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Performance and innovation measurement systems: The mediating role of organizational agility

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ABSTRACT

The objective of this study was to examine the mediating role of organizational agility in the relationship between the performance measurement system (PMS) and different types of innovation: incremental, radical, and ambidextrous, within the manufacturing industry. The relationship between PMS and innovation has attracted increasing attention in the literature, particularly regarding dynamic capabilities that help explain the development of innovations. In this context, organizational agility is particularly relevant for understanding the PMS–innovation relationship, as both reflect and foster the organizational capabilities that drive innovation. This research demonstrates that the use of interactive PMS and organizational agility are critical determinants of innovation and organizational success in business environment characterized by rapid change and intense competition. A survey was conducted with 221 manufacturing organizations exhibiting high level of innovation and the data were analyzed using partial least squares structural equation modeling. The results reveal positive associations between the use of interactive PMS and incremental and ambidextrous innovations. Furthermore, they indicate that organizational agility mediates the relationship between the interactive use of PMS and all three types of innovation—incremental, radical, and ambidextrous. From a theoretical perspective, by focusing on organizational agility as a mediating mechanism between the use of interactive PMS and innovative outcomes, an area that has received limited scholarly attention, this study contributes to the literature on management control systems. By identifying organizational agility as a key explanatory mechanism, the findings further demonstrate that the interactive use of PMS extends beyond its informational role, enhancing organizations' ability to simultaneously pursue diverse innovation opportunities. The practical contributions suggest that the use of PMS promotes the continuous exchange of managerial information and organizational coordination, contributing to agile responses to the demands of the competitive environment and to innovative initiatives.

Keywords: performance measurement system, organizational agility, innovation, manufacturing industry.

1. INTRODUCTION

The organizational environment, characterized by rapid change and intense competition, requires organizations to continually prioritize innovation (Henri & Wouters, 2020; Panda, 2025). Understanding the factors that enable and enhance companies' innovative capacity is essential for continuous development, which should guide efforts to ensure incremental, radical, or both types of innovation (ambidextrous) (Idrees et al., 2022; Mura et al., 2021).

Incremental innovation refers to the continuous improvement of existing products and processes, whereas radical innovation is grounded in new knowledge bases, enabling the creation of products and the adoption of new internal processes (Dewar & Dutton, 1986). The simultaneous integration of these two innovation approaches gives rise to ambidextrous innovation, which allows organizations to balance the pursuit of incremental and radical improvements, thereby contributing to the sustainability of innovative processes in environments characterized by high volatility (Lin et al., 2013; Monteiro & Beuren, 2020; Waseel et al., 2024).

Organizational agility is a dynamic capability that enables firms to remain vigilant and ready to respond innovatively to market demands (Motwani & Katatria, 2024). The dynamic capabilities approach offers a relevant theoretical foundation by arguing that organizations must be continuously prepared to adapt to change and promote their resources in innovative ways (Teece et al., 1997, 2016). As a dynamic capability, organizational agility is particularly relevant for understanding the relationship between management control systems (MCS) and innovation, as both reflect and promote the organizational capacity to generate innovation (Müller-Stewens et al., 2020).

Within this context, MCS emerges as a key mechanism for innovation (Bedford et al., 2019; Mura et al., 2021; Truant et al., 2025) and for fostering agility (Brüggemann et al., 2022; Lee et al., 2017; Toubtou & Nabil, 2023). The importance of MCS lies in its informational role in supporting decision-making and its facilitating function in innovation processes (Badu & Micheli, 2025; Müller-Stewens et al., 2020; Mura et al., 2021). MCS encompasses a broad set of managerial mechanisms, among which the performance measurement system (PMS) stands out as a tool widely recognized for fostering innovation in companies (Bedford et al., 2019; Truant et al., 2025). The functions of the PMS include monitoring and understanding organizational performance, promoting strategic alignment and supporting institutional stability (Henri, 2006; Le et al., 2023; Monteiro & Beuren, 2020), with evidence suggesting that it also facilitates innovation development (Mura et al., 2021).

One stream of PMS research distinguishes between two modes of use: (i) diagnostic use, which refers to the approach of monitoring results in relation to organizational objectives; (ii) interactive use, aimed at the prospective use of performance data, communication processes, and mutual adjustment among organizational actors (Brüggemann et al., 2022; Henri, 2006; Le et al., 2023). Both diagnostic and interactive uses are recognized as mechanisms capable of enhancing organizational innovation capacity (Mura et al., 2021; Truant et al., 2025).

PMS enhances decision-making in organizational contexts characterized by simultaneous demands for innovation by guiding efforts toward the development of ambidextrous innovation (Bedford et al., 2019; Le et al., 2023). Moreover, managerial discussions surrounding performance metrics stimulate the search for solutions that increase the visibility and effectiveness of innovation-oriented initiatives (Monteiro & Beuren, 2020).

Despite the contributions of the MCS literature to our understanding of innovation (Bedford et al., 2019; Henri, 2006; Le et al., 2023; Mura et al., 2021), there remains a gap in research on the different configurations of MCS, especially PMS, important gaps remain regarding different MCS configurations—particularly PMS—and the implications of their diagnostic and interactive uses in practice. Specifically, limited evidence exists on the relationship between management controls, dynamic capabilities (Lill & Wald, 2021; Motwani & Katatria, 2024; Truant et al., 2025) and the promotion of innovation in dynamic organizational environments (Badu & Micheli, 2025; Müller-Stewens et al., 2020).

By promoting effective communication, continuous learning, and structured dialogue across hierarchical levels, PMS functions as a mechanism that enables organizational agility (Brüggemann et al., 2022; Motwani & Katatria, 2024). This process enables companies to identify changes in the competitive environment in a timely manner and respond through the reconfiguration of processes and the reallocation of resources (Hu & Wang, 2025).

Examining PMS as a precursor to organizational agility and innovation is theoretically relevant (Brüggemann et al., 2022; Lill & Wald, 2021; Motwani & Katatria, 2024; Toubtou & Nabil, 2023). Brüggemann et al. (2022) emphasize that organizational agility serves as a link in the relationship between strategic decisions and the development of innovations. This highlights the need for organizations to develop the capacity to respond, in an agile and effective manner, to changes in the environment (Lu & Ramamurthy, 2011; Teece et al., 2016). Accordingly, this study aims to evaluate the mediating effect of organizational agility on the relationship between the PMS and radical, incremental, and ambidextrous innovation in the context of the manufacturing industry.

The manufacturing industry warrants particular attention because of its fundamental role in economic development and its strong dependence on technological innovation (Diegues & Roselino, 2021). In this sector, competitive dynamics demand agile responses to market changes and technological advances, which requires the continuous development of innovations aimed at both exploiting new opportunities and enhancing existing capabilities (Brüggemann et al., 2022; Diegues & Roselino, 2021).

This study is justified by the need to deepen our understanding of the relationship between the use of PMS in the innovation process and the enhancement of dynamic capabilities, as this mechanism provides valuable information that supports decision-making (Henri, 2006; Henri & Wouters, 2020). The study also highlights the relevance of PMS to management accounting studies, especially as a precursor to organizational agility (Brüggemann et al., 2022; Lee et al., 2017; Toubtou & Nabil, 2023). Regarding incremental, radical, and ambidextrous innovation, the concept of effective use of the PMS enables organizations to produce distinct innovative outcomes. Such outcomes are essential for organizations operating in turbulent competitive environments (Badu & Micheli, 2025; Mura et al., 2021).

This study contributes theoretically by advancing understanding of dynamic capabilities theory, particularly with regard to its intersection with organizational agility and innovation in the manufacturing industry. By adopting this theoretical approach as an analytical lens, the study broadens our understanding of the antecedents of organizational agility (Panda, 2025; Walter, 2021). The results show that the use of interactive PMS, by promoting information sharing and dialogue among managers, fosters the development of organizational agility and innovation. In doing so, the study advances the literature on the role of PMS in fostering organizational agility and innovation (Brüggemann et al., 2022; Roeth et al., 2025; Toubtou & Nabil, 2023). Additionally, the study focuses specifically on medium- size and large companies in the manufacturing industry, a sector characterized by high competitive pressure and intense demand for innovation (Müller-Stewens et al., 2020; Zhang & Hao, 2024).

The study also offers practical contributions, particularly for managers in the manufacturing industry. The findings regarding the use of PMS provide insights for the development of management practices focused on internal training and strengthening organizational communication, with an emphasis on fostering innovation. Furthermore, the results support the design of internal strategies aimed at enhancing dynamic capabilities, which are considered essential for sustaining competitive advantages in the industrial sector. This process encourages managers to act proactively, enabling them to make adjustments in line with market trends and to promote the implementation of innovative initiatives.

2. THEORETICAL BACKGROUND AND RESEARCH HYPOTHESES

2.1 Dynamic Capabilities Theory

Dynamic capabilities theory posits that organizations must accurately identify relevant changes in the competitive environment, reconfigure their resources, and adjust organizational routines in to sustain and enhance competitive advantage (Teece et al., 1997). Within this framework, organizational agility constitutes a higher-order dynamic capability, encompassing the ability to sense environmental changes, make rapid strategic decisions, and reconfigure resources and business systems in a timely manner (Teece et al., 2016). These capabilities enable the identification and assessment of emerging technological opportunities and threats in relation to customer needs, mobilize resources to exploit opportunities, and maintain competitiveness through continuous renewal (Teece et al., 2007).

From this perspective, organizational agility enables organizations to respond effectively to environmental fluctuations, reconfigure internal processes to mitigate emerging threats, and exploit strategic opportunities (Lu & Ramamurthy, 2011; Puriwat & Hoonsopon, 2022). As a dynamic capability, organizational agility, as a dynamic capability, acts as a mechanism that enables the incorporation of innovations and the continuous renewal of processes and products, thereby contributing to improved innovation performance (Walter, 2021).

As a dynamic capability, organizational agility promotes adaptation and innovation development in environments characterized by volatility and uncertainty (Panda, 2025; Teece et al., 2016). By enabling rapid responses, informed decisions, and continuous adaptation, it strengthens innovation processes, increases operational efficiency, and enhances organizational capabilities (Hu & Wang, 2025; Idrees et al., 2022).

Dynamic capabilities theory is closely associated with organizational competencies and routines that enable the optimization of innovation processes and the ability to respond to changes in the competitive environment (Teece et al., 2016; Zhang et al., 2023). When combined with the diagnostic and interactive use of PMS, which are recognized as important mechanisms for supporting strategic capabilities (Brüggemann et al., 2022; Mura et al., 2021; Roeth et al., 2025), these elements result in the development of capabilities that guide decision-making and continuous organizational reconfiguration, fostering agility in dynamic adaptation and the advancement of innovation (Bedford et al., 2022; Luiz et al., 2025).

2.2 PMS and Innovation

PMS assists in the design and implementation of strategies, in addition to ensuring consistency between organizational objectives and expected outcomes (Simons, 1990). As a component of the MCS, PMS, can be used as a mechanism of diagnostic or interactive function. Diagnostic use, by monitoring organizational outcomes, enabling the identification and correction of deviations, as well as the alignment of team behaviors with the objectives previously established by the organization (Simons, 1995). In contrast, the interactive use, by encouraging critical interpretation and ongoing discussion of the data among managers at all hierarchical levels, promotes constant and systematic attention to strategic issues (Simons, 1995).

By translating strategic objectives into measurable and actionable indicators, PMS serves as a central mechanism for developing, implementing, and monitoring organizational strategy (Grafton et al., 2010). Moreover, by directing managerial attention toward dynamic information, PMS promotes organizational alignment and continuous adaptation to competitive demands (Bititci et al., 2018). It is worth noting that the use of the PMS plays a role in supporting a wide range of managerial activities (Biswas et al., 2023; Ferreira & Otley, 2009; Frare et al., 2022; Mura et al., 2021). It consists of financial and non-financial metrics and is used to align organizational behavior with strategic objectives (Henri, 2006).

The literature highlights the importance of PMS use as a driver of innovation (Bedford et al., 2019; Mura et al., 2021; Truant et al., 2025). It is important to note that innovation, due to its different characteristics and purposes, has been classified as incremental, radical, or both (ambidextrous) (Atuahene-Gima, 2005; Lin et al., 2013). Incremental innovation involves improvement and strengthening of products, processes, technologies, and organizational structure (Dewar & Dutton, 1986). Radical innovation entails substantial changes in products, processes, technologies, organizational structures, and methods (Dewar & Dutton, 1986). Ambidextrous innovation, on the other hand, consists of the simultaneous pursuit, at a high level, of both radical and incremental innovations (Lin et al., 2013).

Regarding diagnostic PMS and innovation, Biswas et al. (2023) show that diagnostic control can have positive effects on innovation because, by helping to reduce costs, it promotes alignment in project execution and facilitates the introduction of new products. Similarly, Le et al. (2023) note that the use of diagnostic PMS helps encourage both radical and incremental innovation, as it is considered a means of stimulating problem-solving and increasing managers' focus on achieving operational and strategic objectives. Furthermore, Basly and Cano-Rubio (2024) note that diagnostic control fosters product innovation, provides management direction through the setting of clear goals, continuous performance monitoring, and efficient resource allocation—factors that contribute to creating an environment conducive to the generation and implementation of innovations.

In contrast, Brüggemann et al. (2022) find that the use of diagnostic PMS has no direct impact on innovation; their findings suggest that the more rigid and structured characteristics of this type of control may constrain the firms' capacity for innovation. The divergence of this study from the aforementioned ones suggests the need for further research. Despite the contradictory findings of Brüggemann et al. (2022), this study aligns with the evidence presented by Basly and Cano-Rubio (2024), Biswas et al. (2023), and Le et al. (2023), which support the initial hypotheses:

H_{1a}: diagnostic PMS is positively associated with radical innovation.
H_{1b}: diagnostic PMS is positively associated with incremental innovation.
H_{1c}: diagnostic PMS is positively associated with ambidextrous innovation.

Regarding the relationship between the use of interactive PMS and innovation, Brüggemann et al. (2022) point out that the use of interactive PMS, by promoting communication and facilitating the generation of creative ideas, contributes to the innovation process. Likewise, Mura et al. (2021) find that the use of interactive PMS, by directing managers' attention to strategic priorities and stimulating dialogue throughout the organization, contributes to the development of capabilities that enhance both radical and incremental innovation. By encouraging managerial focus on strategic priorities and creating an environment conducive to information exchange and learning, interactive monitoring strengthens innovation capabilities (Dangereux et al., 2024). Additionally, interactive control tends to support not only the development of new business models but also ambidextrous innovation (Endenich et al., 2023).

In this context, Basly and Cano-Rubio (2024) demonstrate that interactive control exerts a significant influence on product innovation, as it strengthens the organization's capacity to efficiently absorb and respond to informational demands, while promoting strategic dialogue. Thus, the use of interactive PMS expands senior management's ability to access knowledge dispersed throughout the organization, which contributes to the development of incremental and radical innovation, thereby optimizing performance (Le et al., 2023; Monteiro & Beuren, 2020). The discussion presented here suggests the following hypotheses:

H_{2a}: Interactive PMS is positively associated with radical innovation.
H_{2b}: Interactive PMS is positively associated with incremental innovation.
H_{2c}: Interactive PMS is positively associated with ambidextrous innovation.

2.3 PMS and Organizational Agility

Although the literature on the direct relationship between the PMS and organizational agility is limited, there are indications of a positive relationship. Regarding the relationship between the use of diagnostic PMS and organizational agility, evidence suggests that diagnostic PMS enhances organizations' ability to respond swiftly to changing demands, particularly when balancing adaptation requirements with cost-control objectives (Rigby et al., 2016; Toubtou & Nabil, 2023). Accordingly, diagnostic PMS provides information that enhances organizational agility and offers control mechanisms that support innovation in increasingly volatile business environments (Markides et al., 2018; Vergin et al., 2022), as is the case in the manufacturing industry.

Furthermore, Lill and Wald (2021) highlight that the application of diagnostic control—by providing structured guidelines that efficiently direct innovation-focused activities—supports processes and procedures predefined by the organization. Thus, the use of diagnostic control contributes to a deeper understanding of processes, helps reduce lead times and costs, and promotes the continuous improvement of business activities (Bititci et al., 2018). Collectively, this evidence supports the following hypothesis: :

H_{3a}: diagnostic PMS is positively associated with organizational agility.

Regarding interactive PMS and organizational agility, Toubtou and Nabil (2023) demonstrate that interactive control strengthens organizational agility by continuously directing management's attention and encouraging members of the organization to discuss and analyze the available information. Beyond facilitating the formulation of new strategic initiatives, interactive control contributes to establishing organizational priorities and effectively disseminating knowledge throughout the organization, thereby strengthening adaptive capacity in response to market dynamics (Toubtou & Nabil, 2023).

Dynamic capabilities theory emphasizes an organization's ability to renew itself and reconfigure its resource base in environments undergoing continuous change (Teece, 2007; Zhang et al., 2023). From this perspective, dynamic capabilities are integrated into managerial routines and processes, through the use of PMS and organizational agility, which support more informed decisions within organizational processes and favor agility in seizing opportunities and developing innovations (Brüggemann et al., 2022; Roeth et al., 2025).

By enhancing organizations' ability to identify and respond rapidly to business opportunities, interactive control ensures agile and effective decision-making in dynamic environments (Vergin et al., 2022). Consequently, interactive control promotes greater organizational agility in an increasingly volatile environment (Markides et al., 2018; Toubtou & Nabil, 2023).

Based on this empirical evidence, the following hypothesis is proposed:

H_{3b}: Interactive PMS is positively associated with organizational agility.

2.4 Organizational Agility and Innovation

Agility in organizations leads to the development of new products and the integration of new technologies into internal processes (Idrees et al., 2022). Consequently, organizational agility impacts radical innovation, resulting in an essential capability to identify and capitalize on opportunities when launching a new product into the market (Puriwat & Hoonsopon, 2022). In this sense, organizational agility, by facilitating the efficient exploitation of opportunities in potential markets, plays a decisive role in enhancing innovative performance (Hu & Wang, 2025). Furthermore, by enabling companies to anticipate and proactively respond to the dynamics of the markets in which they operate (Hu & Wang, 2025), organizational agility promotes the optimization of processes and structures, which, in turn, enhance the execution of innovative activities in the business environment (Panda, 2025).

In this context, organizational agility favors the adoption of new technologies, the understanding of customer needs, and the continuous optimization of operational processes—factors that, together, enhance the firms' capacity for innovation (Dahms et al., 2025). Zhang and Hao (2024) demonstrate that organizational agility contributes significantly to the development of both incremental and radical innovations. By facilitating the implementation of emerging technologies and continuous improvement practices, organizations create an environment conducive to experimentation, fostering everything from gradual adjustments to disruptive innovations in their products.

Organizational agility also facilitates the effective sharing of information within organizations and facilitates the substantive transformation of ideas and creativity into innovative solutions (Idrees et al., 2022). As a result, organizations become capable of responding rapidly to changes in the environment and capitalizing on emerging opportunities ahead their competitors (Zhang & Hao, 2024). Accordingly, organizational agility promotes both the exploration of new possibilities for innovation and the optimization of existing innovative capabilities, contributing to a balance between incremental and radical innovation (Waseel et al., 2024).

Dynamic capabilities theory refers to the ability to identify threats and opportunities in the competitive environment, mobilize resources in a timely manner, and reconfigure processes, with the aim of maximizing the exploitation of emerging opportunities (Panda, 2025; Teece et al., 2016), whereas organizational agility is a strategic capability that contributes to improving the identification of opportunities and the continuous monitoring of changes in the business environment by fostering the optimization of innovation processes within the organization (Laguir et al., 2022; Luiz et al., 2025).

The literature suggests that organizational agility is intrinsically linked to a company's ability to continuously monitor changes in the external environment and to respond quickly and effectively, with the aim of delivering high-quality products and services that meet market demands (Motwani & Katatria, 2024). An agile organization is distinguished by a strategic orientation focused on technology and growth, value creation, and the development of innovation models (Ramadan et al., 2023), regardless of the type of innovation (incremental, radical, or ambidextrous). Based on these arguments, the following hypotheses are proposed:

H_{4a}: organizational agility is positively associated with radical innovation.

H_{4b}: organizational agility is positively associated with incremental innovation.

H_{4c}: organizational agility is positively associated with ambidextrous innovation.

2.5 PMS, Organizational Agility and Innovation

Diagnostic PMS plays a key role in promoting actions aimed at problem-solving and enhancing managerial focus on achieving operational and strategic objectives (Le et al., 2023). This mechanism provides a structured and evidence-based foundation for the decision-making process, which operates through the monitoring of goals and the efficient management of information flows (Badu & Micheli, 2025; Mura et al., 2021).

According to Vergin et al. (2022), organizational agility acts as a mediating factor in the relationship between the use of diagnostic control and the innovation process. Thus, the diagnostic control system can provide information that contributes to enhancing organizational agility by establishing control mechanisms that positively impact innovation, especially in a business environment characterized by increasing volatility and uncertainty (Vergin et al., 2022).

However, Brüggemann et al. (2022) shows that organizational agility does not play a mediating role in the relationship between the use of diagnostic PMS and innovation. According to the authors, the rigidity characteristic of diagnostic control tends to undermine organizational flexibility, an essential element for fostering innovation. Corroborating this perspective, Dangereux et al. (2024) argue that the use of diagnostic control can hinder organizations' capacity for innovation by limiting managers' creativity and intensifying control mechanisms. Considering the limited empirical evidence found during the literature review and the fact that the studies do not point to a positive or negative relationship, it is posited that the direction of the relationship remains unknown a priori, as outlined in the following research hypotheses:

H_{5a}: organizational agility mediates the relationship between diagnostic PMS and radical innovation.

H_{5b}: organizational agility mediates the relationship between diagnostic PMS and incremental innovation.

H_{5c}: organizational agility mediates the relationship between diagnostic PMS and ambidextrous innovation.

Interactive control, by fostering continuous innovation in contexts characterized by competitive and volatile markets, strengthens agile capabilities at the organizational level (Vergin et al., 2022). Organizational agility thus emerges as a capability that enhances innovative activities through the optimization of organizational processes and structures (Panda, 2025).

Lee et al. (2017) argue that organizational agility, by acting as a mediating factor in the relationship between interactive control and organizational performance, facilitates the optimization of business opportunities. This process fosters shared organizational focus, stimulates communication, and enables an efficient flow of information, contributing to improved organizational performance. Greater organizational agility expands firms' strategic action repertoire and strengthens their competitive capabilities, enabling them to adapt and thrive in highly dynamic environments (Ramadan et al., 2023).

Organizational agility plays a mediating role in the relationship between interactive PMS and innovation (Brüggemann et al., 2022). Thus, it is evident that organizational agility enhances organizations' ability to identify and respond effectively to market changes and demands (Brüggemann et al., 2022). Consequently, the PMS and organizational agility foster an environment conducive to integration and information sharing, as well as to strengthening cooperation among different departments and teams, thereby reinforcing innovation-oriented organizational processes (Brüggemann et al., 2022; Roeth et al., 2025). Furthermore, organizational agility enables companies to react proactively to changes in the business environment, which strengthens the relationship between interactive control and organizational performance (Toubtou & Nabil, 2023). Based on these arguments, the following hypotheses are proposed: H_{6a}: organizational agility has a positive mediating effect on the relationship between interactive PMS and radical innovation.

H_{6b}: organizational agility has a positive mediating effect on the relationship between interactive PMS and incremental innovation.

H_{6c}: organizational agility positively mediates the relationship between the interactive PMS and ambidextrous innovation.

Figure 1 below illustrates the relationships proposed in this study and highlights the hypotheses tested.

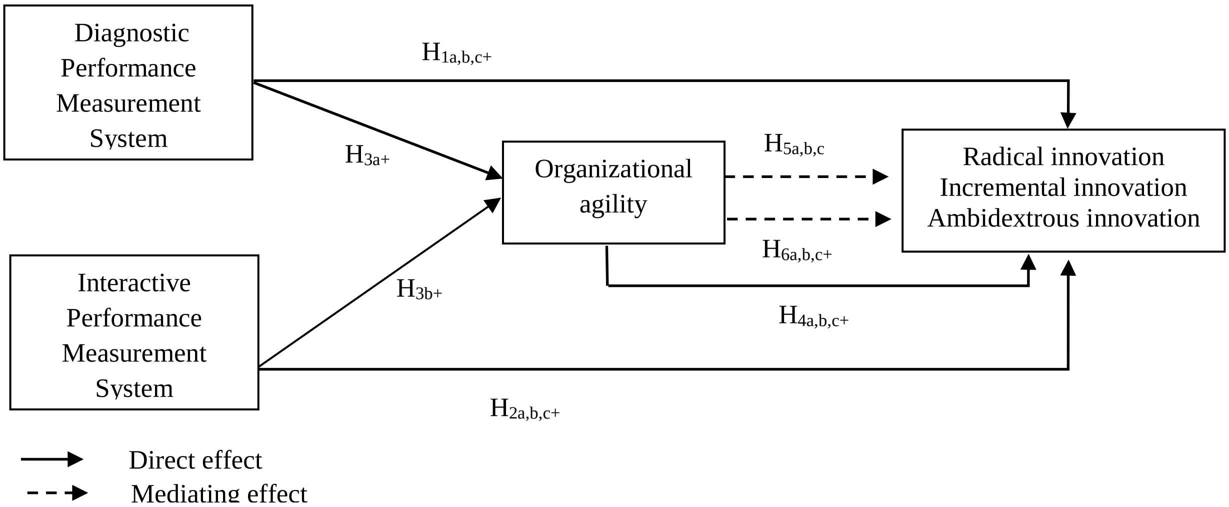

Figure 1 Research model
Source: *Prepared by the authors.*

3. METHODOLOGICAL PROCEDURES

3.1 Population and Sample

The study focuses on analyzing manufacturing industries with a high level of innovation, as identified in the Sectoral Innovation Report by the National Confederation of Industry (NCI, 2022), namely: electronics, automotive, chemical, and pharmaceutical sectors. Based on company size data available on the Econodata platform, a random sample of 1,000 medium- and large-sized companies was selected, whose primary sector of operation was one of those mentioned above. Subsequently, executives (directors, coordinators, and managers) affiliated with these companies were identified through LinkedIn. A connection request was then sent to a manager at each organization, along with an invitation to participate in the survey.

After the connection was accepted, the survey link was sent; the survey was accessed by 838 managers, and responses were received from 223 respondents. After analysis, two questionnaires were excluded due to response inconsistencies, such as identical response patterns across all scales and completion times below the expected minimum threshold. Consequently, the final sample comprised 221 respondents. It is important to note that the sample selection process and the completion of data collection took place between October 2024 and January 2025.

The participating organizations have operated, for an average, of 56 years, ranging from 8 to 125 years. In terms of size, approximately 58% of the companies are classified as large, employing 500 or more employees. It is worth noting that 39% of these organizations are listed on stock exchanges, either nationally or internationally, while the remaining 61% are privately held.

Regarding the respondents' profiles, 28.2% occupy director or coordinator positions, while 68.8% serve as managers. In terms of length of experience in their current positions, 61.1% have held in their roles for more than 5 years, which suggests they possess the necessary knowledge to ensure the quality of the information collected. Regarding gender, 64.7% of participants identify as male and 35.3% as female. Finally, in terms of educational attainment, 22.6% hold a bachelor's degree, and 76.9% reported having completed graduate-level education.

3.2 Measurement of Variables

The survey instrument was organized into five sections: (i) performance measurement system (diagnostic and interactive use), using 11 items assessed on a seven-point scale, ranging from 1 = not at all to 7 = to a great extent, adapted from Henri (2006); (ii) organizational agility, consisting of six items on a seven-point scale, ranging from 1 (strongly disagree) to 7 (strongly agree), adapted from Lu and Ramamurthy (2011); (iii) innovation (incremental, radical, and ambidextrous), consisting of six items on a seven-point scale ranging from 1 (strongly disagree) to 7 (strongly agree), adapted from Atuahene-Gima (2005) and Lin et al. (2013). Ambidextrous innovation is conceptualized as a multidimensional aggregate construct composed of the interaction between two dimensions (Cao et al., 2009). In line with the study by Bedford et al. (2019), ambidextrous innovation is operationalized through the interaction of two dimensions: (a) the balanced dimension, measured by the inverse of the absolute difference between incrementaland radical innovation; and (b) a combined dimension, calculated as the product of incremental and radical innovation. Thus, ambidextrous innovation was defined as an aggregated multidimensional construct, operationalized by multiplying the balanced and combined dimensions, with its calculation performed using a Microsoft Excel spreadsheet.

The fourth block (iv) included the control variables: environmental turbulence and a second-order construct (competitive intensity, technological uncertainty, and market turbulence), consisting of nine items on a seven-point scale ranging from 1 (strongly disagree) to 7 (strongly agree), adapted from Jaworski and Kohli (1993). The inclusion of environmental turbulence as a control variable is justified by the fact that environments marked by instability resulting from rapid technological changes, competitive pressures, and market volatility can significantly influence how organizations design and use their control mechanisms (Henri & Wouters, 2020; Müller-Stewens et al., 2020). Regarding firm size, it was operationalized as the logarithm of the number of employees (Henri & Journeault, 2010), and firm tenure was assessed by the number of years the firm has been in the industry. Finally, the last section included questions to characterize the respondents, covering the respondent's age, gender, educational level, job title, and length of time in their current position.

3.3 Bias Test

To minimize common method bias (CMB), several procedural remedies were adopted to mitigate potential biases associated with collecting data through a single survey instrument completed by individual respondents (Podsakoff & Organ, 1986). Accordingly, the questionnaire was designed using criteria that included instructional guidelines and an emphasis on anonymity (Podsakoff et al., 2003). Harman's one-factor test was applied using SPSS 23 software. The results indicated that a single factor accounted for 36.78% of the total variance, suggesting that CMB did not pose a significant threat to the validity of the findings (MacKenzie & Podsakoff, 2012).

In addition to assessing CMB, another relevant aspect examined in the sample was the possibility of distortions resulting from nonresponse bias. For this investigation, an independent samples t-test was conducted to examine possible differences in responses between two groups: the first and last participants in the study (Wåhlberg & Poom, 2015). The statistical analysis was performed using SPSS 23 software, with the first 20% of respondents classified as early respondents and the last 20% classified as late respondents. The results indicated no statistically significant differences between the groups' means, with the lowest p-value found being 0.132, suggesting that the response rate is not a problem for the study and indicating that the timing of data collection did not influence participants' response patterns.

3.4 Techniques Used in Data Analysis

The data were analyzed using structural equation modeling, specifically partial least squares structural equation modeling (PLS-SEM), implemented in SmartPLS4. PLS-SEM was chosen because of its ability to focus on the predictive nature of the variables, its suitability for smaller but statistically significant sample sizes, and the fact that it does not require the data to be normally distributed. Another notable advantage is the robustness and high statistical power offered by PLS-SEM (Hair et al., 2019). To demonstrate that the sample of 221 respondents is adequate, a G* Power 3.1, assuming a mean effect size (f2) of 0.15, a significance level α of 0.05, a power (1 – significance level β) of 0.95, and six predictors, which required a minimum of 146 cases (Faul et al., 2009).

4. DATA ANALYSIS AND DISCUSSION OF RESULTS

4.1 Quantitative Approach: PLS-SEM

The PLS-SEM analysis began the assessment of the measurement model to establish the reliability and validity of the constructs. Second-order modeling was used for the constructs of organizational agility and environmental turbulence, employing a Type I higher-order structure through the indicator repetition approach (Sarstedt et al., 2019). Table 1 presents the results of the measurement model.

Table 1

Measurement model

Panel A: descriptive statistics, reliability, and convergent validity					
Variables	**Average**	**SD**	***α***	**CR**	**AVE**
1. Interactive PMS	5,24	1,44	0,884	0,915	0,729
2. Diagnostic PMS	5,47	1,49	0,909	0,928	0,647
3. Organizational agility	5,14	1,43	0,862	0,898	0,903
4. Incremental innovation	5,46	1,48	0,881	0,927	0,808
5. Radical innovation	4,36	1,70	0,927	0,954	0,872
6. Environmental turbulence	4,82	1,75	0,850	0,793	0,835

Panel B: discriminant validity – critério de *heterotrait-monotrait ratio*									
Variável	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
1. Diagnostic PMS									
2. Interactive PMS	0,729								
3. Organizational agility	0,652	0,371							
4. Ambidextrous innovation	0,493	0,305	0,647						
5. Incremental innovation	0,483	0,185	0,641	0,695					
6. Radical innovation	0,480	0,244	0,668	0,985	0,669				
7. Environmental turbulence	0,248	0,229	0,396	0,373	0,492	0,419			
8. Size	0,116	0,334	0,056	0,032	0,118	0,043	0,185		
9. Time in operation	0,079	0,065	0,072	0,008	0,034	0,045	0,103	0,306	

Panel C: discriminant validity – criterion of Fornell and Larcker									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
1. Diagnostic PMS	**0,854**								
2. Interactive PMS	0,671	**0,804**							
3. Organizational agility	0,357	0,580	**0,903**						

4. Ambidextrous innovation	0,322	0,473	0,603	**0,968**					
5. Incremental innovation	0,202	0,437	0,560	0,653	**0,899**				
6. Radical innovation	0,259	0,444	0,600	0,918	0,606	**0,934**			
7. Environmental turbulence	0,055	0,207	0,337	0,351	0,425	0,380	**0,793**		
8. Size	0,299	0,084	-0,006	0,032	-0,112	-0,022	-0,177	-	
9. Time in operation	0,066	0,078	0,047	0,008	-0,031	0,043	-0,084	0,306	-

Note: The bolded values on the diagonal represent the square root of the average variance extracted (AVE).
CR = composite reliability; SD = standard deviation; PMS = performance measurement system; α = alfa de Cronbach; AVE = average variance extracted.
Source*: Prepared by the authors*

The confirmatory factor analysis indicated that all items had adequate factor loadings (> 0.7) (Hair et al., 2019). Internal consistency was confirmed, with Cronbach's alpha (α) for the constructs above 0.7, and composite reliability (CR) showed satisfactory values (> 0.7) (Hair et al., 2019). Convergent validity was supported, as the average variance extracted (AVE) exceeded the adequate threshold (> 0.5) (Hair et al., 2019). The heterotrait-monotrait ratio indicated that the the discriminant validity estimate between the constructs "radical innovation" and "ambidextrous innovation" was above the threshold of 0.90 (Hair et al., 2019), suggesting a potential lack of discriminant validity between these constructs. However, the assessment of discriminant validity using the Fornell and Larcker criterion, presented in Panel C, revealed no inconsistencies, confirming that all constructs in the study are explicitly independent (Hair et al., 2019). Once the validity of the measurement model was confirmed, we proceeded to the structural model, using bootstrapping with 5,000 resamples via the bias-corrected and accelerated method and a two-tailed test. Table 2 presents the results of the structural model.

Table 2

Structural model

Structural relationship	**Hypothes**	**Beta (β)**	**Value *t***	**Value *p***	**Decision**
Diagnostic PMS → Radical innovation	H_{1a}	0,036	0,501	0,617	Rejected
Diagnostic PMS → Incremental innovation	H_{1b}	-0,026	0,324	0,746	Rejected
Diagnostic PMS → Ambidextrous innovation	H_{1c}	0,097	1,369	0,170	Rejected
Interactive PMS → Radical innovation	H_{2a}	0,119	1,353	0,176	Rejected
Interactive PMS → Incremental innovation	H_{2b}	0,196	1,969	0,049**	Not rejected
Interactive PMS → Ambidextrous innovation	H_{2c}	0,270	5,049	0,000***	Not rejected
Diagnostic PMS → Organizational agility	H_{3a}	-0,063	0,831	0,406	Rejected
Interactive PMS → Organizational agility	H_{3b}	0,310	6,994	0,000***	Not rejected
Organizational agility → Radical innovation	H_{4a}	0,449	6,783	0,000***	Not rejected
Organizational agility → Incremental innovation	H_{4b}	0,376	4,978	0,000***	Not rejected
Organizational agility → Ambidextrous innovation	H_{4c}	0,441	7,556	0,000***	Not rejected
Time in operation → Incremental innovation	-	-0,022	0,367	0,713	
Time in operation → Radical innovation	-	0,031	0,522	0,602	
Time in operation → Ambidextrous innovation	-	-0,029	0,493	0,622	
Size → Incremental innovation	-	-0,137	1,154	0,249	
Size → Radical innovation	-	-0,025	0,219	0,827	
Size → Ambidextrous innovation	-	0,076	0,681	0,496	
Environmental turbulence → Incremental innovation	-	0,244	4,430	0,000***	
Environmental turbulence → Radical innovation	-	0,208	3,602	0,000***	
Environmental turbulence → Ambidextrous innovation	-	0,194	3,395	0,001***	
Indirect relationship					
Diagnostic PMS → Organizational agility → Radical innovation	H_{5a}	-0,028	0,823	0,410	Rejected
Diagnostic PMS → Organizational agility → Incremental innovation	H_{5b}	-0,024	0,799	0,424	Rejected
Diagnostic PMS → Organizational agility → Ambidextrous innovation	H_{5c}	-0,028	0,821	0,412	Rejected
Interactive PMS → Organizational agility → Radical innovation	H_{6a}	0,274	4,766	0,000***	Not rejected (full mediation)

Interactive PMS → Organizational agility → Incremental innovation	H_{6b}	0,229	4,010	0,000***	Not rejected (partial mediation)
Interactive PMS → Organizational agility → Ambidextrous innovation	H_{6c}	0,269	5,049	0,000***	Not rejected (partial mediation)

Coefficients of determination and predictive validity of the model		
Construct	**R^2**	**Q^2**
Organizational agility	0,340	0,312
Ambidextrous innovation	0,420	0,247
Incremental innovation	0,401	0,250
Radical innovation	0,410	0,235

*Significance level: * = p < 0,01; ** = p < 0,05; *** = p < 0,001.*

Source: Prepared by the authors.

Given the proportion of variance explained (R^2) by organizational agility (34%), it is considered that the exogenous variables have a high explanatory power (Hair et al., 2022). The model did not exhibit multicollinearity, as the highest variance inflation factor values found were below 5 (Hair et al., 2022). Regarding the three control variables included in the model (size, time in business, and environmental turbulence), only environmental turbulence was statistically significant, exerting an effect on ambidextrous, radical, and incremental innovation. The predictive power indicated by Q^2 was considered acceptable because it was above 0, attesting to the model's predictive accuracy (Hair et al., 2019).

Table 2 summarizes the structural model results and the hypothesis tests. Hypotheses H_{1a}, H_{1b}, and H_{1c} were not statistically significant, indicating that the use of the diagnostic PMS was not significantly related to radical, incremental, and ambidextrous innovation. In contrast, hypotheses H_{2b} and H_{2c} revealed a positive and statistically significant relationship between the use of interactive PMS and incremental and ambidextrous innovation. However, hypothesis H_{2a} was not supported, indicating no significant relationship between the use of the interactive PMS and radical innovation.

With regard to organizational agility, hypothesis H_{3a} was not supported, indicating no significant relationship between the use of diagnostic PMS and organizational agility. In contrast, hypothesis H_{3b} revealed a positive and statistically significant relationship between the use of interactive PMS and organizational agility. Hypotheses H_{4a}, H_{4b}, and H_{4c} were also supported, indicating positive and statistically significant relationships between organizational agility and the three types of innovation (radical, incremental, and ambidextrous). With regard to hypotheses H_{5a}, H_{5b}, and H_{5c}, no statistical significance was observed for the mediating role of organizational agility in the relationship between the use of diagnostic PMS and the different types of innovation. Finally, hypotheses H_{6b} and H_{6c} were statistically significant, indicating the existence of partial mediation by organizational agility in the relationship between the use of interactive PMS and incremental and ambidextrous innovation. Hypothesis H_{6a}, on the other hand, demonstrated full mediation by organizational agility in the relationship between the use of interactive PMS and radical innovation.

4.2 Discussion of Results

Hypotheses H_{1a}, H_{1b}, and H_{1c} were rejected, indicating that the use of diagnostic PMS may hinder managers' decision-making processes and, consequently, reduce the capacity for radical, incremental, and ambidextrous innovation in the manufacturing firms examined. Diagnostic PMS appears to exert no direct influence on innovation processes, as the rigidity inherent in this type of control tends to constrain the flexibility necessary for generating innovations (Brüggemann et al., 2022). Furthermore, the adoption of diagnostic controls may limit the capacity to innovate due to excessive controls, making the decision-making process bureaucratic may inhibit innovation by imposing excessive monitoring and bureaucratizing managerial decision-making (Dangereux et al., 2024).

However, H_{2a} was rejected, suggesting that although interactive PMS promotes dialogue and organizational learning, these mechanisms alone may not be sufficient to stimulate radical innovation in the manufacturing firms investigated. Although Biswas et al. (2023) argue that interactive control promotes innovation, the findings of the present study do not support this relationship in the context examined. Likewise, the results do not indicate that interactive PMS alone enhances radical innovation by directing managerial attention toward strategic priorities or by fostering an organizational environment conducive to breakthrough innovation (Dangereux et al., 2024).

Conversely, H_{2b} was supported, indicating that the use of interactive PMS promotes incremental innovation by strengthening internal communication, enhancing the understanding of customer needs, and facilitating the continuous adaptation and improvement of products. The use of interactive control also enhances the organizational capacity to access and integrate different sources of knowledge, thus promoting the development of innovations (Le et al., 2023).

Interactive control encourages the pursuit of innovation by promoting the integration of third-party ideas and technologies to solve challenges related to product creation projects and process development (Biswas et al., 2023). Moreover, it significantly influences product innovation by strengthening the organization's capacity to absorb and respond efficiently to informational demands, while simultaneously fostering strategic dialogue in among managers (Basly & Cano-Rubio, 2024).

The theoretical support that interactive PMS is positively associated with ambidextrous innovation (H_{2c}) was not rejected. The findings indicate that interactive PMS contributes to ambidextrous innovation by fostering an organizational environment characterized by continuous learning, information sharing, and collaboration. Consistent with Brüggemann et al. (2022), the results demonstrate that interactive PMS strengthens communication among organizational members, thereby facilitating innovation processes and reinforcing shared organizational practices.

Interactive control also serves as an important mechanism for promoting product innovation, strengthening the organizational capacity to effectively absorb and respond to the informational demands of the environment, while simultaneously stimulating dialogue within business management (Basly & Cano-Rubio, 2024). The use of interactive PMS expands the managers' ability to access and integrate different knowledge flows, favoring the combination of existing knowledge with new insights, resulting in innovation within organizations (Le et al., 2023).

It was also found that diagnostic PMS was not positively associated with organizational agility (H_{3a}). In the context analyzed, diagnostic PMS does not appear to facilitate organizational adaptation or the agile exploitation of innovation-oriented business opportunities through predefined procedures (Lill & Wald, 2021; Rigby et al., 2016). One possible explanation may be that the use of diagnostic control, based on continuous monitoring and strict analysis of results in relation to previously established goals, may restrict the ability of organizations to respond rapidly to changes in the external environment (Toubtou & Nabil, 2023).

Conversely, H_{3b} was supported, indicating that interactive PMS is positively associated with organizational agility. Interactive PMS favors internal communication between managers, thereby strengthening organizational agility. By facilitating the identification of organizational priorities and promoting knowledge sharing, interactive PMS improves organizations' ability to recognize and respond effectively to market changes.

The above findings are consistent with Lee et al. (2017), who demonstrated that interactive control enhances organizational agility by fostering learning, managerial attention, and continuous information exchange. Similarly, Brüggemann et al. (2022) argue that interactive PMS optimizes organizational agility especially by encouraging organizational communication, a necessary condition for companies to identify and respond quickly to changes in the corporate environment.

The hypothesis H_{4a} was also supported, indicating that organizational agility contributes to radical innovation by enhancing organizations' ability to understand customer demands while acquiring and integrating new ideas and technologies. Oganizational agility allows organizations to optimize the implementation of new technologies and the restructuring of processes, enabling accelerated development of new products and significantly strengthening their competitive capacity (Panda, 2025; Zhang & Hao, 2024).

It was also found that H_{4b} was supported, indicating that organizational agility enables firms to continuously adapt and refine their products through incremental innovation in response to environmental changes. Idrees et al. (2022) emphasize that organizational agility favors the adaptation and development of product innovations that enhance both sustainability and organizational profitability.

In turn, H_{4c} was supported, demonstrating that organizational agility positively influences ambidextrous innovation by enabling organizations to identify, respond to, and rapidly adapt to environmental change. Organizational agility enables firms to respond quickly to changes in the external environment, optimizing ambidextrous innovations related to their products. These findings are consistent with the study by Puriwat and Hoonsopon (2022), which showed that organizational agility favors the promotion of innovation by facilitating the identification and exploitation of business opportunities while supporting product innovation. Likewise, Waseel et al. (2024) emphasize that organizational agility enables organizations to respond quickly and flexibly to competitive pressures, thereby fostering an effective balance between continuous improvement and the pursuit of new opportunities.

From the perspective of dynamic capabilities theory, these findings reinforce the importance of developing organizational practices that enhance agility. Organizations must continuously monitor market changes while maintaining an ongoing capacity for transformation and adaptation to promote innovation and sustain competitive advantage (Panda, 2025; Teece et al., 2016). Thus, organizational agility represents a strategic capability that enhances opportunity recognition and continuous environmental monitoring, thereby improving organizational innovation processes (Luiz et al., 2025; Zhang et al., 2023).

The hypotheses H_{5a}, H_{5b}, and H_{5c} were not supported, indicating that organizational agility does not mediate the relationship between the use of diagnostic PMS and radical, incremental, or ambidextrous innovation. This finding may be explained by the rigid nature of control mechanisms, frequently associated with mechanistic organizational structures, which tend to limit the flexibility and experimentation necessary for the promotion of innovative processes. A similar result was observed by Brüggemann et al. (2022), who likewise found no mediating effect of organizational agility on the relationship between diagnostic control and innovation, suggesting that diagnostic PMS may limit organizations' ability to respond agilely to changes in the external environment. According to Dangereux et al. (2024), the restrictive aspect of diagnostic controls can hinder the innovation capacity of organizations by limiting the creativity of both managers and employees.

The hypothesis that organizational agility positively mediates the relationship between interactive PMS and radical innovation (H_{6a}) was not rejected. The observed full mediation suggests that organizational agility is the mechanism through which the use of interactive PMS enhances radical innovation, underscoring its critical role in strengthening innovation within the organizations studied. Thus, it is evident that organizational agility enhances the firm’s ability to identify and respond effectively to changes and market demands (Brüggemann et al., 2022), thereby facilitating the development of radical product innovations and sustaining innovation performance (Ciampi et al., 2022).

In this way, organizational agility benefits interactive control and the introduction of innovations in products and services, optimizes the identification of opportunities, monitors changes in the business environment, and strengthens competitiveness in the market (Idrees et al., 2022). Likewise, Toubtou and Nabil (2023) highlighted that organizational agility allows companies to react proactively to transformations in the business environment.

The hypothesis that organizational agility positively mediates the relationship between interactive PMS and incremental innovation (H_{6b}) was supported, revealing partial mediation. This result highlights the role of organizational agility in strengthening the influence of interactive PMS on incremental innovation by enabling organizations to continuously adapt their products to changing customer needs and market conditions. Similarly, Motwani and Katatria (2024) argue that organizational agility, as a dynamic capability, enables companies to translate continuous environmental monitoring into product innovations that effectively meet market demands.

More specifically, by mediating the relationship between the interactive use of PMS and incremental innovation, organizational agility promotes shared managerial attention, facilitates continuous communication, and enhances information exchange. Together, these mechanisms strengthen organizational innovation capacity (Brüggemann et al., 2022; Toubtou & Nabil, 2023). Moreover, organizational agility promotes the incorporation of new technologies and enables innovation, both in terms of product development and adoption of more efficient operational practices (Walter, 2021).

From the perspective of dynamic capabilities theory, these findings reinforce that the ability to integrate, develop, and reconfigure skills and routines in dynamic environments enhances innovation processes (Teece et al., 2016; Zhang et al., 2023). In line with this perspective, the use of interactive PMS favors the development of skills aimed at improving decision-making and the continuous reconfiguration of products and processes, fostering the advancement of innovation (Bedford et al., 2022; Brüggemann et al., 2022; Hu & Wang, 2025).

The hypothesis that organizational agility positively mediates the relationship between interactive PMS and ambidextrous innovation (H_{6c}) was supported. The observed partial mediation confirms that organizational agility strengthens communication and information sharing, thereby reinforcing the positive relationship between interactive PMS and ambidextrous innovation. By enabling organizations to identify, interpret, and respond more effectively to changing market conditions, organizational agility serves as a key mechanism linking interactive PMS to innovation outcomes (Brüggemann et al., 2022). Furthermore, the combined use of interactive PMS and organizational agility promotes information sharing and cross-functional collaboration, thereby reinforcing organizational processes that support innovation (Roeth et al., 2025).

Organizational agility enables firms to respond proactively to changes in the business environment, contributing to strengthening the relationship between the interactive use of MCS and organizational performance (Toubtou & Nabil, 2023). Lee et al. (2017) argue that organizational agility, acting as a mediator between the interactive use of management control systems and organizational performance, enhances organizations' ability to identify and capitalize on business opportunities. In the context investigated here, organizational agility favors both the optimization of existing processes and the development and application of new procedures and resources, as well as the redesign and adaptation of organizational structures (Teece et al., 2016).

5. FINAL CONSIDERATIONS

5.1 Conclusion

This study examined the mediating effect of organizational agility on the relationship between diagnostic and interactive PMS and innovation, considering the radical, incremental, and ambidextrous dimensions in manufacturing organizations characterized by high levels of innovation. Grounded in the theory of dynamic capabilities, the study demonstrated that the use of interactive PMS significantly contributes to the development of innovation by promoting internal communication, facilitating information sharing, and fostering organizational learning. Interactive PMS also enhances managers' understanding of organizational priorities and supports the dissemination of knowledge, thereby improving organizations' ability to identify and respond rapidly to changes in the market environment. Furthermore, it was evident that organizational agility fosters multiple forms of innovation by enabling organizations to recognize, respond to, and adapt effectively to environmental change.

The results allow us to conclude that organizational agility mediates the relationship between the interactive use of PMS and the different forms of innovation examined. By strengthening communication and facilitating the continuous flow of information, organizational agility enables organizations to identify and respond more effectively to changing market conditions and business demands. In this sense, organizational agility serves as a key mechanism that supports both the exploration of new opportunities and the effective exploitation of existing capabilities. In contrast, organizational agility did not mediate the relationship between the use of diagnostic PMS and innovation. These findings suggest that the rigidity inherent in diagnostic control mechanisms may constrain organizations' ability to identify and exploit business opportunities in an agile manner, thereby limiting the development of radical, incremental, and ambidextrous innovation within the manufacturing industry.

5.2 Theoretical Implications

This study offers contributions to the theory of dynamic capabilities, extending to the literature on organizational agility and innovation, contextualized within the manufacturing industry. First, it extends the application of dynamic capabilities theory (Teece et al., 1997) as a theoretical lens to explain both the antecedents and consequences of organizational agility (Panda, 2025; Walter, 2021). In doing so, it reinforces the relevance of MCS for the development of dynamic capabilities, highlighting that such systems provide management information to support organizational decision-making. More specifically, the findings show that the interactive use of PMS enhances organizational agility, which, in turn, promotes ambidextrous innovation while also supporting the development of both radical and incremental innovation.

When strategic direction is geared towards incremental innovation, the combination of interactive PMS and organizational agility enables continuous and timely adaptations. In contrast, although the interactive use of PMS does not directly promote radical innovation, its effect becomes significant when mediated by organizational agility. Organizational agility constitutes the mechanism through which interactive PMS enables organizations to continuously reconfigure their resources and processes, thereby fostering radical innovation in dynamic environments.

Additionally, although previous studies have examined the relationship between PMS and innovation using diverse samples and additional analytical approaches to understand the dynamics of different sectors and organizational sizes (Badu & Micheli, 2025; Biswas et al., 2023), tthis study advances the literature by focusing exclusively on medium- and large-sized manufacturing firms characterized by high levels of innovation.

This specific empirical context provides a deeper understanding of the interplay between PMS, organizational agility, and innovation under conditions of intense competitive pressure and continuous technological and strategic change.

5.3 Practical Implications

Regarding its practical contribution, this study offers important practical implications for managers in the manufacturing industry by highlighting the role of PMS in strengthening organizational communication and promoting an effective flow of information for decision-making. In particular, the findings demonstrate that the interactive use of PMS serves as an important antecedent of organizational agility, enabling firms to respond more rapidly to environmental changes and to develop both incremental and radical innovations, thereby enhancing their competitiveness in dynamic and competitive markets. It was demonstrated that PMS promotes organizational agility by facilitating continuous adaptation to evolving market demands. By supporting the formulation of organizational objectives and the systematic monitoring of the external environment, interactive PMS enables manufacturing firms to respond more effectively to changing customer needs and competitive pressures through innovation-oriented initiatives (Brüggemann et al., 2022; Toubtou & Nabil, 2023).

This study indicates that managers can strengthen innovation outcomes by promoting training and organizational relationships that favor the maturation and development, by employees and leaders, of managerial and organizational mechanisms aligned with the desired innovation results. In short, those responsible for defining internal communication strategies will have additional resources to guide the prioritization of the development of dynamic capabilities, especially in organizations belonging to the manufacturing industry.

Beyond their managerial implications, the findings also have broader societal relevance. By identifying ways and mechanisms through which manufacturing organizations can enhance their performance and increase their chances of success, this study indirectly contributes to discussions on employment generation and economic development. These discussions are relevant for two reasons. Firstly, successful industries tend to expand their workforce, thus promoting job creation and socioeconomic development. Secondly, organizations that achieve sustained growth are better positioned to meet market demands at the local, regional, and national levels. Consequently, the study contributes to a broader understanding of the organizational capabilities that support firm survival, growth, and value creation for society.

5.4 Limitations and Recommendations for Future Studies

This study presents some limitations, which may suggest relevant directions for future research. First, the cross-sectional design does not capture the temporal evolution of PMS use, organizational agility, or innovation capabilities. Second, the findings should be interpreted with caution because the sample is limited to highly innovative firms in the manufacturing industry. Regarding suggestions for future research, it is recommended that studies be conducted to examine the relationship between the use of PMS and organizational agility in different forms of innovation. In particular, studies could examine how alternative patterns of PMS use interact with organizational agility to drive innovative organizational performance.

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Methodology: lead;
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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

DATA AVAILABILITY STATEMENT

The entire dataset supporting the results of this study can be made available upon request to the authors.

GENERATIVE AI DISCLOSURE

The authors declare that no generative artificial intelligence was used in any stage of the production of this manuscript (including research, writing, data analysis, formula generation, or the creation of graphic elements).

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