10.2308/accr.00000010>
- Engelman, R., Fracasso, E. M., Schmidt, S., & Muller, H. F. (2016). Capacidade absorptiva: Adaptação e validação de uma escala em empresas sul-brasileiras. *Revista Base (Administração e Contabilidade)*, 13(3), 235-247. <https://doi.org/10.4013/base.2016.133.04>
- Escribano, A., Fosfuri, A., & Tribó, J. A. (2009). Managing external knowledge flows: The moderating role of absorptive capacity. *Research policy*, 38(1), 96-105. <https://doi.org/10.1016/j.respol.2008.10.022>
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G\* Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, 41(4), 1149-1160. <https://doi.org/10.3758/BRM.41.4.1149>
- Fernández-Mesa, A., Alegre-Vidal, J., Chiva-Gómez, R. and Gutiérrez-Gracia, A. (2013). Design management capability and product innovation in SMEs. *Management Decision*, 51(3), 547-565. <https://doi.org/10.1108/00251741311309652>
- Flatten, T. C., Engelen, A., Zahra, S. A., & Brettel, M. (2011). A measure of absorptive capacity: Scale development and validation. *European Management Journal*, 29(2), 98-116. <https://doi.org/10.1016/j.emj.2010.11.002>
- Freitas, H., Oliveira, M., Saccol, A. Z., & Moscarola, J. (2000). O método de pesquisa survey. *Revista de Administração da Universidade de São Paulo*, 35(3), 105-112.
- Gebauer, H., Worch, H., & Truffer, B. (2012). Absorptive capacity, learning processes and combinative capabilities as determinants of strategic innovation. *European Management Journal*, 30(1), 57-73. <https://doi.org/10.1016/j.emj.2011.10.004>

- Gomes, G., & Wojahn, R. M. (2017). Organizational learning capability, innovation and performance: study in small and medium-sized enterprises (SMES). *Revista de Administração* (São Paulo), 52(2), 163-175. <https://doi.org/10.1016/j.rausp.2016.12.003>
- Gonçalves, R. B., Vieira, G. B. B., & Pedrozo, E. Á. (2014). O impacto da capacidade absorptiva e do aprendizado no desempenho internacional das empresas: um estudo de múltiplos casos. *Revista Alcance*, 21(4), 674-694. <https://doi.org/alcance.v21n4.p674-694>
- Gronum, S. Verreyne, M.L., Kastle, T. (2012). The role of networks in small and medium-sized enterprise innovation and firm performance. *Journal of Small Business Management*, 50(2), 257-282. <https://doi.org/10.1111/j.1540-627X.2012.00353.x>
- Hair Jr, J. F., Sarstedt, M., Hopkins, L., & Kuppelwieser, V. G. (2014). Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. *European Business Review*. 26(2), 106-121. <https://doi.org/10.1108/EBR-10-2013-0128>
- Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2009). *Análise multivariada de dados*. Bookman editora.
- Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing theory and Practice*, 19(2), 139-152. <https://doi.org/10.2753/MTP1069-6679190202>
- Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E. & Tatham, R.L. (2005). *Multivariate Data Analysis*, 6 ed., Pearson Prentice-Hall, Englewood Cliffs, NJ.
- Han, Y. & Li, D. (2015). Effects of intellectual capital on innovative performance: The role of knowledge-based dynamic capability. *Management Decision*, 53(1), 40-56. <https://doi.org/10.1108/MD-08-2013-0411>
- Hannachi, Y. (2015). Development and validation of a measure for product innovation performance: the PIP scale. *Journal of Business Studies Quarterly*, 6(3), 23.
- Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. *Advances in International Marketing*, 20, 277–320. [https://doi.org/10.1108/S1474-7979\(2009\)0000020014](https://doi.org/10.1108/S1474-7979(2009)0000020014)
- Hernandez-Perlines, F. (2018). Moderating effect of absorptive capacity on the entrepreneurial orientation of international performance of family businesses. *Journal of Family Business Management*, 8(1), 58-74. <https://doi.org/10.1108/JFBM-10-2017-0035>
- Hsu, L. C., & Wang, C. H. (2012). Clarifying the effect of intellectual capital on performance: the mediating role of dynamic capability. *British journal of management*, 23(2), 179-205. <https://doi.org/10.1111/j.1467-8551.2010.00718.x>

- Huang, K. F., Lin, K. H., Wu, L. Y., & Yu, P. H. (2015). Absorptive capacity and autonomous R&D climate roles in firm innovation. *Journal of Business Research*, 68(1), 87-94. <https://doi.org/10.1016/j.jbusres.2014.05.002>
- Jeon, J., Hong, S., Ohm, J., & Yang, T. (2015). Causal relationships among technology acquisition, absorptive capacity, and innovation performance: evidence from the pharmaceutical industry. *PloS One*, 10(7), e0131642. <https://doi.org/10.1371/journal.pone.0131642>
- Jerez-Gómez, P., Céspedes-Lorente, J., & Valle-Cabrera, R. (2005). Organizational learning and compensation strategies: evidence from the Spanish chemical industry. *Human Resource Management: Published in Cooperation with the School of Business Administration, The University of Michigan and in alliance with the Society of Human Resources Management*, 44(3), 279-299. <https://doi.org/10.1002/hrm.20071>
- Jiménez-Jiménez, D., & Sanz-Valle, R. (2011). Innovation, organizational learning, and performance. *Journal of Business Research*, 64(4), 408-417. <https://doi.org/10.1016/j.jbusres.2010.09.010>
- Jung-Erceg, P., Pandza, K., Armbruster, H., & Dreher, C. (2007). Absorptive capacity in European manufacturing: a Delphi study. *Industrial Management & Data Systems*, 107 (1), 37-51. <https://doi.org/10.1108/02635570710719043>
- Jyothibabu, C. D., Farooq, A., & Pradhan, B. B. (2010). An integrated scale for measuring an organizational learning system. *The Learning Organization*, 17(4), 303-227. <https://doi.org/10.1108/09696471011043081>
- Keupp, M. M., Palmié, M., & Gassmann, O. (2012). The strategic management of innovation: A systematic review and paths for future research. *International Journal of Management Reviews*, 14(4), 367-390. <https://doi.org/10.1111/j.1468-2370.2011.00321.x>
- Kim, D. H. (1998). The link between individual and organizational learning. *The Strategic Management of Intellectual Capital*, 41, 62.
- Koerich, G. V., Cancellier, É. L. P. D. L., & Tezza, R. (2015). Capacidade de absorção, turbulência ambiental e desempenho organizacional: Um estudo em empresas varejistas catarinenses. *RAM. Revista de Administração Mackenzie*, 16(3), 238-267. <https://doi.org/10.1590/1678-69712015/administracao.v16n3p238-267>
- Koh, S. L., & Gunasekaran, A. (2006). A knowledge management approach for managing uncertainty in manufacturing. *Industrial Management & Data Systems*, 106(4), 439-459. <https://doi.org/10.1108/02635570610661561>
- Krumpal, I. (2013). Determinants of social desirability bias in sensitive surveys: a literature review. *Quality & Quantity*, 47(4), 2025-2047. <https://doi.org/10.1007/s11135-011-9640-9>

- Lane, P. J., Koka, B. R., & Pathak, S. (2006). The reification of absorptive capacity: A critical review and rejuvenation of the construct. *Academy of management review*, 31(4), 833-863. <https://doi.org/10.5465/amr.2006.22527456>
- Leal-Rodríguez, A. L., Ariza-Montes, J. A., Roldán, J. L., & Leal-Millán, A. G. (2014). Absorptive capacity, innovation and cultural barriers: A conditional mediation model. *Journal of Business Research*, 67(5), 763-768. <https://doi.org/10.1016/j.jbusres.2013.11.041>
- Leal-Rodríguez, G. Albort-Morant. (2016). Linking market orientation, innovation and performance: An empirical study on small industrial enterprises in Spain. *Journal of Small Business Strategy*, 26(1), 37-50.
- Leggett, C. G., Kleckner, N. S., Boyle, K. J., Dufield, J. W., & Mitchell, R. C. (2003). Social desirability bias in contingent valuation surveys administered through in-person interviews. *Land Economics*, 79(4), 561-575.
- Lei complementar nº 123, de 14 de dezembro de 2006. (2006). *Institui o Estatuto Nacional da Microempresa e da Empresa de Pequeno Porte*. Brasília, DF. Disponível em: [http://www.planalto.gov.br/ccivil\\_03/leis/lcp/lcp123.htm](http://www.planalto.gov.br/ccivil_03/leis/lcp/lcp123.htm)
- Lemon, M., & Sahota, P. S. (2004). Organizational culture as a knowledge repository for increased innovative capacity. *Technovation*, 24(6), 483-498. [https://doi.org/10.1016/S0166-4972\(02\)00102-5](https://doi.org/10.1016/S0166-4972(02)00102-5)
- Leone, N. M. D. C. P. (1991). A dimensão física das pequenas e médias empresas (PME'S): à procura de um critério homogeneizador. *Revista de Administração de Empresas*, 31(2), 53-59. <https://doi.org/10.1590/S0034-75901991000200005>
- Liao, S. H., & Wu, C. C. (2009). The relationship among knowledge management, organizational learning, and organizational performance. *International Journal of Business and Management*, 4(4), 64-76.
- Limaj, E., & Bernroider, E. W. (2019). The roles of absorptive capacity and cultural balance for exploratory and exploitative innovation in SMEs. *Journal of Business Research*, 94, 137-153. <https://doi.org/10.1016/j.jbusres.2017.10.052>
- Lund Vinding, A. (2006). Absorptive capacity and innovative performance: A human capital approach. *Economics of innovation and New Technology*, 15(4-5), 507-517. <https://doi.org/10.1080/10438590500513057>
- Maes, J. Sels, L. (2014). SMEs' radical product innovation: The role of internally and externally oriented knowledge capabilities. *Journal of Small Business Management*, 52(1), 141-163. <https://doi.org/10.1111/jsbm.12037>
- Mainert, J., Niepel, C., Lans, T. and Greiff, S. (2018). How employees perceive organizational learning: construct validation of the 25-item short form of the strategic learning assessment map (SF-SLAM). *Journal of Knowledge Management*, 22(1), 57-75. <https://doi.org/10.1108/JKM-11-2016-0494>

- Manthey, N. B., Verdinelli, M. A., Rossetto, C. R., & Carvalho, C. E. (2016). Desempenho da inovação de produto: teste de uma escala para aplicação em PMEs. *Revista Ibero Americana de Estratégia*, 15(4), 43-62. <https://doi.org/10.5585/riae.v15i4.2413>
- March, J. G., & Olsen, J. P. (1975). The uncertainty of the past: Organizational learning under ambiguity. *European Journal of Political Research*, 3(2), 147-171. <https://doi.org/10.1111/j.1475-6765.1975.tb00521.x>
- Martínez-Sánchez, A., Vicente-Oliva, S., & Pérez-Pérez, M. (2020). The relationship between R&D, the absorptive capacity of knowledge, human resource flexibility and innovation: Mediator effects on industrial firms. *Journal of Business Research*, 118, 431-440. <https://doi.org/10.1016/j.jbusres.2020.07.014>
- Mbengue, A., & Sané, S. (2013). Capacité d'apprentissage organisationnel: analyse théorique et étude empirique dans le contexte des équipes de projets d'aide publique au développement. *Canadian Journal of Administrative Sciences/Revue Canadienne des Sciences de l'Administration*, 30(1), i-xvi. <https://doi.org/10.1002/cjas.1240>
- McDowell, W. C., Peake, W. O., Coder, L., & Harris, M. L. (2018). Building small firm performance through intellectual capital development: Exploring innovation as the “black box”. *Journal of business research*, 88, 321-327. <https://doi.org/10.1016/j.jbusres.2018.01.025>
- Moilanen, M., Ostbye, S., & Woll, K. (2014). Non-R&D SMEs: external knowledge, absorptive capacity and product innovation. *Small Business Economics*, 43(2), 447-462. <https://doi.org/10.1007/s11187-014-9545-9>
- Murovec, N., & Prodan, I. (2009). Absorptive capacity, its determinants, and influence on innovation output: Cross-cultural validation of the structural model. *Technovation*, 29(12), 859-872. <https://doi.org/10.1016/j.technovation.2009.05.010>
- Muscio, A. (2007). The impact of absorptive capacity on SMEs' collaboration. *Economics of Innovation and New Technology*, 16(8), 653-668. <https://doi.org/10.1080/10438590600983994>
- Naqshbandi, M. M., & Tabche, I. (2018). The interplay of leadership, absorptive capacity, and organizational learning culture in open innovation: Testing a moderated mediation model. *Technological Forecasting and Social Change*, 133, 156-167. <https://doi.org/10.1016/j.techfore.2018.03.017>
- Organization for Economic Co-operation and Development (OECD). (1999). *Measuring and reporting intellectual capital: experience, issues, and prospects*. Amsterdam, International Symposium: 9-11 June.
- Padilha, C. K.; Wojahn, R. M.; Gomes, G.; Machado, D. D. P. N. (2016). Capacidade de aprendizagem organizacional e desempenho inovador: percepção dos atores de uma empresa têxtil. *Revista de Administração, Contabilidade e Economia*, 15(1), p. 327-350.

- Palacios-Marque's, D., Soto-Acosta, P., & Merigó, J. M. (2015). Online social networks as an enabler of innovation in organizations. *Management Decision*, 53(9), 1906–1920. <https://doi.org/10.1108/MD-06-2014-0406>
- Patterson, W., & Ambrosini, V. (2015). Configuring Absorptive Capacity as a Key Process for Research Intensive Firms. *Technovation*, 36, 77-89. <https://doi.org/10.1016/j.technovation.2014.10.003>
- Pedler, M., Burgoyne, J., & Boydell, T. (1991). *Towards the learning company: concepts and practices*. McGraw-Hill.
- Prado, P. H. M., Korelo, J. C., & Da Silva, D. M. L. (2014). Análise de mediação, moderação e processos condicionais. *Revista Brasileira de Marketing*, 13(4), 04-24. <https://doi.org/10.5585/remark.v13i4.2739>
- Ringle, C. M., Da Silva, D., & de Souza Bido, D. (2014). Modelagem de equações estruturais com utilização do SmartPLS. *Revista Brasileira de Marketing*, 13(2), 56-73. <https://doi.org/10.5585/remark.v13i2.2717>
- Rosenbusch, N., Brinckmann, J., Bausch, A. (2011). Is innovation always beneficial? A meta-analysis of the relationship between innovation and performance in SMEs. *Journal of Business Venturing*, 26(4), 441-457. <https://doi.org/10.1016/j.jbusvent.2009.12.002>
- Roxas, B., Battisti, M., Deakins, D. (2014). Learning, innovation and firm performance: Knowledge management in small firms. *Knowledge Management Research and Practice*, 12(4), 443-453. <https://doi.org/10.1057/kmrp.2012.66>
- Saad, M., Kumar, V., & Bradford, J. (2017). An investigation into the development of the absorptive capacity of manufacturing SMEs. *International journal of production research*, 55(23), 6916-6931. <https://doi.org/10.1080/00207543.2017.1327728>
- Schön, D., & Argyris, C. (1996). *Organizational learning II: Theory, method and practice*. Reading: Addison Wesley, 305(2).
- Scuotto, V., Del Giudice, M., & Carayannis, E. G. (2017). The effect of social networking sites and absorptive capacity on SMES' innovation performance. *The Journal of Technology Transfer*, 42(2), 409-424. <https://doi.org/10.1007/s10961-016-9517-0>
- SEBRAE. (2016) *Participação das Micro e Pequenas e empresas na economia brasileira*. Disponível em: <https://datasebrae.com.br/documentos2/pesquisas/Participacao%20das%20MPE%20na%20Economia%20Brasileira/Relatorio%20Executivo%20MPE%20no%20PIB.pdf>
- Souza Bido, D., & da Silva, D. (2019). SmartPLS 3: especificação, estimação, avaliação e relato. *Administração: Ensino e Pesquisa*, 20(2), 1-31. <https://doi.org/10.13058/raep.2019.v20n2.1545>
- Sun, P. Y., & Anderson, M. H. (2010). An examination of the relationship between absorptive capacity and organizational learning, and a proposed integration. *International Journal*

*of Management Reviews*, 12(2), 130-150. <https://doi.org/10.1111/j.1468-2370.2008.00256.x>

- Terziovski, M. (2010). Innovation practice and its performance implications in small and medium enterprises (SMEs) in the manufacturing sector: a resource-based view. *Strategic Management Journal*, 31(8), 892-902. <https://doi.org/10.1002/smj.841>
- Tian, H., Dogbe, C.S.K., Pomegbe, W.W.K., Sarsah, S.A. & Otoo, C.O.A. (2021). Organizational learning ambidexterity and openness, as determinants of SMEs' innovation performance. *European Journal of Innovation Management*, 24 (2), 414-438. <https://doi.org/10.1108/EJIM-05-2019-0140>
- Torodova, G., & Durisin, B. (2007). Absorptive capacity: valuing a reconceptualization. *Academy of Management Review*, 32(3), 774-786. <https://doi.org/10.5465/amr.2007.25275513>
- Tzokas, N., Kim, Y. A., Akbar, H., & Al-Dajani, H. (2015). Absorptive capacity and performance: The role of customer relationship and technological capabilities in high-tech SMEs. *Industrial Marketing Management*, 47, 134-142. <https://doi.org/10.1016/j.indmarman.2015.02.033>
- Valle, S., Fernandez, E., & Avella, L. (2003). New product development process: strategic and organisational success factors. *International Journal of Manufacturing Technology and Management*, 5(3), 197-209. <https://doi.org/10.1504/IJMTM.2003.003414>
- Wegner, D., & Maehler, A. E. (2012). Desempenho de empresas participantes de rede interorganizacionais: analisando a influência do capital social e da capacidade absorptiva. *Gestão & Planejamento-G&P*, 13(2).
- Zahra, S. A., & George, G. (2002). Absorptive capacity: A review, reconceptualization, and extension. *Academy of Management Review*, 27(2), 185-203. <https://doi.org/10.5465/amr.2002.6587995>