Exploring the interplay between innovation capability and firms` financial and non-financial performance

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Abstract: The purpose of this paper is to examine the relationship between innovation capability and firm financial and non-financial performance, with the aim of making a constructive contribution to the ongoing debate. Innovation capability is widely considered to be a strategic differentiator for firms leading to improved performance, yet there is a lack of research demonstrating the effect of innovation capability on firm performance using financial and non-financial indicators. Against this background, a survey was carried out on manufacturing firms in Rio Grande do Sul, Brazil. A total of 166 responses were received. Structural equation modelling (SEM) was used to analyse the innovation capability constructs, which included four dimensions - technological development, operation, transaction and management - and the performance constructs, which were based on financial, customer, internal process and learning and growth perspectives. The results suggest that innovation capability has a positive effect on non-financial performance and non-financial performance has a positive effect on financial performance. These findings provide a strategic view for managing innovation, suggesting that innovation capability leads to superior financial and non-financial firm performance. Furthermore, it could be used by managers seeking to develop innovation capability and improve their organisational performance.

Keywords: Innovation Capability; Firm Performance; Non-financial Performance; Financial Performance; Brazilian Industry.

Código JEL: L60 General - Industry Studies: Manufacturing; O31 - Innovation and Invention: Processes and Incentives

Área Temática: 5.6 Inovação, competências e competitividade

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Explorando a interação entre a capacidade de inovação e o desempenho financeiro e não financeiro das empresas

Resumo: O objetivo deste artigo é analisar a relação entre a capacidade de inovação e o desempenho financeiro e não financeiro de empresas com o objetivo de contribuir de forma construtiva para o debate em curso. A capacidade de inovação é considerada como um fator de diferenciação estratégica para as empresas, podendo conduzir a um melhor desempenho. Porém, observam-se lacunas na literatura que consigam demonstrar o efeito da capacidade de inovação no desempenho da empresa por meio de indicadores financeiros e não financeiros. Neste contexto, foi realizada um pesquisa *survey* em empresas de manufatura no Rio Grande do Sul, Brasil. Foram obtidas 166 respostas. A modelagem de equações estruturais (SEM) foi utilizada para analisar os construtos de capacidade de inovação, que incluíram quatro dimensões - desenvolvimento tecnológico, operação, transação e gestão - e os construtos de desempenho, que se basearam nas perspectivas financeira, do cliente, de processos internos e de aprendizado e crescimento. Os resultados sugerem que a capacidade de inovação tem um efeito positivo no desempenho não financeiro e que o desempenho não financeiro tem um efeito positivo no desempenho financeiro. Estes resultados fornecem uma visão estratégica para a gestão da inovação, sugerindo que a capacidade de inovação conduz a um desempenho financeiro e não financeiro superior da empresa. Além disso, podem ser considerados pelos gestores que procuram desenvolver a capacidade de inovação e melhorar o desempenho organizacional da empresa.

Palavras-chave: Capacidade de Inovação; Desempenho da Empresa; Desempenho Não-Financeiro; Desempenho Financeiro; Indústria Brasileira.

1. Introduction

The aim of this paper is to explore the relationship between innovation capabilities and firms' financial and non-financial performance, with a focus on understanding the nuances and complexities involved. The existing literature suggests that a multifaceted approach to measuring innovation capability, encompassing diverse dimensions, is essential. Similarly, when assessing firm performance, a range of perspectives is crucial. However, our understanding of the intricate relationships between innovation capability and various perspectives on firm performance is still in its early stages.

To our knowledge, few previous studies have explored the potential causal relationships between innovation capability and non-financial performance indicators. Authors as Lawson & Samson (2001), Saunila & Ukko (2012), Kafetzopoulos & Psomas (2015), Alves et al. (2017) and Oliveira et al. (2019), conducted research including some non-financial indicators as part of business performance constructs. However, none of these studies demonstrated the effect of innovation capability on the firm's non-financial performance, highlighting a research gap that could benefit from further investigation.

Drawing on the literature in the fields of technology and management economics, this paper aims to contribute to the understanding of how the firm's innovation efforts translate into organisational outcomes in terms of financial and non-financial performance. We consider it relevant to analyse two dimensions of performance and assume that the innovative activity of the firm, due to its procedural and continuous nature, assumes a relevance that goes beyond the financial result, without neglecting its importance.

In order to improve our understanding of innovation capability in firms, Zawislak et al. (2012)

developed an 'innovation capability model', which includes two main dimensions: technology and business. In their model, firms' innovation capabilities are formed by four resources: technological development, operations, management and transactions (also referred to as commercial capabilities). The first two are defined as technological capabilities and the rest as business capabilities.

In terms of firm performance, we understand that the inclusion of indicators that capture non-financial performance may be facilitated by the Balanced Scorecard (BSC) model developed by Kaplan and Norton (1992). The BSC model is one of the most influential strategy implementation and control tools to support business management (Tawse & Tabesh, 2023) and comprises four perspectives: financial, customer, internal processes and learning and growth.

This research presents a quantitative approach and was conducted through a theoretical-empirical study. Hypotheses were developed based on the literature related to theories of innovation capability and performance. These were tested empirically through a survey of 166 industrial firms in the state of Rio Grande do Sul (RS), Brazil. The results were analysed using structural equation modelling.

Considering that the context in which the empirical research was carried out refers to the industrial activity of the RS, it is important to note that the industrial production structure in the RS has historically been characterised by a high degree of diversification and with a significant share in the national industrial production. However, in the last decade the industrial activity at RS has lost dynamism and also the importance of the most technologically advanced sectors has decreased. There has been a slowdown in industrial production in the RS, especially between 2003 and 2008 and more recently in 2019, which was later exacerbated by the economic crisis caused by the COVID-19 pandemic in 2020. (DEE/SPGG, 2020). This scenario calls for attention and this research aims to contribute to a discussion that allows understanding a relevant aspect for industrial competitiveness, which refers to the relationship between innovation capability and firm performance.

In the next sections, a brief theoretical background on innovation capability and performance is presented, along with the development of the hypotheses. The methodological approach is then presented, along with the results and findings of the research. Finally, limitations and suggestions for future research are presented.

2. Dimensions of firms´ innovation capability and perspectives of firms´ performance

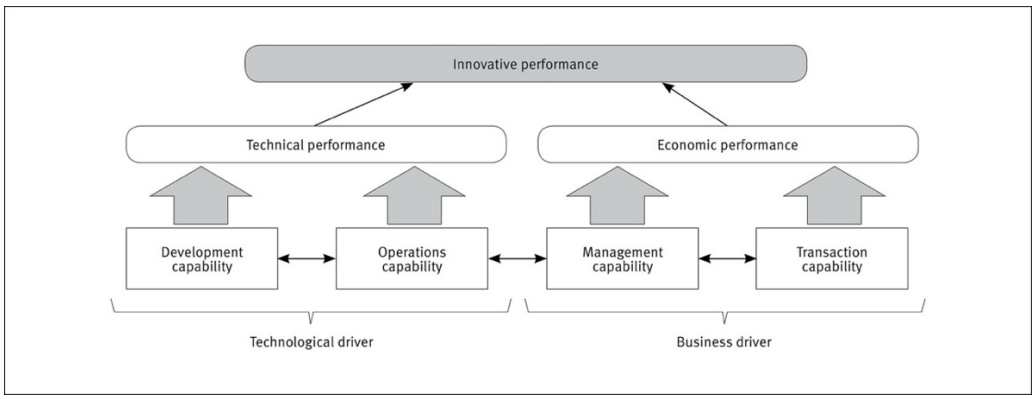
Since the early 2000s, several authors have tested the effect of the innovation capability construct on firm performance, as evidenced in the works of Lawson & Samson (2001), Saunila & Ukko (2012), Kafetzopoulos & Psomas (2015), Alves et al. (2017) and Oliveira et al. (2019). However, a clear relationship between different innovation capabilities and the non-financial performance of the firm remains to be established (Alves et al., 2017; Oliveira et al., 2019). Mendoza-Silva (2020) highlights the paucity of studies that consider the effect that innovation capability can have on business performance, thereby demonstrating that understanding the relationship between the firm's innovation capabilities and non-financial performance remains challenging.

In this regard, Webber, Ruffoni & Solheim (2023) presented a theoretical proposition, demonstrating the relationship between innovation capability and non-financial performance. This study involved a systematic literature review, and the proposed model is a relevant component of the current research.

Innovation capability, as a distinct field in innovation research, has been gaining importance in studies that seek to measure organisations' level of innovation generation (Neely et al., 2001). Innovation capability has been defined as "an organisation's potential to generate innovations with the implementation of all possible facilities available within it". Innovation capability is determined by a series of key indicators of input, process, and output of innovation and should help identifying triggers, drivers, and impediments of innovation and in managing companies' innovation (Carayannis & Provance, 2008).

Zawislak et al. (2012) present a model to measure the firm's innovation capability. This model consists of four resources, the first two of which are technological capabilities and the others business capabilities. These resources are development, operation, management and transaction. The model, illustrated in Figure 1, is grounded in dynamic capabilities (Teece, Pisano & Shuen, 1997) and strikes a balance between the evolutionary line of the firm theory and the organisations' coordination, in alignment with concepts of transaction costs theory (Coase, 1937; Schumpeter, 1942; Zawislak et al., 2012).

Figure 1: Dimensions of Innovation Capability



Source: Zawislak et al. (2012), Alves et al. (2017).

It has been demonstrated that technological development capability is associated with a firm's ability to comprehend the prevailing state of the art, assimilate it, and subsequently transform a specific technology to enhance its operating capability and other capabilities, thereby achieving higher levels of technical-economic efficiency (Zawislak et al., 2012).It is noteworthy that technological development capability emerges as a consequence of the learning process through which companies internalise new knowledge to facilitate technological innovation.

It can therefore be argued that the translation of new processes and products into specific operational capabilities, encompassing processes and routines, is a prerequisite for technological development. Furthermore, technological operation capability can be defined as the ability to perform a given productive capacity through the collection of daily routines embedded in knowledge, skills and technical systems at a given time. The objective is to ensure that the products or services developed reach the market with quality and competitive prices (Alves et al., 2017). As an operation, the use of technology, quality control, maintenance, workflows, and inventories, among others, can be considered (Zawislak et al. 2012).

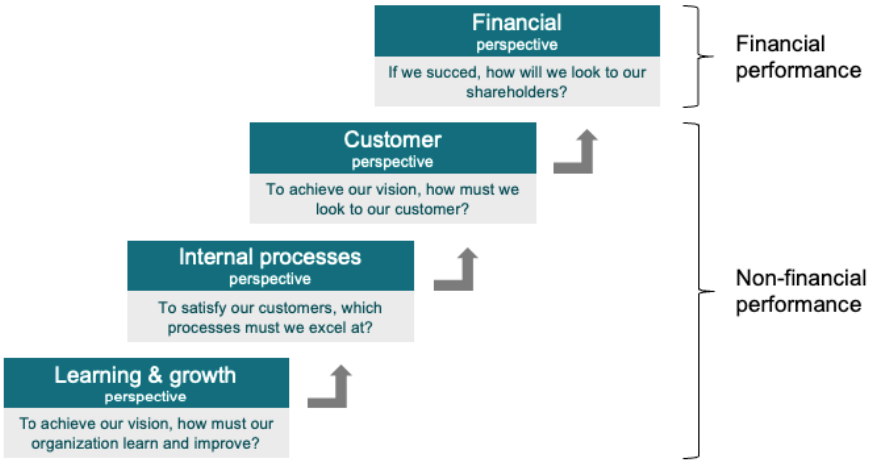
Management capability is categorised within the managerial capabilities group and can be defined as the ability to transform the outcome of technology development into coherent operations and transaction agreements, coordinating assets and activities so that tasks are completed in an effective manner (Alves et al., 2017; Zawislak et al., 2012). It is imperative that management capability is flexible in terms of problem-solving and that a range of skills is required (Langlois, 2003).

Finally, transaction capability is oriented towards commercial concerns and encompasses the ability to minimise marketing, outsourcing, negotiation, logistics and delivery expenses, along with other factors pertinent to transaction costs (Zawislak et al., 2012). This involves the identification of the sources of assets and complementary channels necessary to bring technological development to the market (Teece, 1986), the utilisation of market information, and the identification of methods to reduce transaction costs (Coase, 1937; Williamson, 1979).

Another central theme of this research is firm performance and its measurement. Among the tools employed to measure organisational performance, the Balanced Scorecard (BSC) is distinguished

as one of the most influential strategy implementation and control tools to assist in business management (Tawse & Tabesh, 2023). As illustrated in Figure 2, this tool is employed by numerous firms to translate the company's strategy into a cohesive set of performance indicators, utilising financial metrics of past performance with vectors that drive future performance through non-financial means (Kaplan & Norton, 1992). According to Kaplan and Norton (1997), business strategy can be translated into objectives and measures, organised into four perspectives that represent the organisational pillars, which are the financial, customer, internal processes, and learning and growth perspectives.

Figure 2: Firm Performance consider the Balanced Scorecard (BSC)



Source: Kaplan & Norton (2000)

From a financial perspective, performance measures indicate whether a firm's strategy, implementation, and execution are conducive to improving financial results (Kaplan & Norton, 1997; Atkinson et al., 2015; Tuan, 2020). Financial objectives are generally related to profitability and are measured, for example, by operating income, return on capital employed, or economic value added (Tuan, 2020).

The non-financial perspective is composed of three other perspectives (customer, internal processes and learning & growth). The customer perspective typically includes several basic or generic measures of the success of a well-formulated and well-implemented strategy, with key outcome measures including customer satisfaction, customer retention, and account (customer) shares in target segments. The vectors of essential results for customers are the critical factors for them to change or remain loyal to their suppliers (Kaplan & Norton, 1997; Atkinson et al., 2015; Tuan, 2020).

From the perspective of internal processes, the critical internal processes in which the firm must achieve excellence are identified. Achieving excellence in these domains enables the business unit to offer value propositions that attract and retain customers in target market segments, thereby satisfying shareholders' expectations of achieving optimal financial returns (Kaplan & Norton, 1997; Atkinson et al., 2015; Tuan, 2020).

Lastly, the learning and growth perspective identifies the infrastructure that the company must build to generate long-term growth and improvement. According to Atkinson et al. (2015), in this view, intangible assets such as human resources, information technology and organizational alignment are considered (Kaplan & Norton, 1997; Atkinson et al., 2015; Tuan, 2020).

2.1 Hypotheses

Lawson and Samson (2001) presented studies demonstrating that organisations that consciously and explicitly develop and invest in innovation capability, both individually and collectively, are more likely to achieve sustainable innovation results as a driver of their business performance.

Saunila and Ukko (2012) and Saunila, Pekkola, Ukko (2014) also present research that relates innovation capability and business performance. In a similar vein, Kafetzopoulos and Psomas (2015) developed a construct of innovation capabilities based on the OECD (2005), categorised into product, process, marketing and organisational innovation. They then investigated the relationship with three dimensions of business performance: product quality, organisational performance and financial performance. The results demonstrated that innovation capability directly contributes to product quality and operational performance, and that financial performance is influenced indirectly, with operational performance serving as a mediator between innovation capability and financial performance.

To analyse the relationship between technological capability and firm performance, Fitz-Oliveira and Tello-Gamarra (2024) developed a meta-analysis including 23 primary studies. Results demonstrated that technological capability and performance are positively related. In this study, it is possible to see that the performance variables used in the various articles are predominantly financial, with few non-financial indicators, demonstrating that previous studies that related innovation capability and performance did not bother to distinguish financial indicators from non-financial indicators.

Based on the studies presented, it was possible to identify that there are relationships between innovation capability and non-financial performance. However, it is not clear how these relationships affect the non-financial performance. In this way, it is possible to infer that the innovation capability, based on the Zawislak et. al (2012), leads to better non-financial performance. Therefore, the following hypothesis is presented:

H1: Innovation capability has a positive effect on the financial performance of manufacturing firms.

H2: Innovation capability has a positive effect on the non-financial performance of manufacturing firms.

Kaplan and Norton (2009) demonstrate, through the construction of a strategic map, that non-financial performance indicators from the learning and growth perspectives, internal processes and customers are the factors that drive performance from the financial perspective. In other research, Kafetzoupoulus and Psomas (2015) show that improving operational performance is positively related to financial performance. Glavan and Vuksic (2017) confirmed in their research that better non-financial performance leads to better financial performance. Akroushe Awwad (2018) also demonstrated positive effects between internal learning and marketing performance on financial performance.

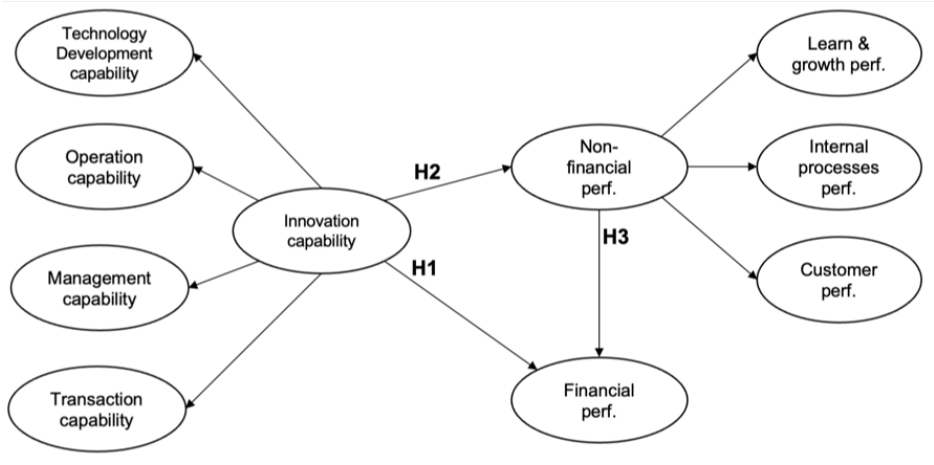
Based on the research presented and using the strategic map perspective, which uses the BSC method, where non-financial performance indicators lead to better financial performance, the following hypothesis is presented:

H3: The set of different types of non-financial performance (learning and growth, internal processes and customers) has a positive effect on the financial performance of manufacturing firms.

Figure 3 demonstrates the relationship proposed in this paper between innovation capability and the financial and non-financial performance. The model developed by Zawislak et al. (2012) was

used to identify the innovation capabilities. To analyse the organizational performance, BSC perspectives were used, according to the model proposed by Kaplan and Norton (1992).

Figure 3: Relationship between innovation capability and firm performance



3. Methodological Procedures

The survey was conducted among manufacturing firms in the state of Rio Grande do Sul, Brazil. The sample consisted of 166 manufacturing firms out of a total of 1,600. Small, medium and large companies were included. According to the classification of the National Confederation of Industries (CNI, 2021): small firms are those with between 20 and 249 employees (115 firms in the sample); medium firms have between 250 and 500 employees (36 firms in the sample); and large firms have more than 500 employees (15 firms in the sample). It is important to note that micro enterprises (less than 20 employees) were not included in the research. The focus of this research is the innovation capability, therefore, manufacturing firms with the greatest potential for innovation were selected. In this way, we considered firms that have medium-low, medium-high and high technological intensity, according to the OECD (2005) classification, not including the low technological intensity manufacturing companies in this study.

Manufacturing companies in the state of Rio Grande do Sul (RS), considering the levels of technology described previously, are divided into different segments, which are: electronics, pharmaceutical, automotive, chemicals, diverse, electric, machines and equipment, transport equipment, machine maintenance, metallurgy, non-metallic, plastic and rubber.

Table 1 shows the industrial segments that are part of the sample. It is important to highlight that the proportion that each segment represents in the RS manufacturing industry was observed, enabling a more assertive analysis, reducing the bias in relation to any segment that could influence the results. This means that the percentage that each industrial segment represents in relation to the total number of companies was maintained in the sample.

Table 1: Classification of manufacturing industries according to the level of technological intensity

Segment	Level of technological intensity	% RS Companies	Nº Surveyed companies	% Surveyed companies
Electronics	High	6,3%	13	7,8%
Pharmaceutical	High	1,3%	2	1,2%
Automotive	Medium-high	10,1%	16	9,6%
Chemicals	Medium-high	8,8%	14	8,4%
Diverse	Medium-high	6,3%	9	5,4%
Electric	Medium-high	3,8%	6	3,6%
Machines and equipment	Medium-high	27,0%	46	27,7%
Transport Equipment	Medium-high	0,6%	1	0,6%
Machine maintenance	Medium-low	1,9%	3	1,8%
Metallurgy	Medium-low	5,0%	8	4,8%
Non-metallic	Medium-low	8,8%	14	8,4%
Plastic and rubber	Medium-low	20,1%	34	20,5%
Total		100%	166	100%

The questionnaire was designed based on the literature review and in validated constructs, as shown in Table 2. To measure innovation capability, the construct validated by Alves et al. (2017) and Ruffoni et al. (2018), which is based on the Zawislak et al. (2012) model, was used. To measure organisational performance, the construct validated by Author Webber et al. (2018), which is based on the Balanced Scorecard model by Kaplan and Norton (1992), was used.

Table 2: Innovation capability and firm performance variables

	Constructs	Variables	Authors
INNOVATION CAPABILITY	Technology Development capability	DC1. Ability to design its own products	Lall (1992); Bell and Pavitt (1995); Teece et al. (1997); Teece (2007); Alves et al. (2017).
		DC2. Ability to prototype of own products	
		DC3. Ability to launch its own products	
	Operation capability	OC1. Ability to establish production routines that to not generate rework	Teece et al. (1997); Teece (2007); Alves et al. (2017).
		OC2. Ability to manage the expansion of the installed capacity whenever necessary	
	Management capability	MC1. Use of internal standards and documents for work procedures	Penrose (1959); Chandler (1977); Zawislak et al. (2012, 2013); Teece et al. (1997); Teece (2007); Alves et al. (2017).
		MC2. Updated management tools and techniques	
		MC3. Use of modern financial management practices	
	Transaction capability	TC1. Ability to impose negotiating terms on its suppliers	Coase (1937); Williamson (1985); Zawislak et al. (2012, 2013); Teece et al. (1997); Teece (2007); Alves et al. (2017).
		TC2. Ability to impose its prices on the market	
		TC3. Ability to impose negotiating terms on its customers	

FIRM PERFORMANCE	Financial perspective	FP1. Growth in company's revenue over the last three years	Kaplan; Norton (1997); Saunila; Ukko (2012); Atkinson et al. (2015); Webber et al. (2018); Tuan (2020), Tang, Wang e Li (2023)
		FP2. Growth in net profits over the last three years	
		FP3. Increase in profitability over the last three years	
	Customer perspective	CP1. Customer satisfaction has increased over the last three years	Kaplan; Norton (1997); Saunila; Ukko (2012); Atkinson et al. (2015); Webber et al. (2018); Tuan (2020), Tang, Wang e Li (2023)
		CP2. The number of customers has increased in the last three years (market share)	
		CP3. Sales volume per customer has increased in the last three years (increase in average customer ticket)	
	Internal processes perspective	PP1. Company has been more effective in solving problems in recent years.	Kaplan; Norton (1997); Saunila; Ukko (2012); Atkinson et al. (2015); Webber et al. (2018); Tuan (2020), Tang, Wang e Li (2023)
		PP2. Company has flexibility in the decision-making process over the last three years	
	Learning & growth perspective	LG1. Company uses management tools to monitor the level of employee satisfaction.	Kaplan; Norton (1997); Saunila; Ukko (2012); Atkinson et al. (2015); Webber et al. (2018); Tuan (2020), Tang, Wang e Li (2023)
		LG2. Employee satisfaction has increased over the last three years	
		LG3.Company has carried out more training to improve the qualifications of employees in recent years	

The data were analysed using Structural Equation Modelling (SEM), where the innovation capability constructs are: technological development, operational, transactional and management. The performance constructs are the perspectives: financial, customer, internal processes and learning and growth.

The observed variables that make up the latent variables are ordinal, as they were collected using a Likert scale. Therefore, the robust DWLS (Diagonally Weighted Least Squares) estimates were used, as they provide more accurate factor loading estimates than maximum likelihood estimation (Li, 2016; DiStefano et al., 2019; Xia & Yang, 2019; Shi & Maydeu-Olivares, 2020).

The reliability of the scales was tested using Cronbach's alpha. In this study, 0.6 was the minimum acceptable level (Hair et al., 2009). To test convergent validity, we used the proposal of Fornell and Larcker (1981), which indicates convergent validity when the Average Variance Extracted – AVE is greater 0.40. The average variance indices extracted from the 8 constructs (Technology Development, Operational, Transactional, Management, Financial, Customer, Process and Learning & Growth) were above 0.40, which is acceptable for this research, as shown in Table 3.

Table 3: Cronbach's Alpha and AVE of the constructs

Factors	AVE	Cronbach's α
Development capability	0.43	0.70
Operation capability	0.43	0.60
Management capability	0.51	0.74
Transaction capability	0.59	0.77
Financial performance	0.70	0.85
Customers performance	0.41	0.66
Internal processes performance	0.49	0.66
Learn & growth performance	0.44	0.70

In order to test the hypotheses, three structural equation models were developed with the aim of demonstrating the relationships and thus responding to each of the hypotheses presented. The models developed are second-order structural equations. In these models, innovation capability is explained by the following latent variables: technology development capability, operational capability, transaction capability and management capability. On the other hand, non-financial performance is explained by the following latent variables: learning and growth, internal processes and customer performance.

To test the fit of the structural model, the Chi-square test was used, which is calculated by dividing the Chi-square by the degrees of freedom, knowing that it must be less than 3.00 to be considered satisfactory (Brown, 2015).

The GFI (Goodness-of-fit Index) was also used as an adjustment indicator, with values greater than 0.90 being desirable (Hair et al., 2009). Another indicator of fit was the RMSEA (Root Mean Square Error of Approximation), which, according to Hair, should be less than 0.08 with a 90% confidence interval, with lower and upper limits of less than 0.10.

The comparative indices, CFI (Comparative Fit Index) and TLI (Tucker-Lewis Index), were also used to check the quality of the model. These indices seek to compare the proposed model with a null model, where the reference value is greater than 0.90. Table 4 shows the fit indices of 3 structural equation models, showing that all fit indices are satisfactory.

Table 4: Structural equation models fit indexes

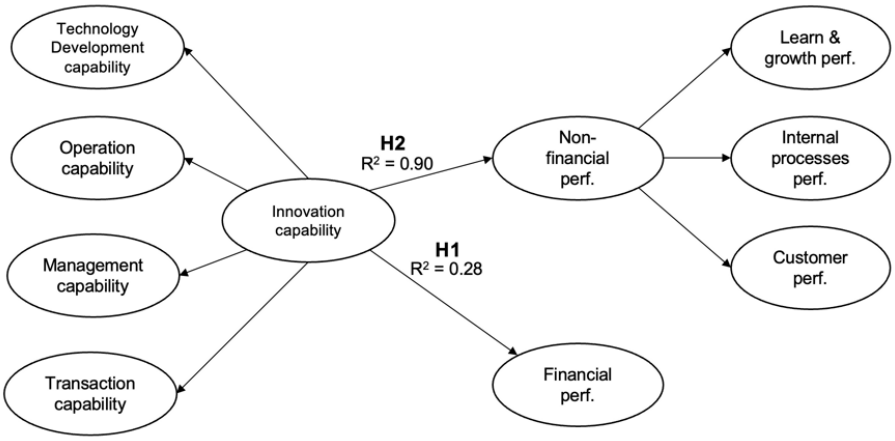
Index	Model 1	Model 2	Model 3
Chi-square / df	1.302	1.389	1.312
Goodness of fit index (GFI)	0.998	0.998	0.998
Comparative Fit Index (CFI)	0.957	0.967	0.965
Tucker-Lewis Index (TLI)	0.950	0.961	0.960
Root mean square error of approximation (RMSEA)	0.049	0.043	0.043
RMSEA 90% CI lower bound	0.034	0.026	0.027
RMSEA 90% CI upper bound	0.062	0.057	0.057

The SPSS and JASP software programs were used as tools to perform the analyses presented. After these analyses, it was possible to determine the relationships between the constructs, making it possible to test the hypotheses presented. These results were used to support or refute the hypotheses presented. The relationships that were tested in the model are presented in the following section.

4. Results

In order to answer the first hypothesis 'innovation capability has a positive effect on financial performance of manufacturing firms' and the second hypothesis 'innovation capability has a positive effect on non-financial performance of manufacturing firms', Model 1 was developed, in which the latent variable 'innovation capability' was related to the latent variables 'financial performance' and 'non-financial performance', as shown in Figure 4.

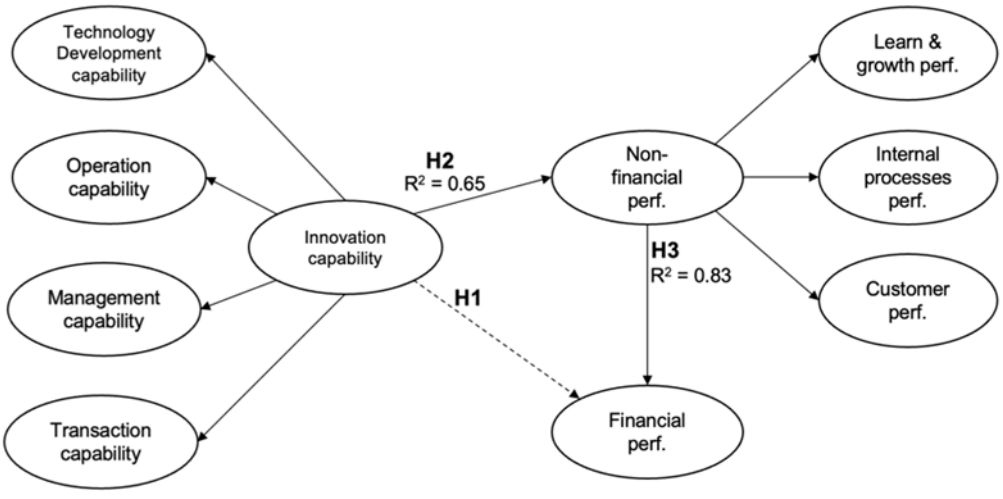
Figure 4: Structural equation model 1 - Innovation capability and financial and non-financial performance



The results showed a positive effect between innovation capability and financial performance (R2 = 0.28 P < 0.001) and non-financial performance (R2 = 0.90 P < 0.001), confirming hypotheses H1 and H2. These results clearly show a greater effect on non-financial performance than on financial performance, highlighting the importance of measuring financial and non-financial performance separately.

Hypothesis H3 "The set of different types of non-financial performance (learning and growth, internal processes and customers) has a positive effect on the financial performance of manufacturing firms" could be demonstrated to link non-financial performance to financial performance, as shown in Figure 5.

Figure 5: Structural equation model 2 - Innovation capability and financial and non-financial performance

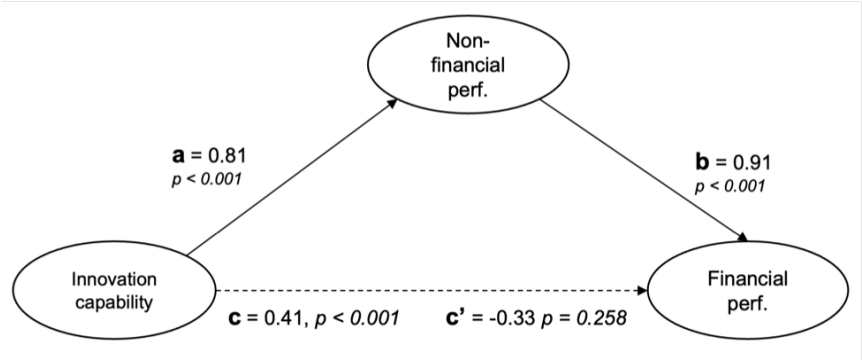


The relationship between the latent variables non-financial performance and financial performance shows that there is a positive effect where non-financial performance explains 83% of the financial performance (p < 0.001), demonstrating a strong effect between these variables, confirming hypothesis H3.

However, the effect between innovation capability and financial performance became null in model 2. These results demonstrated that non-financial performance mediate totally the effect between

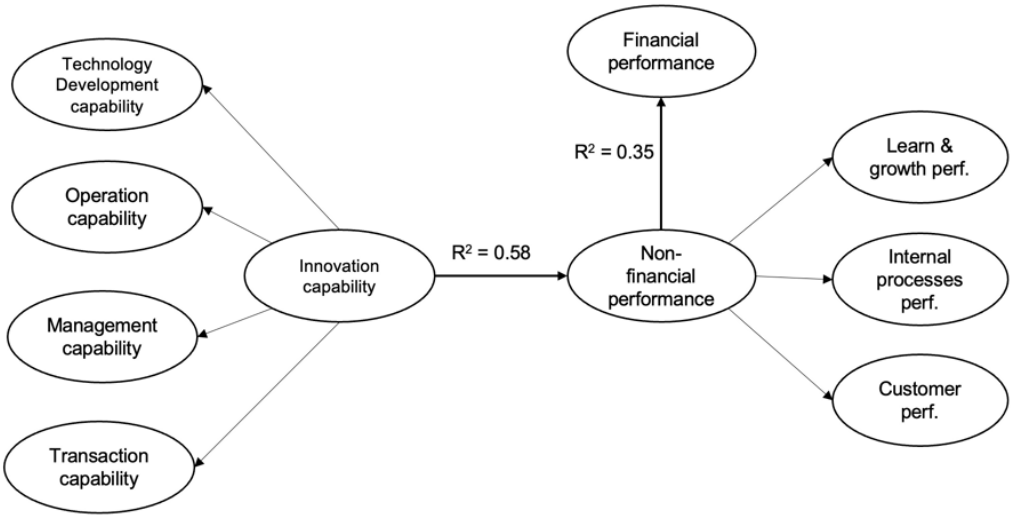
innovation capability and financial performance, as shown in Figure 6. The total effect of innovation capability (c= 0.41; p < 0.001) became null when mediated by non-financial performance (c'= -0.33; p = 0.26), which presented an indirect effect of 0.73 (p < 0.001).

Figure 6: Mediating effect of non-financial performance



These results lead to Structural Equation Model 3, which shows the effect of innovation capability on non-financial performance and the effect of non-financial performance on financial performance. In this model, innovation capability is not related to financial performance, as shown in Figure 7.

Figure 7: Model 3 Relationship between innovation capability and firm performance.



Based on the results presented, structural model 3 better explains the relationship between innovation capability and financial and non-financial performance. The model shows that innovation capability has a strong positive effect on non-financial performance (R2 = 0.58 P < 0.001) and non-financial performance has a positive effect on financial performance (R2 = 0.35 P < 0.001). Therefore, non-financial performance is a key factor in increasing financial performance.

5. Main Findings

The first contribution of this study lies in the utilisation of non-financial performance indicators to enhance the comprehension of the impact of innovation capability on firm performance. Previous studies, including those by Alves et al. (2017), Ruffoni et al. (2018), Oliveira et al. (2019), and Leo et

al. (2022), have demonstrated these relationships; however, they have done so without considering financial and non-financial indicators separately. The findings of this research demonstrate that innovation capability exerts a more pronounced influence on non-financial performance and exhibits a null effect on financial performance when non-financial performance is present.

The use of non-financial performance indicators has broadened the scope of the discourse as it goes beyond the findings of studies such as those by Lawson and Samson (2001), Saunila and Ukko (2012), Zawislak et al. (2012), Kafetzopoulos and Psomas (2015), Alves et al. (2017) and Leo et al. (2022). The relevance of non-financial performance measures is evidenced by their ability to elucidate relationships that are not apparent in financial statements (MILOST, 2013). Furthermore, it has been demonstrated that non-financial performance is conducive to enhanced financial performance, a finding that is consistent with the conclusions of studies such as those by Glavan and Vuksic (2017) and Akroushe Awwad (2018), which have previously established such a relationship. However, this research goes further by relating the variables of innovation capability and non-financial performance to financial performance, thereby strengthening the evidence that non-financial indicators drive financial indicators.

This research can also contribute to the development of industrial innovation, considering the context of Brazilian companies. Gallon et al. (2010) studied the effect of innovation on the economic and financial performance of micro and small companies in Santa Catarina (Brazil), which were financed by the 'Financiadora de Estudos e Projetos' (Finep), which aims to support innovative projects. The research demonstrated that the performance of financial indexes improved after the financing of innovation by Finep. Braga et al. (2014) and Parente et al. (2014) also analyzed the impact of Finep incentives on the economic and financial performance of firms, finding that more innovative companies presented better results.

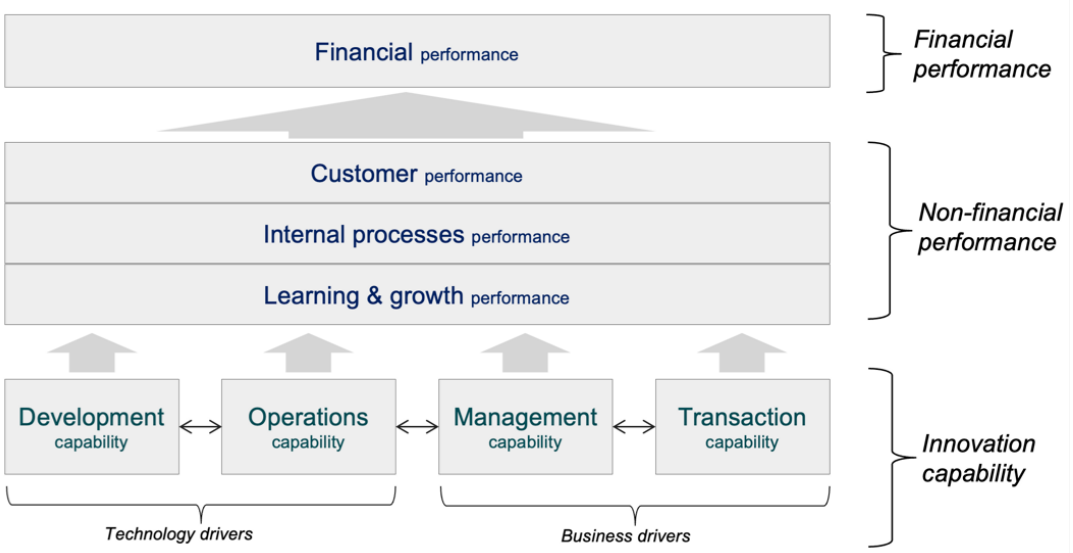
Other studies, such as the one carried out by Silva & Santana (2022), analysed the economic and financial performance of firms in the Brazilian manufacturing industry, based on the strategy of protecting their intellectual property and showed a positive effect of patents on market performance, which is related to the investor's positive expectation about the firm's application in technology, innovation and intellectual property. The use of non-financial performance indicators can broaden the understanding of the effects of innovation on the performance of Brazilian industries, providing opportunities for improvement and development of the sector.

It is worth reflecting on the use of non-financial indicators in future research on innovation, such as the Innovation Survey - PINTEC (IBGE, 2020), which aims to construct sectoral, national and regional indicators of innovation activities. The results of this research can contribute to the incorporation of other indicators into innovation research, such as innovation capability and non-financial performance indicators, to improve the understanding of these factors related to innovation.

The second contribution is constituted by the framework, which demonstrates more specifically and directly how innovation capability leads to superior firm performance, thereby providing a strategic view of innovation capability. It can also be used to assist managers of organisations seeking to develop innovation capabilities and achieve better organisational performance, making it an easy-to-implement performance measurement tool of great strategic importance for improving the competitiveness and results of innovative firms.

Figure 8 presents a framework that brings together the dimensions of innovation capability and performance perspectives. This framework can be used by researchers and managers as a tool for measuring, evaluating, drawing conclusions and making decisions about innovation capability and firm performance.

Figure 8: Framework of the interplay between innovation capability and firm performance



The results presented show that the relationships between innovation capability and performance can occur in a variety of ways. This study proposed to demonstrate the relationship between innovation capability and the financial and non-financial performance of firms, and although the hypotheses presented were confirmed, it cannot be said that each innovation capability (developmental, operational, managerial and transactional) affects only one performance perspective, as there are many other variables that can influence these relationships. Notwithstanding this limitation, the present research has demonstrated a methodology that facilitates the analysis of the relationships between innovation capability and performance, with a view to improving their accuracy.

Advances in understanding the relationship between innovation capability and performance have the potential to help manufacturing firms improve their performance by increasing their innovation capability. The conceptualisation of innovation capability as a strategic factor for improving performance has the potential to revitalise the manufacturing industry in the southern region of Brazil, especially in light of the deindustrialisation process that this sector has undergone in recent years (Lisbinski et al., 2021; Coronel et al., 2022).

6. Conclusion

The purpose of this paper is to demonstrate the relationship between innovation capability and firms' financial and non-financial performance. The importance of using non-financial performance indicators is highlighted and the results show that innovation capability is positively associated with non-financial performance. Thus, it is argued that the results presented provide a nuanced understanding of these relationships, thereby advancing the theory of innovation capability by showing new ways of measuring performance. In a context of

The model developed was based on the innovation capability model developed by Zawislak et al. (2012) and the balanced scorecard (Kaplan; Norton, 1992) used to measure performance. The results showed a positive relationship between innovation capability and performance, including non-financial performance indicators, which represents an advance in the discussion of innovation capability. It was evident that the use of non-financial indicators is very important to measure the impact of innovation capability in a more assertive way. The model presented may prove useful as an easy-to-implement performance measurement tool for managers of organisations seeking to develop innovation capability and achieve better organisational performance. This tool has strategic potential in terms of enhancing the competitiveness and results of innovative firms.

Considering these results, in a regional context (RS) in which industrial activity needs to be expanded and strengthened in terms of competitiveness, this study contributes by explaining that for the industrial firms investigated in this region, there is a positive relationship between innovation capability and performance. Therefore, investing in the development of firms´ innovation capability (considering the four dimensions analyzed in the study) is a fruitful way of contributing to the necessary industrial development.

Despite the contributions of this paper, it is important to acknowledge its limitations. Firstly, the sample used is modest in size and comes from a specific geographical context. Therefore, future studies should consider applying the model on a larger scale and testing it in different contexts. Other contexts could include other regions within Brazil or other geographical contexts. Second, the exclusive focus of the study on innovation capabilities may have influenced the results, given the selection of medium, medium-high and highly innovative manufacturing firms as the sample. Thirdly, the halo effect, where the responses on innovation capability and performance were provided by the same person from each company, could be a potential limitation. To mitigate this effect, future studies could consider collecting data from different respondents to provide innovation and performance data.

In addition, extending the scope to a wider range of industries, including those with lower levels of innovation, could provide a more comprehensive understanding of the relationships under investigation. Finally, given the observed growth of the service sector, future studies would benefit from examining the relationships identified in this study in the context of the service sector.

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