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Absorption Capacity and Social Capital in Product Innovation in Investment Managers

Abstract
Purpose: *This article aims to evaluate how the potential and actual increase in absorption capacity allows these companies to innovate in their products, especially when moderated by external, interorganizational social capital.*
Design/methodology/approach: *Seven hypotheses were evaluated using the structural equation model and the partial least squares technique (PLS-SEM).*
Findings: *The results confirm that potential absorption capacity has a positive impact on realized absorption capacity and that the effects of potential absorption capacity on product innovation are mediated by realized absorption capacity.*
Research limitations/implications: *This research contributes to the existing literature on the multidimensional nature of absorption capacity and the complementarity between potential and actual subgroups.*
Practical implications: *The results indicate that one of the key factors for investment managers to build an innovation mechanism for their products is based, first, on developing higher levels of potential and realized absorption capacities and, secondly, on accommodating highly balanced forms of social capital.*
Practical implications: *This research examines the potential and realized absorption capacity for product innovation among investment managers in Brazil, as well as the need for interorganizational social capital to strengthen this relationship.*
Originality/value: *Based on the results, it can be inferred that RACAP emerges as a mechanism for product innovation, confirming the view that RACAP is fundamental to performance improvements.*
Keywords: *Interorganizational Social Capital; Potential and Realized Absorption Capacities; Product Innovation.*

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I. INTRODUCTION

Currently (decade 2020), companies of varied sizes and different sectors compete in a market full of challenges, with increased competition and uncertainty about the global economy, amid a process of digital transformation and continuous search for innovation and competitiveness. The development of the financial system requires transformations within companies, government, and society (de Morais & Sehnem, 2025). In a changing market, companies increasingly depend on their knowledge as a valuable resource (Nonaka et al., 2000) to innovate in their markets. It is necessary to develop more complex innovation structures that integrate with the ecosystem and establish an organizational function with a specific mandate to seek innovation in new business platforms (dos Santos & Marx, 2021).

To access this knowledge, organizations turn to their external networks of relationships (Powell et al., 1996; Pérez-Luño et al., 2011), using two essential factors, according to the theoretical framework. The first corresponds to the development of the capacity to absorb knowledge (Cohen & Levinthal, 1990), a theme that integrates the dimensions of acquisition, assimilation, transformation and exploitation of this knowledge for innovation (Zahra & George, 2002; Miroshnychenko et al., 2021). The second factor refers to social capital, especially interorganizational capital, as a channel of access to knowledge outside the organizational frontier, an activity that demands trust and cooperation, as well as the strength and frequency of interaction between the company and the other agents in its relationship network (Granovetter, 1992; Nahapiet & Ghoshal, 1998).

In Brazil, investment managers manage more than R$7 billion in third-party funds (ANBIMA, 2023) and are immersed in one of the most challenging scenarios in recent years. Intense competition, macroeconomic adjustments at the national level, with continuous rise in interest rates, the retraction in the local scenario, and uncertainty regarding the international economy emerge as daily challenges (FGV, 2022). Given the relevance of this market, it was decided to investigate investment managers in Brazil, a knowledge-intensive sector, considering the constant need for innovation in their products and their investment strategies to face the competition, ensuring adequate returns to their clients.

In the theoretical framework, the relevance of the absorption capacity for innovation in different sectors, such as small and medium-sized companies, technology companies and startups (Limaj & Bernroider, 2019; Sancho-Zamora et al, 2021; Elidjen et al., 2021), as well as social capital for innovation, in the biotechnology and manufacturing sectors, and small and medium-sized enterprises (Pérez-Luño et al., 2011; Ortiz et al., 2016; Presutti et al., 2020), but there are few studies on companies in the financial sector, especially with investment managers.

According to different authors (Pérez-Luño et al., 2011; Limaj & Bernroider, 2019; Miroshnychenko et al., 2021), there is a need to expand the study of the capacity to absorb knowledge in order to achieve a better understanding of the effect of external relationships on innovation (Lawson & Samson, 2001), a complex activity that usually involves all areas of a company (Sancho-Zamora et al., 2021).

The general objective of this study was to analyze the relationship between potential and realized absorption capacity and product innovation in the context of investment managers in Brazil, with special attention to interorganizational social capital moderating this relationship. The specific objective was to evaluate the proposed structural model, capable of analyzing the relationship between potential and realized absorption capacity and product innovation, with moderation of interorganizational social capital.

The article is structured in four more chapters, in addition to this introduction. In the second chapter, the theoretical framework is presented, with the subchapters by theme and proposition of hypotheses and conceptual model. In the third chapter, the methodological proposal of the research is demonstrated. The results of the research are presented in the fourth chapter. The research ends with chapter five, presenting the discussion of the results and conclusion.

II. THEORETICAL FRAMEWORK

In this chapter, we present the theoretical framework that supported the research.

2.1. Interorganizational Social Capital and Product Innovation

From its origin in 1980, defined by Bourdieu (1980; 1986) as something inherent to the network of relationships of an individual and to his set of norms that facilitate cooperation and coordinated actions among its members (Coleman, 1988; Putnam, 2001), social capital migrates to the organizational level (Nahapiet & Ghoshal, 1998) as a key element for obtaining competitive advantage (Adler & Know, 2002; Presutti et al., 2022). Social capital, by allowing connection with different agents, internal and external, enables access to sources of knowledge for innovation (Nhapiet & Ghoshal, 1998; Yli-Renko et al., 2001; Adler & Know, 2002), making use of relationship networks that sustain the social, economic, political and technological productivity of the company (Pooe & Mynyanyi, 2021).

Regarding the internal perspective of social capital, Adler and Kwon (2002) defend its development based on the relationship between individuals or groups in a company, facilitating the pursuit of common objectives. As for the external, interorganizational perspective, social capital occurs through exchange, through the relationship between agents who absorb it from their social structures to achieve their own objectives (Baker, 1990). This perspective of social capital allows the company to position itself at distinct levels of the external network, with the aim of locating and transferring valuable resources, including knowledge, above its limits (Navas et al., 2019), to innovate and remain competitive.

In this regard, the literature on innovation broadly discusses the positive effect of interorganizational collaboration on innovation and highlights a series of reasons that explain why these interorganizational relationships stimulate innovation (Pérez-Luño et al., 2011; Wu & Qu, 2021). Most of these arguments rely on the potential of inter-organizational collaboration to facilitate knowledge-sharing and interactive learning processes among participating companies (Wu & Qu, 2021). Adler and Kwon (2002) state that the primary direct benefit of the interorganizational network is access to additional sources of knowledge, which enables innovation and the pursuit of competitive advantage (Nonaka et al., 2000).

In this context, organizations use their external network relationship to obtain knowledge (Navas et al., 2019), improve and create new products. To access this external knowledge, the company must focus on its relationship networks, considering that the direct and indirect links between individuals and groups facilitate innovative activities (Adler & Know, 2002). In relation to this fact, the volume and diversity of agents in a network alone do not explain the advantages of interorganizational relationships for product innovation (Pérez-Luño et al., 2011), so it is necessary to analyze the other dimensions of social capital.

Nahapiet and Ghosal (1998), in their work on the relevance of social capital, suggest three dimensions to the theme: (i) structural; (ii) cognitive; and (iii) relational. The structural dimension of social capital corresponds to the set of relationships that a given agent has in a network (Granovetter, 1992), considering factors such as the union of relationship ties, the strength of these ties and the frequency of their interactions (Nahapiet & Ghoshal, 1998). In this regard, Bessant and Tidd (2019) suggest that a company's ability to develop new products requires

strong interorganizational linkages. A study conducted in manufacturing companies in different sectors established that close links with suppliers have a positive effect, as suppliers bring new working methods to organizations (Porter & Heppelmann, 2015).

The cognitive dimension of social capital corresponds to the code shared among the agents of a network, with the purpose of facilitating mutual understanding in the pursuit of collective goals, thus defining the behavior of the network (Granovetter, 1992; Nahapiet & Ghoshal, 1998). The relational dimension includes the proximity of the agents, the shared trust, their obligations and expectations, as well as the level of commitment of this relationship (Nahapiet & Ghoshal, 1998). Relational social capital reflects the benefits derived from the content of the actions that the agents develop together (Parra-Requena et al., 2015) and the quality and proximity of the interactions between these agents (Navas et al., 2019).

Trust in the context of strong relationships between network agents represents a stimulus with positive effects on the product innovation process, considering the exchange of knowledge (Pérez-Luño et al., 2011). In their study on interorganizational social capital, Ul Zia et al. (2022) highlight that companies from developing countries with strong social ties in developed countries gain innovation capacity. Navas et al. (2019) highlights the relevance of strong interorganizational social capital ties for more accessible and reliable acquisition of complex external knowledge. In consonance, Martínez-Canãs et al. (2011) highlight the importance of social capital in the external perspective, among companies, for the acquisition of knowledge and innovation. Therefore, considering the relationship between interorganizational social capital and product innovation, the first hypothesis of this research is formed:

H1: Interorganizational social capital positively affects product innovation.

2.2. Absorption Capacity and Product Innovation

The absorption capacity emerges as support for innovation in companies (Cohen & Levinthtal, 1990; Zahra & George, 2002; Limaj & Bernroider, 2019; Elidjen et al., 2021; Sancho-Zamora, 2021), by effectively recognizing, acquiring, and managing knowledge obtained from abroad and applying it to routines, activities, and daily skills in competitive contexts (Miroshnychenko et al., 2021).

The concept of absorption capacity emerges as the "(...) the ability of the company to recognize the value of new information, assimilate it and apply it for commercial purposes", p. 128). Lane et al. (2001) suggest a dynamic view for the capacity for absorption, dependent on internal processes and routines, which allow the company to create, expand or modify its resource base, as well as to reconfigure, integrate and originate new skills, products, processes and routines. (Cohen & Levinthal, 1990)

Thus, as presented by Jimenez-Barrinuevo et al. (2011), it is a complex issue, which requires in-depth studies in relation to the composition of its dimensions. Lane and Lubatkin (1998) state that capacity depends on the characteristics of the companies that develop the daily exchange of knowledge and suggest three dimensions for absorption capacity: (i) ability to understand knowledge; (ii) the company's ability to assimilate the new knowledge; and (iii) ability to apply external knowledge. Zahra and George (2002) suggest four dimensions for absorption capacity composed of the acquisition, assimilation, transformation and exploitation of knowledge.

In the original proposal of Cohen and Levinthal (1990), the dimension of acquisition refers to the recognition of the value of knowledge, while Zahra and George (2002) highlight, in this dimension, the transfer of knowledge between companies. Regarding the assimilation of knowledge, Zahra and George (2002) understand the understanding of acquired knowledge based on one's own capacities and routines. In Zahra and George's (2002) proposal, the transformation of knowledge constitutes the third dimension, equivalent to the internalization and conversion of the new knowledge acquired and assimilated. The fourth dimension is the exploitation of knowledge, a process of high strategic potential, as it is the basis for generating the results and efforts made in the previous dimensions (Zahra & George, 2002).

Zahra and George (2002) bring an additional contribution to the theme of absorption capacity by proposing the division of the four dimensions into two subgroups with different potential for value creation, called, respectively, potential absorption capacity and realized absorption capacity. The first, composed of the dimensions of acquisition and assimilation of knowledge and the second of the exploration and exploitation of knowledge.

2.2.1 Potential Absorption Capacity and Product Innovation

The potential absorption capacity (PACAP) proposed by Zahra and George (2002) integrates the dimension of knowledge acquisition, originally presented by Cohen and Levinthal (1990), and the dimension of knowledge assimilation. Acquiring knowledge from different external agents develops the breadth and depth of the company's existing knowledge base (Hu, 2014). In addition, the acquisition of new knowledge has been shown to have a positive relationship in the development of new products (Elidjen et al., 2021).

In addition, assimilating external knowledge involves incorporating it into the routines and procedures of analysis, processing, interpretation, and understanding of information obtained outside the organization (Zahra & George, 2002). The assimilation of knowledge represents its integration into organizational structures (Gebauer

et al., 2012). In addition, the continuous updating of knowledge stocks using their assimilation (Chaudhary, 2019), improves the levels of the PACAP, stimulating innovation (Miroshnychenko et al., 2021). That said, the following hypothesis is constituted:

H2: Potential absorption capacity positively affects product innovation.

2.2.1 Realized Absorption Capacity and Product Innovation

The realized absorption capacity (RACAP) is a primary key to increasing the company's performance and generating innovation for competitive advantage (Zahra & George, 2002). RACAP consists of the transformation and application of knowledge (Miroshnychenko et al., 2021). Transformation is considered as the ability to combine ancient and ingrained knowledge with newly acquired knowledge. This process involves adding new knowledge while reevaluating and modernizing the company's existing knowledge (Zahra & George, 2002). By combining old and new knowledge, original associations and links emerge between different information flows (Limaj & Bernroider, 2019). This can lead to new perspectives on how to improve current activities, leading to product innovation strategies (Enkel et al., 2017). Finally, the following hypothesis is defined:

H3: The realized absorption capacity positively affects product innovation.

According to Zahra and George (2002), both PACAP and RACAP play separate but complementary roles. Companies cannot apply external knowledge without first acquiring it. Thus, some organizations can acquire and assimilate external knowledge but are sometimes unable to transform and exploit that knowledge. Thus, RACAP requires PACAP to achieve product innovation (Limaj & Bernroider, 2019). This complementarity emerges from the theoretical framework and reveals that PACAP complements RACAP positively (Limaj & Bernroider, 2019; Elidjen et al., 2021; Sancho-Zamora, 2021). Thus, two new hypotheses are established:

H4: Potential absorption capacity positively affects realized absorption capacity.

H5: The positive effect of the relationship between the potential absorption capacity for product innovation is mediated by the realized absorption capacity.

2.3 Social Capital in the Interorganizational Perspective as a Moderating Variable between Absorption Capacity and Product Innovation

PACAP groups the efforts necessary in the acquisition of new external knowledge (Zahra & George, 2002), relevant to the development of operations and the assimilation of the knowledge obtained based on its classification, processing, interpretation, and understanding (Miroshnychenko et al., 2021). In this sense, research shows (Ortiz et al., 2017; Navas et al., 2019; Presutti et a., 2022) that high levels of structural social capital result in high levels of potential absorption capacity, effect of the presence or absence of network ties, network configuration, and pattern of connections in terms of density, connectivity, and hierarchy.

Similarly, in relation to cognitive social capital, as the agents of a network have similar views on the behavior of interactions, on the norms of sharing, and on the policy of relationship with the rest of the members of the network, knowledge can be better identified for acquisition and subsequent assimilation (Nahapiet & Ghoshal, 1998; Inkpen & Tsang, 2005). The more complex the knowledge that is desired to be acquired, the greater the degree of confidence necessary for its transfer between companies (Audretsch et al., 2011). Therefore, the following hypothesis is constituted:

W1: The positive contribution of PACAP to product innovation will be greater under conditions of higher levels of interorganizational social capital.

RACAP, in turn, guarantees the exploitation of the knowledge acquired, formed by the capacities of transformation and exploitation (Zahra & George, 2002). Transformation represents the ability of a company to develop and improve processes that facilitate the combination of existing knowledge with new knowledge acquired and assimilated, based on the addition and elimination of knowledge or on the distinct interpretation of present knowledge (Jansen et al., 2005). Henderson and Cockbur (1994) suggest a positive relationship between the level of development of a company's social network and its ability to improve processes that facilitate the combination of existing knowledge with new acquired knowledge. Ortiz et al. (2017) state that companies with stronger, more frequent and closer relationships, within structural social capital, are able to increase knowledge transformation.

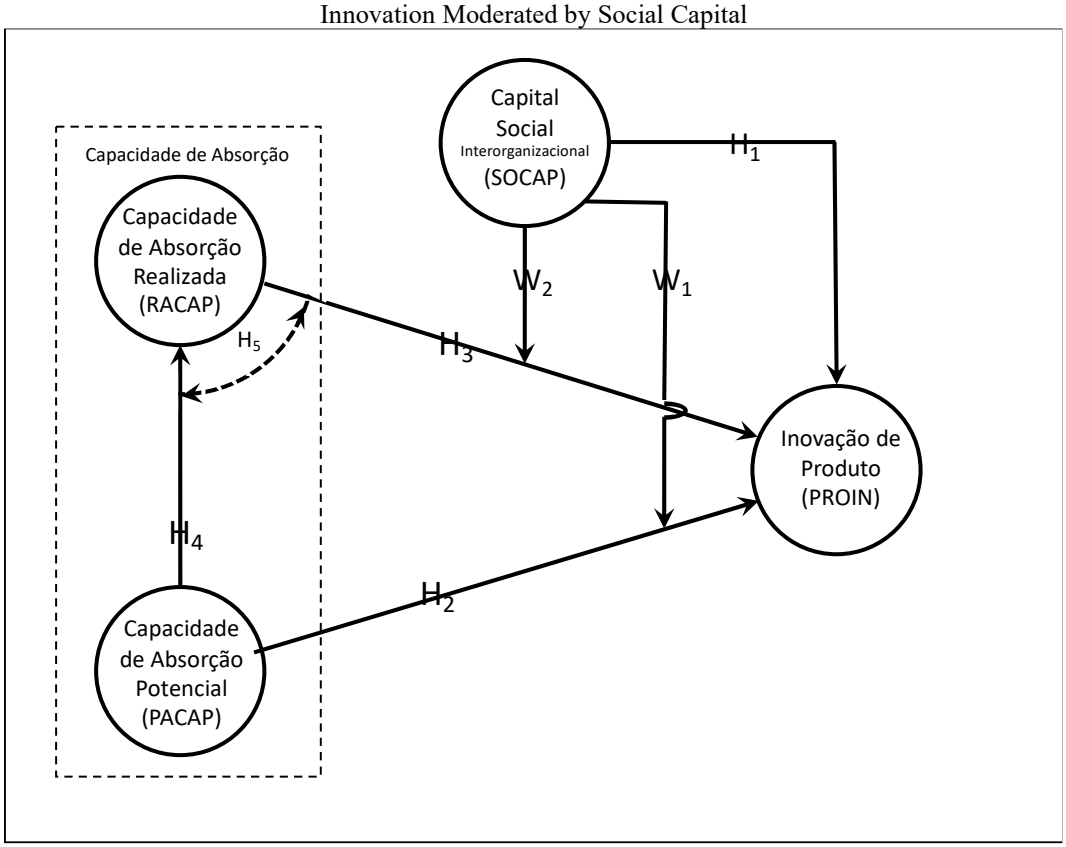
Close interactions increase companies' exposure to different interpretations of the meaning and relevance of knowledge (Yli-Renko, 2001). Strong bonds arising from a recurrent interaction over time facilitate the transformation of knowledge Therefore, the structure and strength of their contact with external agents influence the ability to transform and exploit knowledge for product innovation (Parra-Requena et al., 2015). Based on this, the following hypothesis is constituted:

W2: RACAP's positive contribution to product innovation will be greater under conditions of higher levels of inter-organizational social capital.

2.4 Proposed Conceptual Model

This study explores the relationships of potential and re-evaluated absorption capacities for product innovation in investment managers in Brazil and the moderating effect of interorganizational social capital in this relationship. Based on the analysis of the theoretical framework, the conceptual model of this research is established. Figure 1 presents the conceptual structure and the theoretical relationship between social capital, PACAP and RACAP and product innovation.

Figure 1: Model of the Relationship between Potential and Relational Absorption Capacity with Product Innovation Moderated by Social Capital



Source: Prepared by the authors based on the theoretical framework (2023).

As shown in the model, PACAP's knowledge acquisition and assimilation activities positively influence product innovation. Likewise, RACAP's knowledge transformation and exploitation activities influence product innovation. At the same time, RACAP has a mediating effect on the relationship between PACAP and product innovation. Social capital, in turn, positively affects product innovation while moderating the relationships of PACAP and RACAP with product innovation.

III. METHODOLOGICAL PROCEDURES

This section describes the procedures used for data collection and analysis.

3.1 Data Collection Method and Sample Plan

In the survey, the hypotheses were tested using a sample of Brazilian investment managers, based on the national *ranking* (ANBIMA, 2023), which totals 866 managers. Subsequently, a multiphase or clustering procedure is assumed (Creswell & Cresweel, 2021). In the first phase, a list of the 300 largest national managers was defined, considering the total value of assets under management, based on the same *national ranking* of managers (ANBIMA, 2023). In the second phase, the members of the management teams of the companies listed in the first phase were searched on the social media platform LinkedIn®, by position and function. Subsequently, individual contacts were made, via the same platform, and a survey instrument was sent to potential respondents. As the sending of the survey instrument was identified, but the answers were not, this survey is considered as a systematic and random sample approach (Fowler Jr, 2014).

In all, 623 professionals from 300 different managers were invited to answer the questionnaire. Of this total, 113 responded, corresponding to a usable response rate of 17.98% of the target population, equivalent to 146% of the minimum sample of 77 calculated based on the G*Power 3® software (Faul et al., 2007). Data collection took place in the first semester of 2023., using a *survey*, identified by Fowler Jr. (2014) as a prominent form of data collection in the social sciences. The *survey* was applied based on a digital survey and its administration *online*, an appropriate strategy in management research (Creswell & Creswell, 2021), with the application of Google Forms® as a survey tool. The respondents, in view of the statements presented, opt for a Likert-type scale, which presents symmetry and demonstrates the equidistance of the items, facilitating the application in the SEM (Hair Jr et al., 2021). In the research, a 10-point scale is used with grades from 1 for strongly disagree or very weakly or extremely low or infrequent, to 10 for strongly or very strongly or extremely high or very frequent agree.

For data analysis, structural equation modeling with partial least squares estimation (PLS-SEM) is used, a technique that in the areas of social and behavioral sciences has been shown to be an excellent possibility for the evaluation of relationships between constructs (or factors, components, latent variables, unobserved variables, subscales, etc.); it is robust due to the lack of multivariate normality, and feasible for samples smaller than 100 cases (Bido & Dirceu, 2019).

3.2 Measurement of Model Variables

To measure the model variables, scales of multiple observable variables, or items, were used. All items are adaptations of previously used measurement scales, most of which have been validated by other researchers.

As detailed in Table 3, for the share capital, an adaptation of the scale of Yli-Renko et al., (2001), Maula et al., (2003) and Parra-Requena, et al., (2013) is considered. For the construct potential absorption capacity and realized absorption capacity, the research by Camisón and Fóres (2010), Flatten et al., (2011) and Limaj and Bernroider (2019) is assumed as a reference scale. For product innovation, the scale of Wang and Ahmed (2004) and Kafetzopoulos (2020) was used.

IV. PRESENTATION AND ANALYSIS OF RESULTS

In this section, the results related to the characterization of the sample, the evaluation of the measurement model (validity and reliability of the constructs) and the structural model are presented.

4.1. Sample Characterization

The profile of the respondents identified in the survey (Table 1) shows that: (i) the majority (30%) occupy leadership positions in the management teams, thus being managers and co-managers; (ii) the majority (56%) are multimarket and equity fund managers; (iii) the respondents primarily belong (64%) to managers with more than R$500.1 million under management *(AUM).*

Table 1: Respondents' Profile

Features		**Sample**	
Role in the manager	Manager	15	13%
	Co-manager	19	17%
	Strategist	10	9%
	Portfollio Manager	24	21%
	Trader	13	12%

Features		Sample	
Type of investment fund	Analyst	32	28%
	Fixed Income	9	8%
	Actions	33	29%
	Multimarket	31	27%
	Real estate	15	13%
	Credit and/or stressed credit	7	6%
	Security	4	4%
	Fund os Funds	13	12%
	Private Equity	1	1%
AUM (Assets Under Management)	Up to R$ 100 million	13	12%
	From R$ 100.1 million to R$ 500 million	27	24%
	From R$ 500.1 million to R$ 1 billion	40	35%
	Above R$ 1 billion	33	29%

Source: Prepared by the authors based on the data collected (2023).

In Brazil, 866 managers manage resources in investment funds equivalent to 50% of the national Gross Domestic Product (GDP) (ANBIMA, 2023). The investment fund is defined as a legal vehicle with the purpose of financial investment, the result of the union of multiple investors in order to make an investment to obtain an objective or expected return, without legal personality. In an investment fund, the revenues generated and the expenses necessary for the project are divided proportionally to the investor's interest in the condominium (ANBIMA, 2023).

4.2 Evaluation of the Measurement Model

With confirmatory factor analysis, which precedes the analysis of relationships between latent variables, the measurement model is evaluated based on convergent validity, discriminant validity, and reliability. As a result, all latent variables, as shown in Table 2, have average variance *extracted (AVE*) greater than 50%, following the recommendation of Hair Jr. et al. (2019), indicating the existence of convergent validity.

Table 2: Statistical correlations of latent variables

Construct	PACAP	PROIN	RACAP	SOCAP
PACAP – Potential absorption capacity	**0.800**			
PROIN – Product innovation	0.558	**0.849**		
RACAP – Realized absorption capacity	0.836	0.662	**0.859**	
SOCA – Capital Social	0,403	0,336	0,361	**0,725**
Composite reliability	0.925	0.911	0.957	0.916
Extracted mean variance - AVE	0.640	0.720	0.737	0.525

Note: Diagonals are square root values of remarked AVE.
Source: Prepared by the authors based on the data collected (2023).

Regarding reliability, according to Hair Jr. et al. (2019), in studies developed based on structural equations, the reliability of the construct is evaluated based on composite reliability, greater than 0.7. The latent variables of this research have a reliability greater than 0.9. Regarding the items, as shown in Table 3, five items of the 33 observable variables were eliminated, representing 15.15%, within the recommended quality limit of the questionnaire, which was less than 25%. With the exception of items CSR3, CRS4, CSC1, PAQ1 and PAQ2, all the others had a load greater than 0.7, as well as discriminant validity considering the load greater than *crossloading,* following the recommendation of Hair Jr. et al. (2019).

Table 3: Cross Load Matrix

Description of the item/observable variable	Load
Social Capital (Yli-Renko et al., 2001; Maula et al., 2003; Parra-Requena et al., 2013)	
CSE1- Our relationship with external agents is very weak to very strong	0,75
CSE2- We know which external agent has relevant knowledge at our disposal.	0,79
CSE3- External agents know what knowledge I have available to share.	0,61
CSE4- Our relationship with external agents is based on cooperation and mutual trust.	0,75
CSR1- The degree of commitment of the relationship with our external agents is very weak to very strong	0,79
CSR2 - In our relationships with third parties, neither side takes advantage of the other, even if opportunities arise.	0,71
CSR3 - We know and accept the standards of professional conduct of our external agents.	(a)
CSR4 - The culture and management style of the external agents in our relationship are similar to ours.	(a)
CSC1 - The intensity of sharing goals with the external agents of our relationship is: very weak to very strong	(a)
CSC2 - The quality of communication between us and our agents is: very low to very high	0,73
CSC3 - We share a common vision with external agents of our relationship in relation to the market.	0,76
CSC4 - The demand for new external knowledge for our management activity is very low to very high	0,82
Potential absorption capacity (Camisón; Fóres, 2010; Flatten et al., 2010; Limaj & Bernroider, 2019)	
PAQ1 - The search for relevant external knowledge is a daily activity of our manager.	(a)
PAQ2 - We have the necessary skills to distinguish between opportunities to obtain relevant information and those that are of no value to our management.	(a)
PAQ3 - We encourage our employees to seek information external to our manager.	0,77
PAQ4 - The frequency of sharing new knowledge between members of our team is: very low to very high	0,72
PAS1 - The knowledge obtained by external sources is quickly analyzed in our team.	0,86
PAS2 - The knowledge obtained by external sources is quickly interpreted in our team.	0,84
PAS3 - We have a recurring agenda of meetings to take advantage of the flow of knowledge acquired externally.	0,77
PAS4 - In our manager, the exchange of new, external knowledge between management teams is very low to very high	0,79
PAS5 - We have the competence to standardize the knowledge collected.	0,83
Realized absorption capacity (Camisón & Fóres, 2010; Flatten et al., 2010; Lima & Bernroider, 2019)	
RTR1 - We know how to absorb new knowledge and integrate it with existing knowledge to improve our management techniques.	0,84
RTR2 - The integration of new knowledge with the existing knowledge of our team is: very low to very high	0,89
RTR3 - We are able to apply new knowledge to our daily routines.	0,89
RTR4 - The application of new knowledge to management activities is very low to very high	0,81
REX1 - We use new knowledge to create investment strategies.	0,88
REX2 - We constantly improve our management method based on the knowledge acquired externally.	0,82
REX3 - Our manager encourages management teams to use new ideas in their daily routines.	0,85
REX4 - The market acceptance of our investment funds is very low to very high	0,88
Product innovation (Wang & Ahmed, 2004; Kafetzopoulos, 2020)	
IPD1 - Our competitors seek to replicate/copy our investment strategies.	0,70

Description of the item/observable variable Load	
IPD2 - Our manager has more capacity to develop new strategies and new funds in relation to the competition.	0,88
IPD3 - We develop new investment strategies based on the existing strategies in our funds.	0,89
IPD4 - When new investment strategies emerge, we are the first to adopt them.	0,91

Note: (a) = item eliminated from the measurement model because it presented factor loadings below the minimum recommended.
Note: all loads are significant ($p < 0.001$).
Source: Prepared by the authors based on the data collected (2023).

The observable variables present higher loads in their VL than in relation to the others, indicating discriminant validity. Regarding reliability, for all constructs, it was higher than 0.72, above the recommended value of 0.6 (Bagozzy & Yi, 1998).

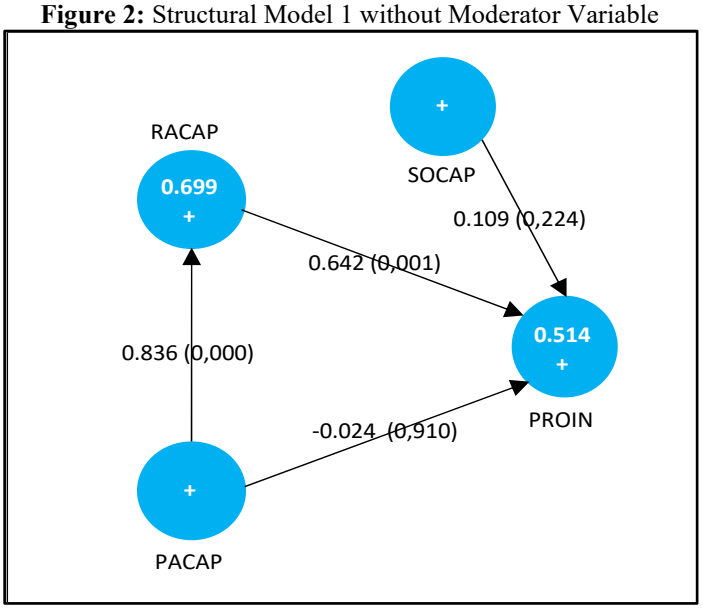
4.3 Evaluation of the Structural Model

Once the construct measurements have been analyzed and confirmed, the evaluation stage of the results of the structural model is conducted. The evaluation is relevant to obtain the best estimates of parameters that adjust the PLS-SEM to the sample data (Limaj & Bernroider, 2019), maximizing the explained variance of endogenous latent variables (Hair Jr. et al., 2021). Thus, the significance of the p-value and the f^2 effects were evaluated, considering the view of Cohen (1997). After executing the PLS-SEM algorithm, using the *bootstrapping* calculation with 10,000 subsamples as a non-parametric resampling procedure (Chin, 1998), as shown in Tables 4 and 5.

Values closer to the limits represent stronger effects and values closer to zero represent weaker effects, respectively non-significant effects. To avoid bias for complex models, we adjusted the R^2 according to the number of exogenous constructs in relation to the sample size (Hair Jr. et al., 2019). Based on the resulting adjusted R^2 values, the model shows adequate predictive accuracy. The f^2 effects were calculated to assess whether the erased observable variables had a significant impact on the latent variables.

In relation to the structural model, corresponding to the relationships between the latent variable's social capital, potential absorption capacity, realized absorption capacity and product innovation, examining the structural model (Figure 2) without moderation of social capital. The model shows adequate convergent validity for all constructs with values greater than 0.5 (Fornell & Larcker, 1981).

Figure 2: Structural Model 1 without Moderator Variable



Source: Prepared by the authors based on the data collected (2023).

Based on the results of the PLS-SEM, detailed in Table 4, hypothesis 1 was not confirmed, given the insignificant relationship between social capital and product innovation ($p>0.05$). Likewise, social capital does not directly influence product innovation in investment managers, considering the insignificance of the

relationship (p>0.05). On the other hand, there is a positive (β = 64) and significant (p = 0.001) effect on the relationship between the absorption capacity and product innovation, considered to have a medium effect (f^2 = 0.224) in Cohen's classification (1997, p.413-414) with an adjusted R^2 of 43%. At the same time, hypothesis 4 is confirmed, considering the significance (p=0.000) and strong effect (f^2=2.325) of PACAP for RACAP, based on the classification of Cohen (1997, p.413-414) with an adjusted R^2 of 69%.

Table 4: Structural relationships between constructs

Structural relations		Effect size (f^2)	Structural coefficient (β)	Standard Error	T-value	P-value	R^2	R^2 adjusted
SOCAP > PROIN	H1	0,018	0,114	0,090	**1,215**	**0,200**	0,448	0,433
PACAP > PROIN	H2	0,001	-0,025	0,208	**0,114**	**0,905**	0,448	0,433
RACAP > PROIN	H3	0,224	0,641	0,193	3,332	0,001	0,488	0,433
PACAP > RACAP	H4	2.325	0,114	0,034	24,319	0,000	0,699	0,697

Note: SOCAP - Share capital; PROIN - Product Innovation; Racap – Realized absorption capacity; PACAP – Potential absorption capacity.
Note: Size of the effect f^2 small 0.02, medium 0.15, large 0.35 (COHEN, 1977, p.413-414)
Source: Prepared by the authors based on the data collected (2023).

In the model proposed and validated in this article, it is suggested according to Hypothesis 5, that RACAP has a mediating effect on the relationship between PACAP and product innovation.

Table 5: Outcome of Mediation

Hypothesis	H5	
Mediator: RACAP	1	2
PACAP > PROIN	0,55	0,46
Effect Ratio	84%	

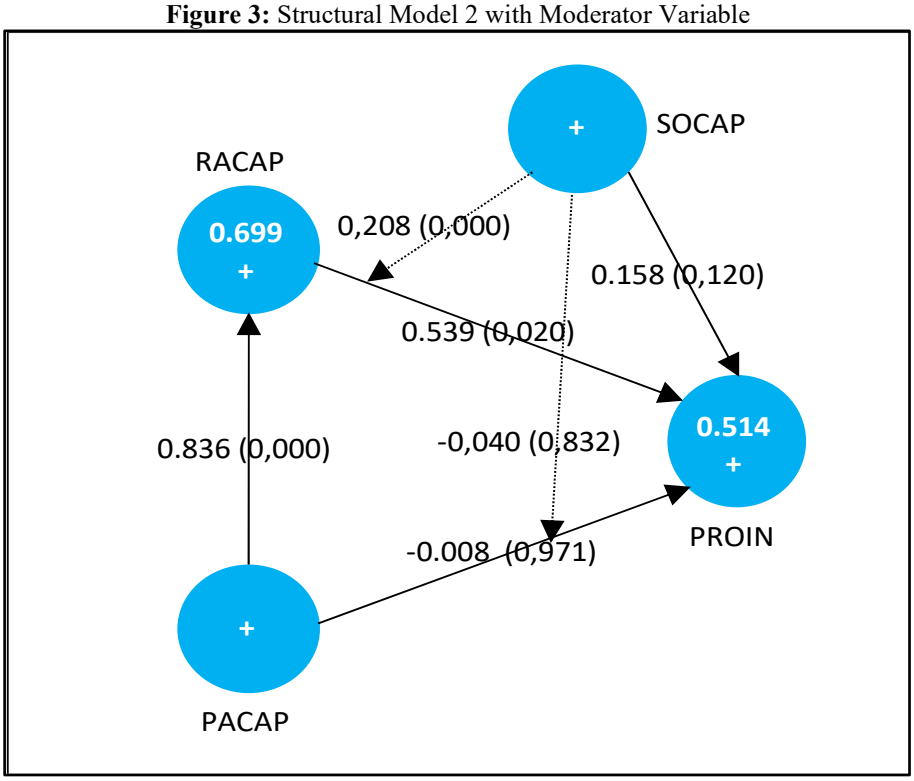
Note 1: PROIN - Product Innovation; RACAP – Realized absorption capacity; PACAP – Potential absorption capacity.
Note 2: Column (1) represents the estimated coefficient without the mediating variable, column (2) with the mediating variable.
Source: Prepared by the authors based on the data collected (2023).

For hypothesis H5, the test was applied without the mediating variable RACAP, and the resulting coefficient between PACAP and product innovation was equal to 0.551 at a level of p < 0.001. Next, the mediating variable RACAP was included in the model, evaluating the significance of the indirect effects. The effect between PACAP and product innovation was smaller, as shown in Table 5, which indicates mediation effects. Next, the variance was calculated to determine the level of mediation. The relationship between potential absorption capacity and product innovation is fully mediated by the actual absorption capacity.

4.4 Evaluation of the Structural Model with Moderation of Social Capital

For this evaluation, the variable social capital was placed as a moderating variable in the relationship between PACAP and PROIN and between RACAP and PROIN, as shown in Figure 3.

Figure 3: Structural Model 2 with Moderator Variable



Source: Prepared by the authors based on the data collected (2023).

Based on the results of the PLS-SEM, detailed in Table 6, the capital stock does not moderate the relationship between potential absorption capacity and product innovation, rejecting the W1 hypothesis. On the other hand, there is a positive (β= 21) and significant (p=0.000) effect of the moderation of social capital on the relationship between the absorption capacity and product innovation, an effect of medium level (f^2=0.201) based on the classification of Cohen (1997, p.413-414), with an adjusted R^2 of 44%.

Table 6: Structural relationships of social capital as a moderating variable

Structural relations		Effect size (f^2)	Structural coefficient (β)	Standard Error	T-value	P-value	R^2	R^2 adjusted
SOCAPxPACAP > PROIN	W1	0,001	-0,040	0,186	0,213	0,832	0,467	0,442
SOCAPxRACAP > PROIN	W2	0,201	0,208	0,170	0,634	0,000	0,467	0,442

Note: SOCAP - Share capital; PROIN - Product Innovation; RACAP – Realized absorption capacity; PACAP – Potential absorption capacity.
Note: Size of the effect f^2 small 0.02, medium 0.15, large 0.35 (COHEN, 1977, p.413-414)
Source: Prepared by the authors based on the data collected (2023).

Thus, the results of the hypotheses evaluated in the research are summarized, as shown in Table 7, below.

Table 7: Summary of the result of the research hypotheses

Identification/hypotheses	Result
H1: Interorganizational social capital positively affects product innovation.	Unconfirmed
H2: Potential absorption capacity positively affects product innovation.	Unconfirmed
H3: The realized absorption capacity positively affects product innovation.	Confirmed
H4: Potential absorption capacity positively affects the realized absorption capacity.	Confirmed
H5: The positive effect of the relationship between the potential absorption capacity for product innovation is mediated by the realized absorption capacity.	Confirmed

Identification/hypotheses	Result
W1: The positive contribution of PACAP to product innovation will be greater under conditions of higher levels of interorganizational social capital.	Unconfirmed
W2: RACAP's positive contribution to product innovation will be greater under conditions of higher levels of inter-organizational social capital.	Confirmed

Note: SOCAP - Share capital; PROIN - Product Innovation; RACAP – Realized absorption capacity; PACAP – Potential absorption capacity.
Source: Prepared by the authors based on the data collected (2023).

The positive influence of PACAP's knowledge acquisition and assimilation activities on product innovation has not been confirmed. The positive influence of PACAP on RACAP's knowledge transformation and exploitation activities was confirmed, as well as the influence of RACAP's knowledge transformation and exploitation activities for product innovation. At the same time, RACAP has a mediating effect on the relationship between PACAP and product innovation. The direct relationship of social capital to product innovation was not confirmed, as well as its moderating effect on the PACAP relationship and product innovation. On the other hand, the moderating effect of the capital stock on the ratio of RACAP to product novation was confirmed.

V. DISCUSSION OF RESULTS AND CONCLUSION

This research examines the potential and realized absorption capacity for product innovation in investment managers in Brazil and the need for interorganizational social capital to strengthen this relationship. More specifically, it defends the importance of the complementarity of the absorption capacity realized in the potential absorption capacity, to promote innovation in products, and explains the extent to which the social capital affects these relationships.

As detailed in the previous paragraphs, the results of the tests and hypotheses presented in this article establish relevant *insights* into the mechanisms that affect product innovation in investment managers and the conditions that facilitate these effects. First, PACAP has a strong effect on RACAP, corroborating the evidence regarding absorption capacity (Cohen & Levinthal, 1990), especially in relation to the proposal of the PACAP and RACAP subgroups of Zahra and George (2002).

The results also indicate the mediating effect of RACAP on the positive effects of PACAP on product innovation, while demonstrating a positive effect of RACAP on product innovation. This evidence proves that investment managers must rely on absorption capacity to drive innovation as a relevant source of competitive advantage.

On the other hand, the results do not support the argument that PACAP directly affects product innovation. This finding suggests that, despite the need for PACAP, the capacity is not sufficient to transform the knowledge acquired and assimilated into new or improved products. The evidence found adds to other studies that did not find a direct relationship between the PAC and innovation results (Limaj & Bernroider, 2019).

Regarding the analysis of the moderating effect of interorganizational social capital, managers with strong network ties, who have similar views on the behavior of interactions, on the sharing norms and on the relationship policy, and who establish relationships of trust with the other agents of their external relationship network, strengthen the absorption capacity carried out for the innovation of their products.

5.1 Theoretical implications

This research contributes to the existing literature on the multidimensional nature of absorption capacity and the complementarity between the potential and actual subgroups. As presented in the literature review, the existence of reinforcement links between PACAP and RACAP is suggested. Thus, with this research, these considerations are expanded by specifically confirming that PACAP positively affects RACAP in the context of investment managers.

Although it seems natural to consider that high PACAP can enhance RACAP and, subsequently, the absorption capacity as a whole, focusing only on the development of PACAP is not sufficient. Zahra and George (2002) argue that many organizations, due to exogenous and endogenous forces, may still be inefficient in leveraging RACAP. With this article, although an initial proposal that interorganizational social capital may be one of these forces, we did not find empirical evidence to verify the moderation effects of social capital in the two subgroups of absorption capacity.

Based on the results, it can be inferred that RACAP emerges as a mechanism for product innovation, confirming the view that RACAP is fundamental for performance improvements (Zahra & George, 2002). Specifically, the findings of this research indicate that managers who have strong and recurrent network ties, trust

with other agents, and similar views on behavior and interactions with these agents perform better in product innovation than others.

5.2 Future Limitations and Research

Like all empirical research, this study is subject to its reliability. However, the number of respondents met 146% of the recommended minimum guarantee. Regarding the representativeness of the respondents, in which 30% are managers and co-managers, future studies may focus exclusively on these management leadership functions, abandoning the other functions. In terms of sector and nationality bias, future research may attempt to replicate the findings of this study in different sectors of the economy and other countries. Finally, future research may investigate more specifically the level of identified threshold of RACAP, necessary to exploit social capital for the production of product innovation or analyze the moderating effect of social capital in the mediation between PACAP and RACAP.

5.3 Conclusion

This study aimed to analyze the link between potential and realized absorption capacity and product innovation in the context of investment managers in Brazil, paying special attention to interorganizational social capital in this relationship. With the research, it is confirmed that the potential absorption capacity positively impacts the realized absorption capacity, and it is perceived that the effects of the potential absorption capacity on product innovation are mediated by the realized absorption capacity.

Based on the results obtained, it can be deduced that one of the key factors for investment managers to build an innovation mechanism for their products is based, first, on the development of higher levels of potential and realized absorption capacities and, secondly, on accommodating highly balanced forms of social capital. Finally, we hope that this article will stimulate innovative ideas and research to expand or refute the findings detailed in this research.

The research results align with Sustainable Development Goal (SDG) 9: "Industry Innovation and Infrastructure: build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation," which is outlined in the 2030 Agenda for Sustainable Development. These goals are adopted by the 193 member countries of the United Nations (UN).

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