Developing organizational resilience from business process management maturity

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Abstract

Purpose – In the current business context, there is a current need to adopt contemporary practices of process management as a competitive advantage to leverage organizational results. This study aims to explore such relationships, considering the performance results in the organizational resilience (OR) dimension.

Design/methodology/approach – The authors collected 82 valid responses from a survey targeted at professionals occupying positions or functions in the operations area. For data analysis, the authors used the technique of structural equation modeling (SEM) using the partial least squares (PLS) algorithm.

Findings – The results show that maturity in the management of business processes positively influences the behavior of OR, with the highest level of maturity primarily being responsible for this impact. This result reveals that resilience naturally depends on mature and well-established processes in the organizational structure. The proposed model explained 78.5% of OR.

Practical implications – Companies that maintain mature management of their business processes will be better able to positively influence OR since process management can make organizations less fragile supply chains and more adaptable to changes.

Originality/value – The findings helped clarify the extent to which process management influences the results of OR. Although the literature indicates that maturity in business processes is formed by five first-order constructs, only the "innovated" dimension proved to be significant in the present study.

Keywords Processes management, Process maturity, Organizational resilience, Performance, Structural equations

Paper type Research paper

1. Introduction

The business environment has undergone radical changes over the past three decades. A series of technological advances and innovations drive these changes and bring several strategic and operational challenges to modern organizations in both the public and private sectors (Hennelly, Srai, Graham, & Wamba, 2019; Queiroz, Fosso Wamba, De Bourmont, & Telles, 2021; Rowlands & Milligan, 2021).

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One of today's most prominent challenges involves designing processes and improving procedures for management planning and decision-making. This can provide a superior competitive advantage by improving operational efficiency, promoting innovation and creating added value for all companies and stakeholders (inside and outside an organization) (Forliano, De Bernardi, Bertello, & Temperini, 2020; Ongena & Ravesteyn, 2020). In this context, business process management "BPM" emerges as a powerful alternative to support the decision-making process and generate superior performance results. BPM is a strong alternative since the benefits deriving from its practice are evident in different business contexts, proving to be fundamental for the organization to obtain a competitive advantage in its markets (Baiyere, Salmela, & Tapanainen, 2020; Battisti, Shams, Sakka, & Miglietta, 2020; Bogodistov, Moormann, Sibbel, Krupskyi, & Hromtseva, 2022; Fosso Wamba & Mishra, 2017; Lizano-Mora, Palos-Sanchez, & Aguayo-Camacho, 2021; Saravia-Vergara, Sanchís-Pedregosa, & Albort-Morant, 2020; Silva, Longaray, Munhoz, & Castelli, 2019).

Different possibilities of understanding this dimension are identified in the organizational horizon when talking about performance results. In this study, the performance dimension to be evaluated refers to organizational resilience (OR), which has been widely discussed in academic research and the popular press (Alkhudary, Queiroz, & Féniès, 2022; Alvarenga, Oliveira, Filho, Desouza, & Ceryno, 2022; Linnenluecke, 2017; Nascimento, Oliveira, Pettit, & Bronzo, 2021; Pettit, Croxton, & Fiksel, 2019; Queiroz, Fosso Wamba, Chiappetta Jabbour, & Machado, 2022; Wieland & Durach, 2021). Thus, when considering that maturity in process management has conditions to positively influence performance and its subsequent results, it is understood that it is possibly previously related to OR. This assertion is supported by numerous studies that demonstrated a positive association between maturity in process management and some aspects of organizational performance. Examples include Lockamy III and McCormack (2004), Hammer (2007), Oliveira (2009), Dijkman, Lammers, & Jong (2015), Ongena and Ravesteyn (2020), Bogodistov *et al.* (2022) and many others.

Analyzing this relationship in the business environment proves to be relevant, given that the development of more resilient processes mitigates the effects that unexpected events and disruption situations generate in operations, as they can result in negative consequences for the organization (Altay, Gunasekaran, Dubey, & Childe, 2018; Alvarenga *et al.*, 2022; Ambulkar, Blackhurst, & Grawe, 2015; Pettit *et al.*, 2019; Ponomarov & Holcomb, 2009).

When considering the current global situation affected by the recent COVID-19 pandemic (Craven, Mysore, Singhal, & Wilson, 2020; Hudecheck, Sirén, Grichnik, & Wincen, 2020), a study shows how corporations around the world can address moments of crises, disruptions and losses that can potentially directly influence their operations and organization. This study seems to receive relevant practical contours and implications, especially for the activity developed by managers in managing the business. Knowing the current stage and strengthening the maturity levels of the processes to face adverse situations can provide the identification of viable and effective ways to respond to the needs of the market and the demands of work, which are likely already emerging, due to the unfolding of the current pandemic (Kang & Stephens, 2022; Ketchen & Craighead, 2020; Purnomo, Adiguna, Widodo, Suyatna, & Nusantoro, 2021; Ruel & El Baz, 2023).

Thus, this argument inspired this research, and we present the following research problem: What is the impact exerted by business process management maturity (BPMM) on OR? Therefore, we establish the general objective to explore such relationships, considering the performance results in the OR dimension.

2. Development of hypothesis and research model

2.1 Business process management maturity (BPMM)

BPMM derives from the understanding that processes have life cycles or stages of development that can be clearly defined, managed, measured and controlled over time (Rosemann & Vom Brocke, 2010, Skrinjar & Trkman, 2013). In any business process, a higher level of maturity results in better control of results, more accurate forecasting of goals, costs and performance, and greater effectiveness in achieving defined goals (Hung, 2006; Lockamy III & McCormack, 2004; Oliveira *et al.*, 2012).

Maturity models continue to be developed and operate as a tool that allows organizations to classify their processes according to how they are structured, described, managed, evaluated and optimized (Bogodistov *et al.*, 2022; Dijkman *et al.*, 2015; Lockamy III & McCormack, 2004; Object Management Group, 2008; Oliveira, McCormack, & Trkman, 2012; Ongena & Ravesteyn, 2020; Saravia-Vergara *et al.*, 2020). Specifically, regarding the business process maturity model, developed by the Object Management Group (OMG) and applied in this study from the version adapted by Dijkman *et al.* (2015), we observed the institution of five distinct levels of maturity, used to theoretically understand the respective variable.

Management practices for Level 1 (initial) are non-existent, as business processes are performed inconsistently and sometimes *ad hoc*, with difficulty to predict results. Therefore, individual efforts are conducted without explicit processes or organizational support. At Level 2 (managed), management seeks to stabilize activities within work units to ensure they are performed in a repeatable manner, meeting the commitments of the primary work groups. However, units that perform similar tasks may use different procedures (Dijkman *et al.*, 2015).

At Level 3 (standardized), management practices refer to standardizing common processes based on best practices identified in working groups and providing adaptation guidelines to support different business needs. Standardized processes provide economies of scale and a basis for learning from common measurements and experiences. Level 4 (predictable) explores capabilities enabled by standardized processes and feeds back to work units. Process performance is managed statistically throughout the workflow to understand and control variation so that the results can be predicted from intermediate states. At Level 5 (innovated), there are management practices related to proactive and opportunistic improvement actions to seek innovations that can close the gaps between the organization's current capacity and the capacity needed to achieve its business objectives (Dijkman *et al.*, 2015).

The five levels illustrate how an organization can gradually improve its BPM capability, that is, its ability to make timely improvements in the management of its business processes. In this way, the five maturity levels guide an organization in evolving from ill-defined and inconsistent practices (level 1); going through repetitive practices at the unit level (level 2); then the processes become standards across the organization (level 3); later they become predictable and statistically managed (level 4) and finally, they begin to receive continuous innovation and optimization (level 5) (Dijkman *et al.*, 2015).

Therefore, the conceptual domain of the construct BPMM is defined as the degree of evolution of process management practices undertaken by companies when executing their operations. Such practices are allocated to maturity levels, which result in reporting on the organization's capabilities to manage its business processes (Bogodistov *et al.*, 2022; Dijkman *et al.*, 2015; Object Management Group, 2008; Ongena & Ravesteyn, 2020; Saravia-Vergara *et al.*, 2020; Sincorá, Dias, Louro, Amaral, & Alvarenga, 2019).

2.2 Organizational resilience (OR)

According to the literature, resilience is defined in terms of a set of capabilities, if developed by the organization, strengthens the organization (Alvarenga *et al.*, 2022;

Fiksel, Polyviou, Croxton, & Pettit, 2015; Nascimento *et al.*, 2021; Pettit, Croxton, & Fiksel, 2013, 2019; Wieland & Durach, 2021). Ambulkar *et al.* (2015) state that resilience is the company's ability to be alert, adapt and respond quickly to changes brought about by an interruption in its chain. Pettit, Fiksel and Croxton (2010, 2013) discuss the ability to survive, adapt and grow in the face of turbulent change. Wieland and Wallenburg (2013) conceptualize it as the ability to act before they become a definite necessity or to recover after experiencing a crisis, returning to an acceptable level of performance in a satisfactory time.

Per the definitions presented above, it appears that organizations with resilience capabilities are proactive and reactive as they anticipate and recover better in contexts of challenges and difficulties (Wieland & Wallenburg, 2013). However, Ponomarov and Holcomb (2009) emphasize that resilience is more than anticipation or recovery; it also requires a certain degree of flexibility and ability to adapt to the positive and negative influences of the environment. They state that resilience from an organizational perspective emphasizes important aspects such as adaptability, flexibility, maintenance and recovery. Corroborating Ponomarov and Holcomb (2009), Christopher (2005) notes that resilient processes are characteristically flexible and agile, as well as capable of rapid change. The dynamic nature of this adaptive capability allows both the supply chain and the organization to recover after being interrupted, returning to its original state, or reaching a more desirable (i.e. better) state of its operations.

Complementarily, from conducting a broad systematic literature review, Linnenluecke (2017) apprehends that the term "resilience" has been used at the organizational level to describe the inherent characteristics of those corporations that can respond faster, recover faster, or develop more unusual ways of doing business under threat situations than others. According to the author, the concept most often refers to strength, perseverance and organizational recovery in the face of adversity.

Despite the scientific community stating that the theory about resilience is fully developed (Linnenluecke, 2017; Ponomarov & Holcomb, 2009; Wieland & Wallenburg, 2013), the topic has adopted an operational definition, as well as a set of characterizing elements to enable its measurement. Based on Pettit *et al.* (2013, 2010), the conceptual domain selected to delimit the OR construct consists of the ability to survive, adapt and grow in the face of turbulent change. Specifically, it refers to the capabilities to prepare for unexpected events (anticipation), respond to disturbances (adaptability) and recover from them (recovery), while maintaining control over structure and functions, and the continuity of operational processes at the desired level (Ponomarov & Holcomb, 2009). This is, therefore, the essence of resilience adopted in this study.

2.3 Theoretical relationship between BPMM and OR

To establish a relationship between BPMM and organizational performance, specifically, in the dimension of OR, we used the discussion of dynamic capabilities theory as a conceptual background. This component was necessary since, when formulating such a perspective, Teece, Pisano and Shuen (1997) argue that an organization's capabilities can be renewed and developed to achieve congruence with the changing environment. They state that this makes it possible to adapt, integrate and reconfigure resources, capabilities and organizational and functional competencies to respond to the challenges of the external environment (Teece, 2009, 2018). When addressed in contexts of reaction to adverse situations, these dynamic capabilities become essential for achieving good performance results in resilience. They enable organizations to respond to the challenges imposed by the environment through the reconfiguration of their resources, organizational practices, continuous improvement and the coordination of key activities to ensure sustained benefits (Škrinjar & Trkman, 2013; Trkman, 2010).

According to Vom Brocke, Schmiedel, Recker, & Trkman (2014), this becomes possible because BPM can provide a solid set of essential resources to master contemporary and future challenges in management, from the application and maintenance of guiding principles, e.g. training, involvement, purpose, technology appropriation, etc. which prove to be critical to further improve, shape and mature process management activities in the organizational structure. The possibility of providing essential resources to direct managerial actions and assertively reprogram how business processes are executed in the organization is identified, whether through ruptures or external events that create vulnerabilities and risks of interruptions, allowing the organization to generate competitive advantages and positive performance results in different dimensions (Vom Brocke *et al.*, 2014).

Additionally, organizations must also align their business processes to the complex, turbulent and uncertain environment, since BPM has as one of its premises, adaptability to the context (Vom Brocke, Zelt, & Schmiedel, 2016). Vom Brocke *et al.* (2016) argue that in turbulent contexts it is crucial to building additional capabilities and competencies, which include broader cooperation between organizational areas and stakeholder management. A focus on change and risk management, strengthening analytical capabilities and promoting innovation to address the extreme environment, builds more resilient companies (Alvarenga *et al.*, 2022; Belhadi, Mani, Kamble, Khan, & Verma, 2021; Kang & Stephens, 2022; Purnomo *et al.*, 2021; Ruel & El Baz, 2023). Corroborating this, Vom Brocke *et al.* (2014) argue that BPM should not only focus on building the capabilities currently needed to manage an organization, but also promote the building of dynamic capabilities needed to effectively respond to future contingencies and fight potential "fires" (Teece, 2009, 2018).

When considering that maturity in managing the organization's processes is also a distinctive feature (Vom Brocke *et al.*, 2014), it is assumed that when the processes are reconfigured based on managerial capabilities and work teams (through the involvement of people) (Hung, 2006), factoring in the business context and the related situational factors (Vom Brocke *et al.*, 2016), to help the organization address situations of turmoil and uncertainty, such a resource becomes rare, valuable and difficult to imitate. Therefore, the different levels of maturity in process management allow identifying potential problems and ways to satisfactorily conduct reconfigurations in the execution of processes to respond to the challenges imposed by the environment (Dijkman *et al.*, 2015) and, therefore, possibly, collaborate for better results in resilience.

Pettit *et al.* (2010, 2013), Fiksel *et al.* (2015) and Battisti *et al.* (2020) emphasize that within the scope of strategies to improve resilience, there is the prior adoption of certain measures and procedures, such as the focus on business process management. It is understood that organizations that practice process management culminate in managing the moments of instability without interrupting the operational processes and the supply of goods and services. The research recognizes that such an initiative promotes the development of resilience capabilities of an entire chain and an organization (Alkhudary *et al.*, 2022; Altay *et al.*, 2018; Fosso Wamba & Mishra, 2017). Therefore, from the respective theoretical chain, the theoretical proposition of the research is formulated:

H1. BPMM positively impacts OR.

2.4 Presentation of the theoretical model and operationalization of variables

The hypothetical model of the research contemplates the constructs related to the conceptual domains of BPMM and OR. Figure 1 illustrates that the conceptual model of this investigation presents the BPMM as a predictor variable for OR as a dependent variable.

Table 1 represents the general system of operationalization of the research model, demonstrating the items composing the first order constructs.

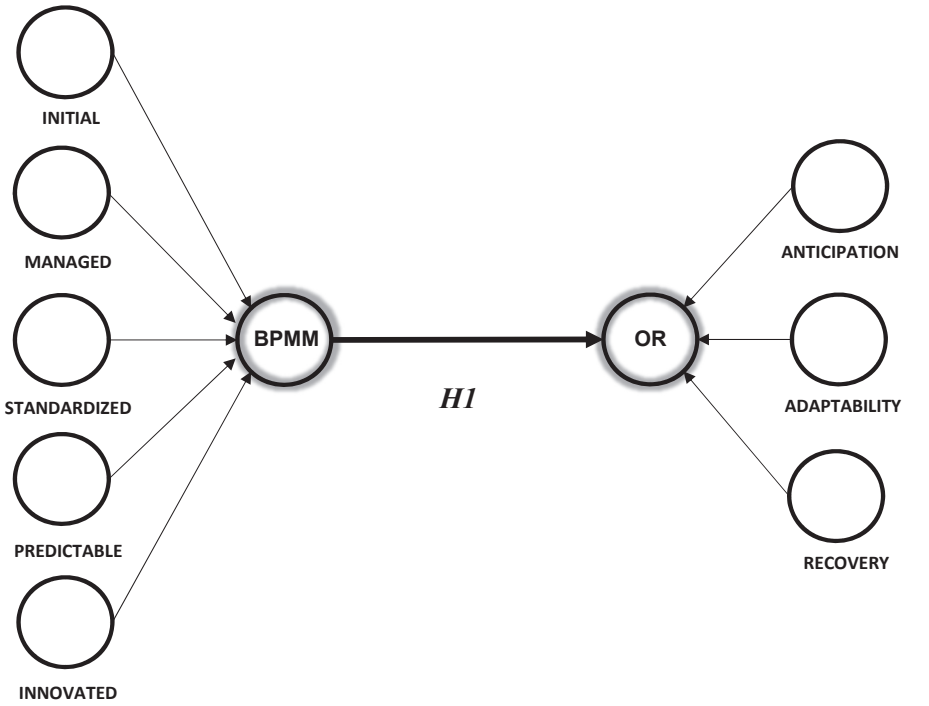

Figure 1.
Research model and hypothesis

Note(s): BPMM = Business Process Management Maturity; OR = Organizational Resilience
Source(s): Prepared by authors

3. Methodological aspects

To investigate the type of impact exerted by BPMM on OR, we conducted survey-type research and administered an online questionnaire utilizing the Google Docs platform. The survey was aimed at professionals who held positions and functions in the areas of operations (e.g. representatives of top management, managers/operational managers, responsible for production, quality, supplies, logistics, or marketing area).

The study sample consisted of professionals working in companies linked to Federation of Industries of the State of Espírito Santo (FINDES). We designed the questionnaire based on specific references, which served as a theoretical basis for formulating 34 statements – four for the characterization of the respondent/company and 30 for the investigated constructs. The questionnaire utilized a Likert-type scale from one to five categories – ranging from "totally disagree" to "totally agree". The process randomly applied questions on the form to minimize the possibility of bias.

The scale to assess BPMM was based on the work of Dijkman *et al.* (2015), published in the journal *Information Systems Frontiers*. Regarding the OR construct, its measurement was inspired by the work of Pettit *et al.* (2013), published in the *Journal of Business Logistics*.

After structuring the online questionnaire, a group of experts, composed of professors and doctors experienced in conducting and applying survey research, qualitatively evaluated the content of the 34 assertions. The validation by these academic experts contributed to the clarity, scope, acceptability, reliability, validity and operability of the questionnaire (Rea & Parker, 2000). This process eliminated redundancies, ambiguities and overlaps of content,

Formative constructs: 2nd order	Formative constructs: 1st order	Item summary	Author(S)
Business process management maturity (BPMM)	Initial: work runs inconsistently and ad-hoc	- non-formal procedures - non-compliance with procedures when defined - different ways of performing tasks	Dijkman *et al.* (2015), Object Management Group (2008)
	Managed: the processes, within the work units, are done in a repeatable way	- definition of methods and technologies - documentation of working methods - control of individual projects	
	Standardized: processes are standardized and resources are defined for the production of products and services	- standardized procedures - documented procedures and objectives - process definition	
	Predictable: work processes are managed quantitatively to establish predictable results	- performance management - process management - process correction	
	Innovated: the organization's processes are continually improved	- understanding of problems and critical areas - setting goals - constant use of new ideas and technologies	
Organizational resilience (OR)	Anticipation: ability to discern potential future events or situations	- identification of risks - monitoring of deviations - early recognition of disruptions - recognition of new opportunities	Pettit *et al.* (2013)
	Adaptability: ability to modify operations in response to challenges and opportunities	- process modification - process simulation - development of technologies - employment of continuous improvement	
	Recovery: ability to return to normal operating state quickly	- organization of response teams - communication of information - public relations management - mitigation of interruption effects	

Source(s): Prepared by the authors

Table 1.
General system of operationalization of the research model constructs

and reduced the variance bias common use of the research instrument. In a second phase, the development of the questionnaire involved a validation by market professionals, aiming to correct possible gaps in the understanding of the scale items, using an accessible and usual language for key respondents, in addition to the need to ensure the parsimony of the instrument to be applied.

To calculate the sample collected in the study, we adopted the criterion contained in Hair, Hult, Ringle and Sarstedt (2014, p. 20) for the use of the structural equation modeling (SEM) data analytical technique, based on the partial least squares (PLS) algorithm. Thus, the rules consisted of the following conditions: (1) the sample value must be 10 times ≥ the number of indicators of the construct that has the largest number of formative indicators of the measurement model; or (2) the value of the sample must be 10 times ≥ the number of the greatest number of paths directed to a given construct of the structural model. This criterion identified a minimum sample size of 50 respondents. After performing a preliminary analysis to identify and address potential problems with the data collected, the final sample consisted of 82 valid cases.

Finally, to analyze the collected data we first used SPSS Statistics 21 to provide the opportunity for data normality tests and the outlier test. Subsequently, using the Smart PLS-SEM 3.0 software, we utilized the SEM technique (Ringle, Wende, & Becker, 2014), which is based on the PLS algorithm. This test performed a test routine (Table 2) to verify the validity and reliability of the scale measures and attest to the robustness of the theoretical model built to understand the phenomenon studied.

4. Results presentation and discussion

4.1 Sample characteristics

More than half (58%) of the research participants belonged to strategic positions (functions of president, director and manager). When analyzing the sector of activity, we observed that 65.85% of the cases in the sample came from the service sector, followed by companies in the commercial (17%) and industrial (17%) areas. Regarding the time of existence of the companies, 56.10% had more than 20 years of existence in the market, followed by companies between five and 10 years of existence (14.60%). Regarding size, 44% of the companies were small, followed by medium-sized companies (24%) and the minority, represented by 4%, by large companies.

Validation stages tests	Procedures reference	Parameters
Evaluation of the Formative Measurement Model (relationship among constructs and their indicators)	Multicollinearity	• TOL >0.20 • VIF <5
	Significance and Relevance	• Outer Weight: $\leq 1/\sqrt{N}$ e • Outer Loading: ≥0.5 • Hypothesis test(indicators): p-value ≤0.05
Structural Model Assessment (direct and indirect relationships among model constructs)	Multicollinearity	• TOL >0.20 • VIF <5
	Significance and Relevance	• Teste de Hipóteses (construtos): p-value ≤0.05
	Variance Determination Coefficient (R^2)	• R^2: 0.75 (substantial) 0.50 (moderate) 0.25 (weak)

Source(s): Prepared by the authors based on Hair *et al.* (2014)

Table 2.
Data analysis procedure via Smart PLS-SEM

4.2 Analysis of the proposed model

When evaluating the proposed model (as explained in Table 2), at the level of indicators, evidence pointed out that the indicator q8 (referring to the first-order construct "Standardized") had to be removed from the measurement model. We had to remove q8 since it showed a high correlation with the other indicators of the same construct (q7 and q9), that is, multicollinearity problems. Indicator q8 stated that the company had well-documented work procedures and objectives throughout the organization.

It is assumed that the investigated companies did not habitually document information regarding the processes the company performed; or that the content of the other two indicators (q7 – your company has standardized procedures for the entire organization, and q9 – your company defines the same processes for different work groups) was very similar to the one presented multicollinearity problems. Therefore, after eliminating q8, we implanted new tests and the results show that all the relationships between the indicators and their respective constructs were considered valid within the statistical criteria of validity and quality.

With the formative measurement models duly validated, the next step consisted of transforming the first-order constructs related to the endogenous (second-order) construct OR into measurable variables, using the Two-Stages approach (Hair *et al.*, 2014, pp. 229–234). The explanation for the development of such a procedure is mainly due to the first-order constructs: anticipation, adaptability and recovery, which form the OR construct, canceling the effect/impact that the second-order construct (predecessor) BPMM causes in the OR itself, as almost all of its variance is explained by its first-order components (Sarstedt, Hair, Cheah, Becker, & Ringle, 2019). For further details see Ringle, Sarstedt and Straub (2012, p. S8).

Similar to the multicollinearity test performed in the validation stage of the measurement model, the multicollinearity assessment for the structural model did not indicate the existence of a high correlation between the constructs that comprise the research model (TOL >0.20 and VIF < 5) (Hair *et al.*, 2014), indicating a good fit rate of the model.

As for the *t*-distribution significance test, with 81 degrees of freedom and a 5% level of significance through data extracted from Bootstrapping, it showed that hypothesis H1: BPMM positively impacts OR and is considered valid and statistically significant to the structural model, as it rejects the null hypothesis (H0), referring to the non-positive impact of BPMM in OR, as can be seen in Table 3.

Additional analyses of the significance and relevance tests of the first-order constructs concluded that only the highest level of maturity, that is, the innovated, presented a statistically significant and relevant path coefficient (0.659) (*p*-value 0.000) in relation to the BPMM construct. This result indicates that it is the only level that indirectly contributes to impacting and explaining the variation in the endogenous construct OR. Figure 2 presents the final model, post-validation.

Path coefficient direction			Path coefficient value	*p*-value*
Initial	→	BPMM	0.115	0.336
Managed	→	BPMM	0.176	0.243
Standardized	→	BPMM	−0.017	0.912
Predictable	→	BPMM	0.120	0.474
Innovated	→	BPMM	0.659	0.000
BPMM	→	OR	0.886	0.000

Note(s): *Significance of the path coefficients of the 1st and 2nd order constructs, *p*-value <0.05, when submitted to the *t*-test with the Bootstrapping technique, from 5,000 subsamples
Source(s): Prepared by the authors based on research data

Table 3. Total effects of the structural equation - path coefficients

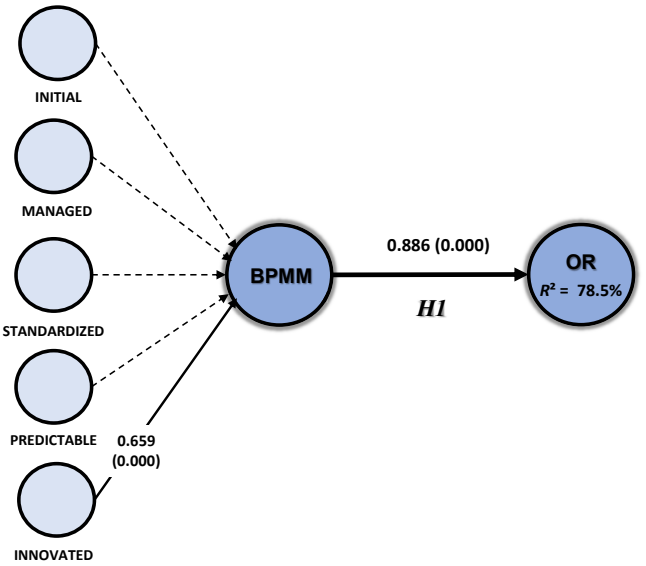

Figure 2.
Final research model

Note(s): The dashed lines represent that the constructs were not significant to form the second-order construct BPMM
Source(s): Prepared by authors

Finally, the variance determination coefficient (R^2) verified that 78.5% of the variation caused in the OR behavior is explained by the variation that occurs in the BPMM predictor variable. This coefficient is a measure of predictive accuracy and robustness of the model, and the closer the R^2 value is to 1, the greater the predictive precision of the exogenous construct – in this case, BPMM – to explain the variation in the behavior of the endogenous construct in question – that is, of OR (Hair *et al.*, 2014, pp. 174–175).

4.3 Managerial and theoretical implications

The results obtained with the research and the theoretical hypothesis (H1) that had been confirmed, infer that a company that maintains the management of its processes characteristically aligned to the "Innovated" level seeks to continuously improve its processes using the understanding of critical business issues and areas, using feedback from performance measures and constantly new ideas and new technologies to improve processes (Baiyere *et al.*, 2020; Battisti *et al.*, 2020; Fosso Wamba & Mishra, 2017; Hennelly *et al.*, 2019; Queiroz *et al.*, 2021).

These data reveal the business structure's need to guarantee and maintain guiding principles for good management of business processes, as recommended by Vom Brocke *et al.* (2014). Guiding principles support organizations to develop capabilities and resources to mature their processes and influence other organizational variables, such as resilience, which has been shown to depend on mature and well-established processes. The highest level of maturity represents, among other things, the continuous improvement of processes, which relates to anticipation, adaptation and recovery from disruptive events (Pettit *et al.*, 2019). Therefore, when they experience a disturbing event or have their operations interrupted, they are better able to return to their original state or even reach a more desirable state in their operations (Alvarenga *et al.*, 2022; Nascimento *et al.*, 2021; Queiroz *et al.*, 2022).

If a manager intends to improve the level of management of his business processes, he must make efforts to mature his processes toward more innovative management practices. This would create business processes that are more flexible and continuously improving as the continuous reformulation of outdated routines and procedures unfolds in activities being performed more quickly and efficiently (Bogodistov *et al.*, 2022; Dijkman *et al.*, 2015; Forliano *et al.*, 2020; Ongena & Ravesteyn, 2020; Saravia-Vergara *et al.*, 2020; Silva *et al.*, 2019). BPMM can act as a medium and long-term performance booster, helping companies design and develop new capabilities in processes and improving, over time, competencies and competitiveness standards. This fundamentally demonstrates that the BPMM construct works as an important foundation to explain the level of resilience in organizations.

Therefore, by reviewing the literature, we can identify practical evidence in corporations around the globe, which support part of the implications presented in this study. For example, a study by Kähkönen, Evangelista, Hallikas, Immonen and Lintukangas (2023), in the medical device industry in Italy and Finland, in 2020, revealed that the organizational capacity to dynamically reconfigure the resource base, helped these companies face the pandemic, and such reconfiguration capacity had a strong influence on resilience. Thus, the impacts of Covid-19 on the downstream supply chain have led companies to realign resources to better respond to demand. Conversely, upstream interruptions led companies to react to threats and opportunities in the supply market; while downstream interruptions leveraged reconfiguration resources (Kähkönen *et al.*, 2023).

The current world situation affected by the recent coronavirus pandemic (Craven *et al.*, 2020; Hudecheck *et al.*, 2020) and armed conflicts between nations that are leaders in the supply of important inputs and raw materials worldwide (Simpson, 2022) show how corporations around the globe can deal with moments of crisis, ruptures and losses. These challenges could potentially directly influence their operations and organizational results. As a response, managers need to develop relevant practices in the management of the companies, justifying in part, the investigation carried out here.

5. Final considerations

The results of this research present pivotal findings from the managerial and academic perspectives, revealing that the management of business processes acts as a critical and predictive element to determine the variation of OR. When seeking an answer to the central problem of this study about the impact exerted by BPMM on OR, the answer obtained (meeting the general objective) is that the impact of this relationship is positive, significant and substantial (i.e. high). It is concluded that companies that have an orientation aimed at managing their processes, that is, structuring, describing, documenting, measuring, controlling and optimizing the different business activities, will be better able to go through situations of vulnerability without succumbing to their markets.

Regarding the managerial scope, the investigation showed that a company interested in becoming resilient will need to develop its business routine. This needs to be done with the support of process management and information technology, certain capabilities in resilience, above all, those which refer to the capabilities to prepare for unexpected events (anticipation), respond to disruptions (adaptability) and recover from them (recovery), maintaining control over structure and functions, and continuity of operations. The effort of this research also allowed managers to understand the relevance of maturing business processes in the organizational structure, given their positive and significant impact to explain variations in the resilience dimension.

Regarding theoretical contributions, we observed that although resilience is an increasingly common theme in academic research, business practice, public policies and the popular press, its conceptualization and operationalization have been quite varied among

the studies published in the area. This work offered a theoretical and operational definition to the research field, allowing deeper discussions from an organizational analysis lens. Regarding the maturity in process management, the literature clarified, theoretically, through the conceptual approach of dynamic capabilities, how the BPMM translates into the organizational structure, as a distinctive and dynamic resource of the company (through the different stages of maturity in processes). Therefore, this research investigation introduced the definitions of constructs, measures and research proposition, as a consistent step to benefit the operations management and supply chain literature to guide future work and research projects.

As for the identified limitations identified, we observed that, as it is essentially quantitative research, the study presented restrictions regarding a qualitative analysis of the variables studied. If this type of analysis had been possible, more explanatory and detailed results could have been obtained. Although this is a recognized restriction, the proposal to perform an essentially quantitative study was met within the statistical and methodological criteria.

Depending on the results obtained from the research and the limitations identified, it was necessary to suggest future works. It is possible to examine the extent to which the practice of data and information analysis in the organization (business analytics) allows to positively mediate or moderate the relationship between the management of business processes and OR (Battisti *et al.*, 2020; Fosso Wamba & Mishra, 2017; Sincorá, Carneiro, & Oliveira, 2020). Furthermore, it is suggested the dissemination of works interested in investigating risk management and the promotion of resilience in operations, both at the organizational level and in the supply chain perspective, contribute to closing gaps in the research field (Trkman, Oliveira, & McCormack, 2016). Finally, it is recommended that new studies be developed using the validated model, considering different types of businesses and economic sectors. From new studies, new and useful information may emerge regarding the relationships between the constructs investigated in the present work.

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