Effects of project management information systems (PMIS) on project manager's performance: the moderating role of PMO

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Abstract

Purpose – The strategic use of technology and adequate support are essential in modern project management, directly influencing successful results and organizational development. Project managers play a fundamental role in achieving project success. This study evaluates the effects of project management information systems (PMIS) on the performance of project managers. Furthermore, the study incorporates project management office (PMO) support as a moderator variable to examine the influence of project management practices on PMIS.

Design/methodology/approach – The authors utilized a three-stage method approach for the creation of constructs and scales. An empirical survey was conducted to collect the data from project management professionals specifically using PMIS and working within a PMO. Structural equation modeling (SEM) was conducted to assess the validity and reliability of the measurement model and to evaluate the hypothesized structural relationships within the conceptual model.

Findings – The analysis of responses indicates that 19% of project management professionals do not use a PMIS, and among them, 57% work in organizations without a PMO. This first observation suggests a perceived lack of professionalization in tools and practices in project management. Applying an exclusion criterion to these two conditions and examining the subset of valid answers, the results indicate that the effective application of technology in project management can significantly enhance project manager performance, emphasizing the importance of establishing well-structured project management systems. Furthermore, the findings highlight the strategic role of PMOs in integrating project management practices with technology, ensuring seamless alignment between organizational processes and technology.

Originality/value – This novel research integrates technology (PMIS) with organizational practices (PMO), an approach insufficiently explored yet with the potential to significantly enhance the successful execution and delivery of projects.

Keywords: *project management information system; individual performance; project management offices; project manager*

1. Introduction

Considering that almost every strategic change in organizations occurs through projects and programs, project management has evolved to play a fundamental role in organizational management in various fields, emphasizing its integrative function in innovative organizations (Musawir *et al.,* 2020). However, despite the increasing importance of project management in recent years, empirical evidence found consistent failures in project execution, leading to negative implications for the business (Joslin and Muller, 2016; Wiewiora *et al.,* 2020).

Project failures frequently result in financial consequences for an organization, including considerable losses in competition, opportunity, productivity, and staff morale (Schmidt, 2023; Nelson, 2008). Effective and efficient project management is essential to foster project teams in decision-making in order to successfully achieve project goals and, consequently, project success (Takagi *et al.,* 2025).

According to Zhang *et al. (*2013), leadership skills are considered to be the most important causes and factors of successful project manager performance, enhancing significantly effective project execution (Ahmad *et al.,* 2022). Several researchers have investigated this subject from many different perspectives, including the core competencies of the project manager (Alvarenga *et al.,* 2019), leadership communication (Rehan *et al*., 2024), shared leadership (Zhou et al., 2025), individual expertise (Ahmed and Lodhi, 2021), education and training (Varajão and Takagi, 2024), and soft or hard skills (Elmezain *et al.,* 2021).

In the context of the growing influence of artificial intelligence, the effective utilization of technology, particularly the PMIS, is of critical importance for advancing understanding of its impact on project manager performance. A PMIS is a centralized digital platform designed to support the planning, execution, monitoring, and control of projects by integrating key functions such as scheduling, resource allocation, work authorization, budgeting, risk management, and communication (Ahlemann, 2009; (Micale et al., 2021). These systems enable real-time data access, facilitate collaboration among stakeholders, and offer analytical tools that support evidence-based decision-making, ultimately contributing to improved project outcomes and greater managerial efficiency. When effectively developed and implemented, PMIS significantly reduces time and effort, enhances coordination, and fosters more sustainable project management practices (Haloul et al., 2022).

The use of standardized and formal project management methodologies contributes to increasing the project's success (Artto *et al.,* 2011; Sergeeva and Ali, 2020). Thus, while technological capabilities play a critical role in project execution, organizational practices are equally vital, especially in multi-project environments where well-defined project management processes ensure efficiency, standardization, and effective coordination (Aubry and Lavoie-Tremblay, 2018). A PMO serves as an organizational management structure that standardizes project governance practices, oversees project execution, ensures consistency, and centralizes management responsibilities, particularly in multi-project environments (Arbabi *et al.,* 2020), to enhance coordination, efficiency, and strategic alignment within organizations (Botelho *et al.,* 2025).

Despite the potential recognized benefits of PMIS and PMO individually, there is a lack of empirical research examining how their integration influences project manager performance. Exploring the extent to which a PMO enhances the effectiveness of PMIS in improving managerial performance remains a critical area for further research.

Our theoretical model combines in an innovative way the dimensions of two well-established theories, DeLone and McLean (1992) and the Expectation-confirmation model (Bhattacherjee, 2001), proposing a PMIS model that supports a comprehensive understanding of PMIS success determinants. To achieve this, the research focuses on key factors of system quality, information quality, and individual performance from DeLone and McLean as well as perceived usefulness, and user satisfaction from the Expectation-confirmation model (ECM). Moreover, incorporating PMO as a moderator provides a valuable understanding of whether organizational project management practices support strengthen, or diminish the effectiveness of PMIS in enhancing individual performance.

Hence based on the identified research gaps, this research contributes in the following ways. First, we integrated two theoretical frameworks with variables and indicators, incorporating a multi-process approach to adoption and scale development refinement, thereby strengthening the validity of the conceptual model (Neves *et al.,* 2025). Second, we enriched the model by introducing a new construct (Colquitt and Zapata, 2007), as a moderator for project management practices, bridging technology (PMIS) with organizational practices (PMO), an approach that, to the best of our knowledge, has not been explored in prior studies. Third, our findings suggest that the appropriate application of technology in project management can significantly enhance project manager performance, underscoring the importance of organizations investing in robust project management systems. However, the analysis of response reveals that not all project management professionals utilize a

PMIS, and a significant percentage perform project management activities in organizations without the presence of a PMO. This observation, consistent with Wald *et al.* (2025), may indicate a lack of professionalization in project management practices. Finally, PMOs must assume a strategic role in the implementation and utilization of PMIS to establish a well-structured system that enhances project manager performance, ultimately improving project execution and delivery.

The article is organized as follows: The subsequent section provides a concise review of the literature on the concepts and theoretical lens; the third section establishes the research model and hypotheses. The methodology and survey development are presented in the fourth section, while the data analysis and results are presented in the fifth section, which follows the discussion in the sixth section. The final section contains the main contributions, conclusions, and potential areas for future research.

2. Theoretical Background

2.1 Project Management Information Systems (PMIS)

Modern organizations invest in technological and IS developments to accomplish their strategic objectives in a controlled environment (Khatib and Falasi, 2021). These organizations' managers believe that new technologies would enhance their decision-making and facilitate the development of appropriate project plans. Technology characteristics, project and organizational characteristics, and task and user characteristics play a significant role in the successful adoption of technologies within businesses (Alkhudary and Gardiner (2024). A PMIS is an integrated management tool that supports project planning, implementation, execution, monitoring, and information gathering and dissemination (Braglia and Frosolini, 2014). It collects and distributes diverse information regarding project management methods to ensure the successful execution of projects (Li *et al.,* 2025).

A high-quality PMIS incorporates access to essential tools for cost management, scheduling, documentation, work authorization, configuration management, and integration with other systems (Lee & Yu, 2012). The effective development and utilization of PMIS can significantly reduce time and effort, enhance decision-making processes, and foster more sustainable project management practices reinforcing its role as a critical determinant of project success (Hughes *et al.,* 2020).

The nature of these systems has changed significantly over the past decade, evolving from standalone systems to distributed, complex, and multifunctional systems that cover more than solely project planning (Kock *et al.,* 2020), supporting project managers with their planning, organizing, control, reporting, and decision-making responsibilities (Raymond and Bergeron, 2008).

Moreover, PMIS serves as a critical repository and distribution mechanism for project information, enabling the timely provision of relevant data to diverse project participants with distinct informational needs throughout the project lifecycle methodologies, including waterfall, agile, and hybrid approaches (Mahmood *et al.,* 2023).

This heterogeneity ensures that the PMIS can be applied across various project management approaches, adapting to the specific needs of the organization (Kostalova *et al*., 2015).

2.2 Information Systems Success Model

DeLone and McLean (1992) made a major contribution to the literature on measuring the success of IS through their model of information systems success (ISS), in which different perspectives were presented with the analysis of 180 conceptual studies resulting in 100 IS success measures. This empirical investigation resulted in the identification of six factors: information quality, system quality, use, satisfaction, individual impact, and organizational impact. This general theory of IS suggests that the performance of a system is more likely to be positively impacted by the relationship between information quality and system quality if the end-user is satisfied and utilizes the system.

To properly apply this model, DeLone and McLean (1992) emphasized that for each research activity, the selection of IS success dimensions and measures must be based on the objectives and context of empirical investigation, but whenever feasible, tested and proven measures should be adopted. This made the model sufficiently flexible to enable the successful measurement of various IS in a variety of contexts, allowing for the modification of these metrics when required (Mustafa *et al*., 2020). The IS community has widely acknowledged their model as a foundational framework for applying theories aimed at evaluating the effectiveness and success of information systems. In the context of project management, the ISS has been used in several studies, such as decision-making in a multi-project environment (Caniëls and Bakens, 2012), dimensional models of project success (Ika and Pinto, 2022), effects of artificial intelligence on project decision making (Khatib and Falasi, 2021), or benefits realization of project portfolio management (Kock *et al.,* 2020). The DeLone and McLean (1992) model has now several versions but keeps the main original constructs. Our model incorporates three dimensions: Information Quality, System Quality, and Individual Performance, which are critical for assessing the impact of PMIS on project manager performance.

2.3 Expectation-Confirmation Model

The ECM is based on three variables: satisfaction, confirmation of expectations, and perceived usefulness, which predict and explain the individual's intention to continue using IS.

The ECM explains that the perceived usefulness of using technology contributes to user satisfaction, and this satisfaction increases the intention to continue using that technology. Some studies have sought to increase the explanatory power of ECM by adding other constructs to the existing structural model, such as antecedents, moderators, or mediators (Akter *et al.,* 2013; Lin and Bhattacherjee, 2009). Recent studies have been conducted to examine the utilization of this model, including Mamakou (2023), Tam *et al.* (2020), and Zhao *et al.* (2022), who incorporate ECM in their models. In our study, we follow this approach considering the use of ECM as a part of our theoretical model, using a novel approach to enhance comprehension of the perceived usefulness and satisfaction of project managers using PMIS to increase their individual performance.

2.4 Project Management Offices and PMIS

Organizations started considering project management as an essential competence a few decades ago, standardizing the adoption of project management methodologies and managing and disseminating knowledge of project management practice (Dai and Wells, 2004; Aubry *et al.,* 2009; Monteiro *et al.,* 2024; Tsaturyan and Müller, 2015; Tshuma *et al.,* 2022). The PMO idea emphasizes different types of processes and procedures that increase project performance and guidance to connect with the strategic plan (Mahabir and Pun, 2022). According to Sandhu *et al.* (2019), the PMO organizational structures provide centralized management for multiple projects and handle both internal and external stakeholders to ensure integration and coordination among all parties involved.

Enhancing project manager performance requires an understanding of whether a well-established relationship between the PMO and PMIS can improve the clarity of project objectives, strengthen alignment with organizational priorities, and ultimately enhance the ability to manage projects successfully and efficiently (Hans & Mnkandla, 2023).

While PMOs vary in their structure and strategic orientation, several studies have shown that PMOs with responsibilities related to the implementation and management of PMIS directly support the information needs of project managers in their daily activities. These PMOs provide tools and systems that facilitate project visibility, performance monitoring, and decision-making, thereby reinforcing their practical relevance to project execution (Hobbs & Aubry, 2007). As summarized in Table 1, a range of empirical studies has identified PMIS-related functions as core responsibilities of certain PMO configurations (Arbabi et al., 2020; Aubry & Brunet, 2016; Alghaseb & Alali, 2024; Ershadi et al., 2022; Hans & Mnkandla, 2023). Therefore, the presence of a PMO with clearly defined responsibilities for managing PMIS can be considered a key enabler of improved project manager performance and project outcomes.

Table 1. *PMO functions related to PMIS from the literature*

Function	Subject	Reference
Implementation and use of project management software	This study explored the effects of PMO functions on the development of knowledge management	Arbabi *et al.* (2020)
Implement and operate a project information system	The article analyzes the classification of PMOs within organizational design and presents an empirical categorization of PMOs.	Aubry and Brunet (2016)
Implement and operate information systems on projects	The study focused on investigating the PMO functions and the indicators of perceived project performance.	Alghaseb and Alali (2024)
Develop and improve project management software	This study sheds light on how PMO functions help address the growing complexity of building projects.	Ershadi *et al.* (2022)
Provide project management software	The research examines how PMO functions may be utilized to implement and standardize the role of project managers.	Hans and Mnkandla (2023)
Implement and operate a project information system	A main research program was undertaken about project management practices, particularly the PMO functions.	Hobbs and Aubry 2007)

3. Model Conceptualization

Abugabah and Sanzogni (2010) argue that each model focuses on a particular perspective and that a single model may not fully represent different contexts. A number of authors have demonstrated the ability to combine a model with other models. For instance, Maillet *et al.* (2015) used the ISS and the unified theory of acceptance and use of technology (UTAUT) to explain electronic patient records. Hsu *et al*. (2014) proposed the ISS model along with the trust dimension to explain people's plans to repurchase online services. Shahzad *et al.* (2024) investigate how the ISS model and the UTAUT can be adopted to explain a blockchain system. Tam *et al*. (2016) evaluated how m-banking affected individual performance using the ISS model in conjunction with the Fit of Technology to Task (TTF) dimension. Regarding the integration of ISS with ECM, there are also some recent studies, such as the understanding of the factors of mobile payment continuance intention (Franque *et al.,* 2021) and investigating the sustained usage intention of travel applications (Liu *et al.,* 2023).

The ISS and ECM models are mutually reinforced, thereby facilitating a comprehensive understanding of the influence of the IS and individual performance. Furthermore, the shortcomings of the two models can be addressed by establishing a connection between them (Sumi, 2024). For instance, a limitation of the ISS model is its failure to consider the impact of perceived usefulness on usage satisfaction (Veeramootoo *et al.,* 2018). In contrast, system quality and information quality are not included in ECM models. The convergence of the constructs in both models, represented in Figure 1, enhances our comprehension of PMIS utilization and individual performance.

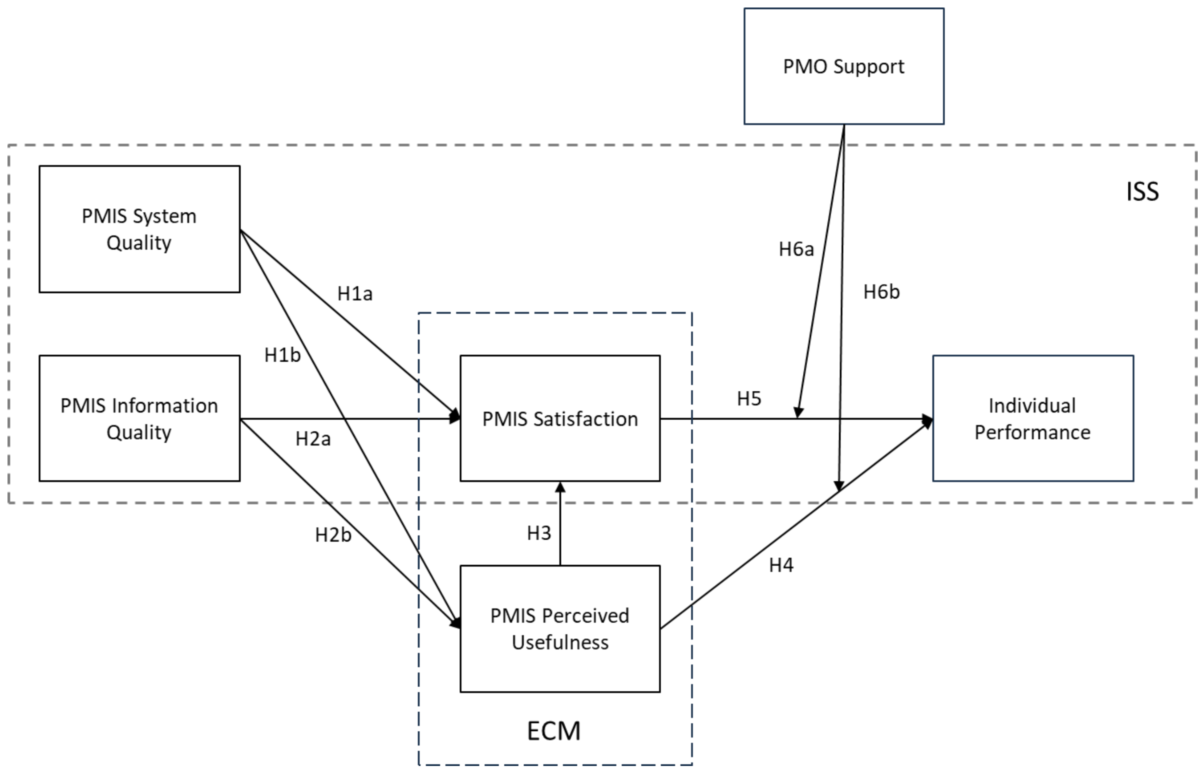

Figure 1. *Research model*

3.1 System Quality

PMIS system quality is defined as the technical specifications, operational functionality, accessibility, ease of use, and general system features that encourage system use, thereby benefiting both users and the organization (Al-Mamary, 2019). System quality is a fundamental and common factor for successful project management (Iriarte and Bayona, 2020). Complex or poorly designed systems, such as those that are difficult to operate, inaccessible, unusable, time-consuming to query, and unclear in their usability (Mustafa *et al.,* 2022), do not contribute to user performance. Freeze *et al*.

(2010) determined that system quality significantly enhances user satisfaction. However, Sharma and Sharma (2019) found no such impact. A recent study by Al-Fraihat *et al.* (2020) showed that system quality positively influences both satisfaction and perceived usefulness.

The following hypotheses are proposed based on the previous discussion:

H1a: Higher PMIS system quality positively impacts the project manager's satisfaction with PMIS.

H1b: Higher PMIS system quality positively impacts the perceived usefulness of PMIS.

3.2 Information Quality

The quality of information is indicative of the characteristics of the data and data processing results in the system. These characteristics include, for example, the accuracy of the data, how the data is represented in a report, and the ease with which the data can be understood, thereby facilitating decision-making (Al-Mamary, 2019; Xie *et al.,* 2022).

The provision of accurate information is beneficial not only in the context of decision-making but also in supporting the execution of activities. Inaccurate and incomplete information misleads the facts, resulting in losses to individuals and organizations (Iriarte and Bayona, 2020; Mustafa *et al*., 2022). A project manager typically bases their decisions on information extracted from the IS, as the quality of this information is fundamental to the strength of the decision.

It is reasonable to assume that when project managers perceive that information is accurate, consistent, and updated, their perceived usefulness and satisfaction increase with the quality of the information. Accordingly, we hypothesize the following:

H2a: Higher PMIS information quality positively impacts the project manager's satisfaction with PMIS.

H2b: Higher PMIS information quality positively impacts the perceived usefulness of PMIS.

3.3 Perceived Usefulness

Perceived usefulness is a perceptual indicator of the degree to which the users believe that using a particular system has enhanced their performance.

In the ECM model, it is posited that perceived usefulness exerts an influence on an individual's behavior concerning the utilization of a specific system, particularly those based on information technology (Maryanto and Kaihatu, 2021). The research conducted by Bataineh *et al.* (2015) demonstrated that perceived usefulness is a key factor influencing user satisfaction. This viewpoint has been previously articulated in the model proposed by Bhattacherjee (2001) and Daneji *et al.* (2019), which posits that perceived usefulness is a pivotal determinant of user satisfaction. When a system is used, it will inevitably be evaluated for its strengths and weaknesses, which will subsequently affect the perceived satisfaction (Haloul *et al*., 2024) of a project manager. Utilizing an IS can enhance the manager's confidence in the system and improve their performance. Based on this reasoning, we propose the following hypotheses:

H3: Higher PMIS perceived usefulness positively impacts the project manager's satisfaction.

H4: The perceived usefulness of PMIS has a positive effect on individual performance.

3.4 User Satisfaction

The utilization of a PMIS is viewed as advantageous for project managers due to its potential contribution to expedited decision-making and enhanced project success (Caniëls and Bakens, 2012). The implementation of PMIS in a multi-project context has the potential to facilitate more realistic project planning, thereby contributing to more effective management of multiple projects (Choi and Ma, 2022; Patanakul and Milosevic, 2009). In this study, we define a multi-project environment as an operational context in which project managers are responsible for multiple projects concurrently. The utilization of PMIS in decision-making processes within a multi-project environment, as perceived by project managers, could enhance project managers' satisfaction, leading to increased individual performance. Hence, the following hypothesis is proposed:

H5: The project manager's satisfaction with PMIS positively impacts their individual performance.

3.5 PMO Support PMIS

The PMO ensures that the use of the PMIS function aligns with organizational policies, compliance requirements, and strategic goals. By establishing governance frameworks, the PMO can monitor and control the use of the PMIS, ensuring that it supports project management objectives and delivers value (Aubry and Brunet, 2016). This governance role reinforces the importance of the PMIS and ensures its proper adoption (Kock *et al.,* 2020). In their studies on PMO functions, many authors have identified software project management as one of the primary responsibilities of the PMO. For instance, Hobbs and Aubry (2007) found that 68% of PMOs reported utilizing a PMIS as part of their operations. This percentage underscores the importance of PMIS in structuring project management practices, improving communication, and fostering a data-driven approach to project execution.

Additionally, Hans and Mnkandla (2023) studied how to use PMO functions to implement and standardize the role of project managers in a software development context, while Barbalho and Silva (2022) researched multinational companies to investigate the list of PMO functions and perceived project performance indicators. Based on this, we expect that the support of PMO positively moderates the satisfaction and perceived usefulness of the project manager, increasing his individual performance.

H6a: PMO Support positively moderates the impact of satisfaction with PMIS on individual performance, such as that the effects will be stronger among organizations with a PMO.

H6b: PMO Support positively moderates the impact of perceived usefulness with PMIS on individual performance, such that the effects will be stronger among organizations with a PMO.

3.6 Individual Performance

In the ISS Model, individual performance refers to the degree to which an IS improves the user's ability to accomplish job-related tasks effectively and efficiently. It considers how the system helps users achieve their professional goals, optimize workflows, and improve the quality of their work output (DeLone and McLean, 1992). In the context of PMIS, individual performance can be related to increased project manager efficiency, better resource allocation, enhanced communication and collaboration, more accurate project tracking and reporting, and improved adherence to project timelines and budgets (Raymond and Bergeron, 2008). These benefits collectively contribute to more successful project outcomes and higher levels of performance for project managers and their teams. Specifically, by surpassing the typical utilization of the system, employees may leverage the system's maximum potential to enhance their work, leading to increased productivity and performance through the utilization of complex IS (Hsieh and Wang, 2007).

4. Research Method

To establish the conceptual foundation and support the novelty of this research, a narrative literature review was conducted. This approach is appropriate for synthesizing diverse perspectives in areas where empirical research remains limited or fragmented. As noted by Kastner et al. (2012), narrative reviews are more concerned with compiling contextually relevant literature to support theoretical development. Unlike systematic reviews, narrative reviews do not follow a rigid protocol of inclusion

or data extraction; instead, they allow for the incorporation of a wide range of relevant studies through a non-standardized but thematically driven selection process (Noordzij et al., 2011). In this study, the literature review was instrumental in identifying the theoretical and empirical boundaries of research involving PMIS, PMO, and project manager performance. Although the data sources were not restricted to predefined databases or search strings, articles were selected based on thematic relevance, citation significance, and contribution to the conceptual scope of the study. This method was particularly appropriate given the limited and scattered empirical evidence addressing the joint role of PMIS and PMO in influencing individual-level performance outcomes in project management.
Following this, the study adopted a three-stage mixed-method approach for construct and scale development, aligned with established methodological practices (Hinkin, 1995; Lewis et al., 2005). The first stage involved both deductive and inductive item generation, using literature examination and expert interviews to ensure comprehensive domain coverage. In the second stage, two rounds of instrument validation were conducted to refine item clarity and content relevance. In the final stage, the refined questionnaire was administered to project management professionals, and the resulting data were analyzed using Structural Equation Modeling (SEM) an appropriate technique for validating multi-dimensional constructs and assessing complex relationships among latent variables (MacKenzie et al., 2011). The following sections provide detailed descriptions of each methodological phase.

4.1 Item generation

Each construct dimension was carefully operationalized by adapting items from previously validated instruments to align with the specific objectives and context of this research, which focuses on the integration of PMIS and PMO in enhancing project execution and managerial performance. The construct of system quality was adapted from Tam and Oliveira (2016) and Urbach et al. (2010), with a focus on refining items to capture dimensions of reliability, functionality, and ease of use specific to IS platforms. For information quality, the measurement scale was drawn from Urbach et al. (2010) and Lee and Yu (2012) and adapted to assess the accuracy, completeness, and timeliness of information produced by PMIS tools. The construct of perceived usefulness incorporated items from Daneji et al. (2019) and Lee et al. (2015), recontextualized to reflect how PMIS use enhances individual and organizational efficiency, decision-making, and project outcomes. User satisfaction was assessed using a scale adapted from Caniëls and Bakens (2012) and Raymond and Bergeron

(2008), focusing on satisfaction with system performance. To capture the organizational dimension, the construct of PMO characteristics was informed by the frameworks proposed by Blomquist et al. (2016) and Turner et al. (2009), with items adapted to evaluate the formalization, strategic role, and functional scope of PMOs. Finally, individual performance was measured using adapted items from Urbach et al. (2010), tailored to capture self-reported improvements in task efficiency, quality of work, and contribution to project success. Table 2 summarizes the sources of the measurement items, the constructs they relate to, and the rationale or method of their adaptation in this study.

Table 2. *Measurement items*

Construct Dimension	**Adaptation Details**	**Source References**
System Quality	Items were modified to reflect PMIS features relevant to contemporary project environments.	Tam and Oliveira (2016); Urbach et al. (2010)
Information Quality	Adapted to evaluate the relevance, accuracy, and timeliness of PMIS-generated information.	Urbach et al. (2010); Lee and Yu (2012)
Perceived Usefulness	Adjusted to reflect how PMIS contributes to the efficiency and decision-making capabilities of users.	Daneji et al. (2019); Lee et al. (2015)
User Satisfaction	Focused on satisfaction with PMIS functionality, usability, and information mechanisms.	Caniëls and Bakens (2012); Raymond and Bergeron (2008)
PMO Characteristics	Items were rephrased to assess the presence, structure, and support functions of PMOs.	Blomquist et al. (2016); Turner et al. (2009)
Individual Performance	Tailored to assess perceived improvements in task execution, productivity, and goal achievement.	Urbach et al. (2010)

Following Churchill's (1979) recommendations for scale development, the initial pool of items was generated to accurately capture the conceptual domain of each construct. This process was guided by two main objectives: (1) to ensure theoretical alignment with constructs drawn from the literature on project management, information systems, and organizational performance; and (2) to incorporate practitioner assessment to enhance contextual relevance and content validity. The item pool was first reviewed by a panel of expert judges, including academics and practitioners, who assessed each item's clarity, relevance, and conceptual consistency. To further refine the constructs and ensure practical applicability, semi-structured interviews were conducted with six senior project management professionals from large organizations. These interviews followed a predefined protocol that explored participants' perceptions of the importance and clarity of each item, as well as the completeness of the constructs in representing the domain. Based on their feedback, the items were refined and adjusted according to their perceived importance (Davis & McGinnis, 2016). This iterative process involved identifying and categorizing concepts, comparing them to existing theoretical assumptions, and reassessing the data to validate construct boundaries (Fawcett et al., 2014). As a result, a refined pool of 48 items was developed and subsequently prepared for content validation.

4.2 Content first-round validation

The content validity of the generated items was subsequently assessed. To ensure that the dimensions and items accurately represented the model, a panel with nine subject matter experts was consulted. The panel members were chosen based on their active academic, research, or professional experience in project management (Grant and Davis, 1997). They assessed the significance of each of the six dimensions utilizing a 5-point rating scale where one indicates ‘not at all’ and five indicates ‘very well. The average values for each dimension are above 3, varying from 3.68 to 4.63, so validating the comprehensiveness of all dimensions in assessing the model.

Experts were thereafter involved with aligning each item to its corresponding dimension and rating the item’s relevancy to that dimension. Balanced ratios for each item were determined, resulting in a threshold value of 0.50 or below (Fehring, 1987). After this procedure, we removed items with average balanced ratios below 0.50 from further study. Expert qualitative input validated the comprehensiveness of the dimensions list, suggesting that no further dimensions were required (Fawcett *et al.,* 2014).

4.3 Content second-round validation

Four of the panel members indicated their willingness to participate in the second round of the study. Lynn (1986) posited that at least three qualified content experts are sufficient for content validation. The participants were requested to provide scores on each item independently in relation to the specified dimension using a five-point rating scale, with one indicating “not relevant” and four indicating “highly relevant.” The input was quantified by the calculation of the Content Validation Index (CVI) per each item and the overall scale, which is consistent with Lynn’s (1986) approach. The average CVI value for all items on the scale was 92%, exceeding the minimum expectation CVI of 0.83 for a new scale (Polit and Beck, 2006).

Consistent with the findings from the initial round, the panel experts reaffirmed that the suggested dimensions adequately represented the concept and that no more dimensions were required. Analysis of the items revealed that seven items exhibited low agreement (less than 70%) and were therefore excluded from further analysis. Appendix lists these items, marked with a superscript ‘a’, indicating those dropped at this stage. A total of 22 items were retained under System Quality, System Quality, Perceived Usefulness, Satisfaction, PMO, and Individual Performance dimensions.

A comprehensive empirical evaluation is required to ascertain whether the newly developed scales provide a robust foundation for theory generation. The following sections provide a detailed explanation of the questionnaire administration process and detail the necessary procedures to ensure the comprehensive validation of the measures.

4.4 Conducting the survey

The project management communities worldwide were identified as a particular focus to ensure the relevance and quality of the responses. The authors, who have been involved within the project management professional community for many years, have requested the assistance of project managers in providing their professional input through participation in the survey. Moreover, the research groups of IPMA Research - *IPMA International Project Management Association* (2024) and Project Management Academic Programs - PMI (2024), which comprises several thousand practitioners related to the field of project management, were also invited through a newsletter publication in the researcher’s groups asked them to take part in the questionnaire. A Web-based survey was conducted (Deutskens *et al.,* 2004) based on a questionnaire hosted on Qualtrics’ online platform and sent to approximately 2,000 individuals by email.

Several empirical studies in the field of information systems have adopted a Likert scale—ranging from “strongly disagree” to “strongly agree”—to measure latent constructs such as system quality, user satisfaction, and perceived usefulness. For example, Akter et al. (2013) conducted a quantitative study to evaluate service quality in mHealth systems, developing a multi-dimensional measurement model based on established constructs. Urbach et al. (2010) developed and validated measurement items for assessing employee portal performance, while Lee et al. (2015) examined users’ continuance intention to use cloud-based systems. These studies employed structured survey methodologies using Likert-type scales and rigorous statistical analyses, including exploratory and confirmatory factor analysis as well as SEM, to validate their instruments and assess relationships among constructs.

It is important to emphasize that the eligibility criteria for survey participants included, first, having actively been involved in project development activities, second, holding experience in using PMI, and third, being part of an organization that currently has a Project PMO in place. After three months, a total of 489 people opened the questionnaire link and began responding. They were then asked whether they had experience using PMIS. In response, 93 participants (19%) reported that they did not have such experience and were therefore excluded from continuing the survey. As a result of this exclusion (rate 19%), 396 respondents advanced to the next question, which asked whether their organization had a Project Management Office (PMO) in place. The responses revealed that 172 participants indicated the presence of a PMO, meaning that 57% of the respondents did not have a PMO in their organization.

From that set, a final number of 147 respondents provided complete and valid responses. It is important to observe that limiting the sample to project professionals' experience with PMIS and organizations with a PMO significantly restricts its size, however, this criterion is essential for ensuring meaningful and relevant research findings.

5. Data analysis and results

This study employed Partial Least Squares Structural Equation Modeling (PLS-SEM) due to its effectiveness in analyzing complex relationships among latent variables and its focus on maximizing the explained variance of endogenous constructs (Hair et al., 2017). PLS-SEM is particularly appropriate for research centered on theory development and predictive modeling, as it facilitates the concurrent estimation of measurement and structural models within an integrated analytical framework (Hair et al., 2019). Its methodological strengths have contributed to its growing application across diverse research domains, including investigations of behavioral factors in information systems usage (Luo et al., 2024; Chin et al., 2020) and studies in software development projects (Tam et al., 2020; Barros et al., 2024). As observed by Rigdon et al. (2017), PLS-SEM compared to covariance-based SEM, is especially advantageous in exploratory research settings, where theoretical models are evolving and require flexibility in empirical validation. In line with these observations, this study utilized SmartPLS 4 software to evaluate the reliability and validity of the measurement model and to test the structural hypotheses (Memon et al., 2021). Additionally, the bootstrap resampling method was employed to generate 95% confidence intervals around the parameter estimates, ensuring robust inference of statistical significance.

5.1 Respondents' profile analysis

The demographic profile of the respondents is summarized in Table 3. Approximately 67% of the respondents were male and 33% female. The majority of the respondents (around 75%) are over 35 years of age. More importantly, approximately 60% of the participants reported having more than 10 years of experience in project management, indicating a considerable level of professional seniority and expertise in the field. This observation suggests that project management activities are more likely to be developed by professionals with extensive experience, as observed by Blomquist *et al.* (2016). The roles with the greatest prevalence in the responses were Project and Program Managers, representing 64% of the total answers. It is also noteworthy that there was a substantial representativeness of PMO Managers, Directors, and Head of PMO, around 25%, which may be indicative of a higher base knowledge of responses due to their experience and seniority. Concerning the organizational context, the various sectors of activity are represented in a relatively equal manner, with a significant predominance in the financial, insurance, utilities, and healthcare sectors. In terms of company size, the largest number of responses were from organizations with over 1,000 employees, representing approximately 66% of the total number of responses. It should be noted that the question regarding company location was not about the physical location of the professionals but rather about the geographical location of the company for which they were laborers. Based on these demographic indicators, the sample is considered suitable for reflecting the intended population, which enhances our confidence in making preliminary generalizations from the study's results.

Table 3. *Demographic information about the respondents*

		Frequency	**Percent**
Gender	Female	49	33%
	Male	98	67%
Age	<25	6	4%
	25-34	26	18%
	35-44	54	37%
	45-54	45	31%
	>54	16	11%
Education	High School	8	5%
	Bachelor's degree	86	59%
	Master's degree / MBA	47	32%
	Ph.D.	6	4%
Job title	Project Manager	62	42%
	Program Manager	32	22%

		Frequency	Percent
	Agile / Scrum Master	17	12%
	PMO Manager	22	15%
	Director/Head of PMO	14	10%
Project management experience	Less than 2 Years	8	5%
	Between 2-5 Years	19	13%
	Between 6-10 Years	36	24%
	Between 11-15 Years	39	27%
	More than 15 Years	45	31%
Organization industry	Banking and Finance	28	19%
	Information Technology and Communications	25	17%
	Insurance	21	14%
	Healthcare and Pharmaceuticals	19	13%
	Energy and Utilities	15	10%
	Construction	13	9%
	Retail	11	7%
	Others	15	10%
Number of employees	0-249 employees	8	5%
	250-1000 employees	42	29%
	>1000 employees	97	66%

5.2 *Assessing the Measurement model*

The initial phase of PLS-Sem analysis involves evaluating the measurement model. Our model incorporated reflectively measured constructs, composite reliability, indicator reliability, convergent validity, and discriminant validity (Hair *et al*., 2019).

5.2.1 *Convergent Validity*

Factor loadings are coefficients that, in a factor analysis, represent the relationship between the observed variables and their underlying latent constructs. They indicate how much of the variance in an observed variable is explained by the latent construct. These values represent the extent to which the latent construct explains the variance of an observable variable (Byrne, 2001). High factor loadings (typically greater than 0.70) suggest that the observed variable is a good indicator of the underlying construct (Hair *et al.,* 2009). Reliability refers to the consistency and stability of a measurement instrument. Cronbach (1951) is a measure of internal consistency, indicating the value of a set of items in assessing a singular unidimensional latent component. The range is from 0 to 1,

with greater values indicating increased reliability. A commonly accepted threshold is 0.70 or higher, although some fields may require a higher threshold (Nunnally and Bernstein, 1994).
Composite reliability (CR) is another measure of internal consistency, often preferred in structural equation modeling (SEM) due to its ability to account for the different loadings of items. A CR value of 0.70 or higher is typically considered acceptable (Fornell and Larcker, 1981).
Convergent validity assesses the extent to which items of a construct that are theoretically related are actually related in practice. It is typically evaluated using the average variance extracted (AVE), which measures the amount of variance captured by the construct in relation to the variance due to measurement error. An AVE value of 0.50 or higher indicates adequate convergent validity, suggesting that the construct explains more than half of the variance of its indicators (Hair *et al.,* 2009). All of the components satisfied the suggested threshold value (Table 4), demonstrating a strong level of convergent validity and reliability.

Table 4. *Item loadings, Reliability, and Convergent Validity*

Dimensions/Items	**λ**	**α**	**CR**	**AVE**
System Quality (SQ)		0.893	0.926	0.757
SQ1	0.888			
SQ2	0.834			
SQ3	0.881			
SQ4	0.877			
Information Quality (IQ)		0.869	0.911	0.719
IQ1	0.817			
IQ2	0.818			
IQ3	0.888			
IQ4	0.864			
Perceived Usefulness (PU)		0.847	0.908	0.766
PU1	0.893			
PU2	0.851			
PU3	0.882			
User Satisfaction (ST)		0.843	0.905	0.761
ST1	0.856			
ST2	0.874			
ST3	0.888			
Individual Performance (IP)		0.919	0.942	0.804
IP1	0.931			
IP2	0.840			
IP3	0.866			

Dimensions/Items	λ	α	CR	AVE
IP4	0.945			
PMO Support (PS)		0.859	0.904	0.702
PS1	0.809			
PS2	0.871			
PS3	0.849			
PS4	0.821			

α= Cronbach's alpha; CR=Composite Reliability, AVE=Average Variance Extracted.

5.2.2 Discriminant Validity

The extent to which a construct is genuinely distinct from other constructs is evaluated by discriminant validity. The square root of the AVE for each construct is compared to the correlations between the construct and other constructs in the model by the Fornell-Larcker criterion. If the square root of the AVE for each construct exceeds its highest correlation with any other construct, discriminant validity is established (Fornell and Larcker, 1981). Another method is HTMT (Heterotrait-Monotrait ratio of correlations), which measures the ratio of average correlations between items across constructs and the average correlations among items of the same construct. Some authors consider it superior to the Fornell-Larcker criterion as it provides a more reliable assessment, particularly in complex models, Henseler *et al.* (2015). An HTMT value below 0.90 suggests adequate discriminant validity (Gold et al., 2001). Therefore, the discriminant validity is established, as shown in Table 5 and Table 6.

Table 5. *Discriminant validity using factor correlations (Fornell and Larcker)*

	IP	IQ	PC	PU	SQ	ST
IP	0.897					
IQ	0.685	0.848				
PC	0.307	0.464	0.838			
PU	0.635	0.712	0.467	0.875		
SQ	0.629	0.768	0.353	0.655	0.870	
ST	0.634	0.735	0.477	0.651	0.717	0.873

Note: Values in italics represent the square root of AVE.

Table 6. *Assessment of discriminant validity using factor correlations (HTMT)*

	IP	IQ	PC	PU	SQ	ST
IP						
IQ	0.753					
PC	0.327	0.537				

	IP	IQ	PC	PU	SQ	ST
PU	0.700	0.826	0.551			
SQ	0.678	0.868	0.401	0.752		
ST	0.708	0.856	0.561	0.770	0.827	

5.3 Assessing the structural model

The structural model illustrates the proposed pathways within the study framework. The efficacy of the model is assessed by the robustness of each structural path, shown by the R^2 value for the dependent variable, which should be equal to or greater than 1 (Falk and Miller, 1992). As seen in Figure 2, the dependent variable "Individual Performance" in this study had an R^2 of 53.8%. Additionally, the model fit was evaluated with the standardized root mean square residual (SRMR). The SRMR value was 0.061, which is below the threshold of 0.08, signifying an acceptable model fit (Hair et al., 2019). The multicollinearity test, via the variance inflation factor (ViF), shows that there are no problems with multicollinearity because all the ViF values fall below the recommended cutoff of 5 (Hair *et al.,* 2019). In addition, we evaluated the importance of the path coefficients by employing a bootstrapping procedure that involved 5000 resampling iterations (Hair *et al*., 2014).

Results from this analysis are presented in detail in Table 7. The model explains 61.4% of the variation in ST. SQ ($\beta = 0.321$, $t = 3.061$, $p < .001$), IQ ($\beta = 0.355$, $t = 3.357$, $p < .001$), PU ($\beta = 0.188$, $t = 1.728$, $p < 0.05$), are statistically significant in explaining ST firming hypotheses H1a, H2a, and H3. The model explains 53.5% of the variation in PU. SQ ($\beta = 0.264$, $t = 1.773$, $p < 0.05$) and IQ ($\beta = 0.509$, $t = 4.452$, $p < .001$) are statistically significant in explaining PU, thus confirming hypotheses H1b and H2b. The model explains 53.8% of the variation in IP, having as statistically significant variables ST ($\beta = 0.553$; $t = 6.357$, $t < .001$) and PU ($\beta = 0.509$, $t = 5.086$, $p < .001$). Therefore, hypotheses H4 and H5 are confirmed.

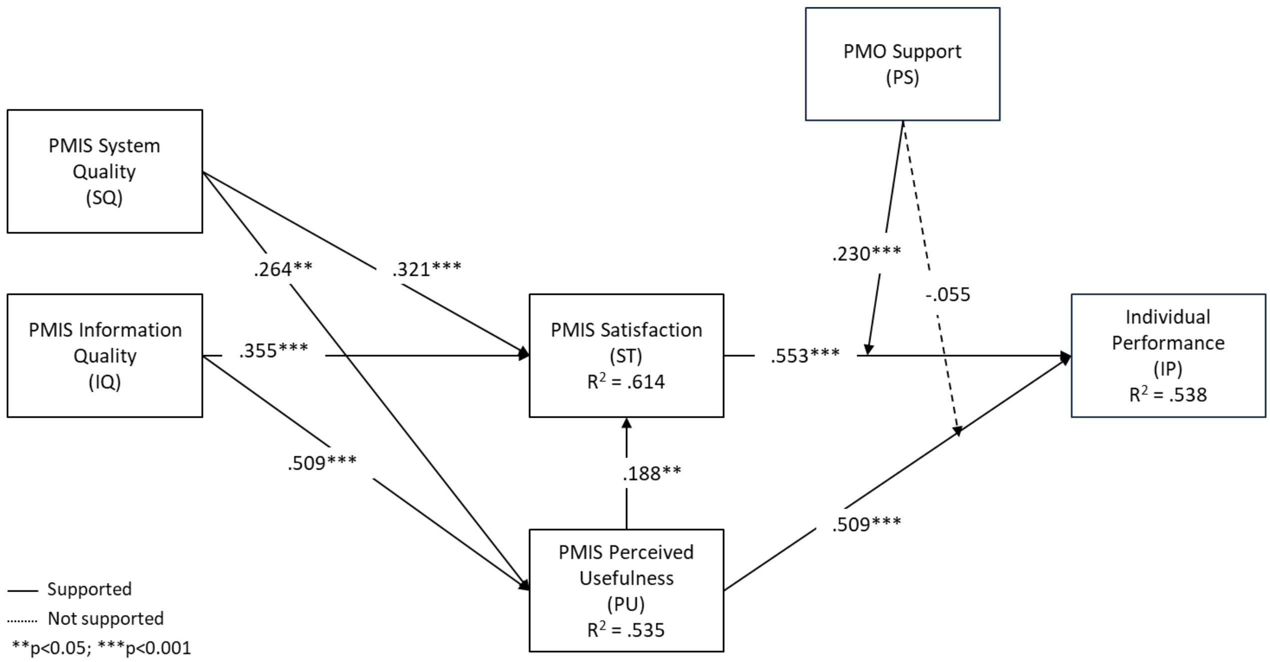

Figure 2. *Research model with results*

Table 7. *Results of hypotheses tests.*

Relationship	***β***	**Result**	***R²***
Perceived Usefulness (PU)			0.535
System Quality -> Perceived Usefulness (H1b)	0.264/*	*Supported*	
Information Quality -> Perceived Usefulness (H2b)	0.509/**	*Supported*	
Satisfaction (ST)			0.614
System Quality -> Satisfaction (H1a)	0.321/**	*Supported*	
Information Quality -> Satisfaction (H2a)	0.355/**	*Supported*	
Perceived Usefulness -> Satisfaction (H3)	0.188/*	*Supported*	
Individual performance (IP)			0.538
Perceived Usefulness -> Individual Performance (H4)	0.509/**	*Supported*	
Satisfaction -> Individual Performance (H5)	0.553/**	*Supported*	
PMO Support -> Satisfaction -> Individual Performance (H6a)	0.230/**	*Supported*	
PMO Support -> Perceived Usefulness -> Individual Performance (H6b)	-0.055/-	*Rejected*	

*Path- β *p<0.05; ** p<0.001*

5.3.1 Moderation Effects

The study assessed the moderating PS on the relationships between ST, PU, and IP. The R-square value for IP was .489, corresponding to 48.9% without the addition of the moderating effects. The incorporation of the interaction term increased the R-squared to 53.8%. This indicates a 4.9% increase in the variance explained in the dependent variable (IP). The analysis of the moderating effect demonstrated a positive and significant influence on the association between ST and IP ($b = 0.230$, $t = 2.542$, $p < 0.001$).

This result shows that the interaction between PS and ST positively affects IP. The R-square value of 0.230 indicates that, as the support of the PMO strengthens, the positive relationship between ST and IP increases. The p-value shows that this moderating effect is statistically significant, meaning there is strong evidence that the PMO enhances the impact of ST on IP. Therefore, PMO support positively moderates the relationship between ST and IP, amplifying the positive impact of satisfaction on performance. Hence, thus confirming hypothesis H6a.

A similar process was conducted to assess the moderating effect of PS on the relationship between PU and IP. The analysis indicated a non-significant influence on the relationship between PU and IP ($b = -0.055$, $t = 0.631$, $p < 0.264$). These results show that hypothesis H6b must be rejected.

5.3.2 Slope Analysis

Further, slope analysis is presented to obtain a more comprehensive understanding of the moderating effects. As shown in Figure 3, the slope analysis graph illustrates the interaction between PS and ST on IP. The steeper black line represents a stronger PS, where the relationship between ST and IP is more pronounced. As ST increases, IP improves significantly, indicating that in environments with higher PS, ST has a substantial positive impact on performance. The flatter line represents a lower PS, where the relationship between satisfaction and individual performance is weaker.

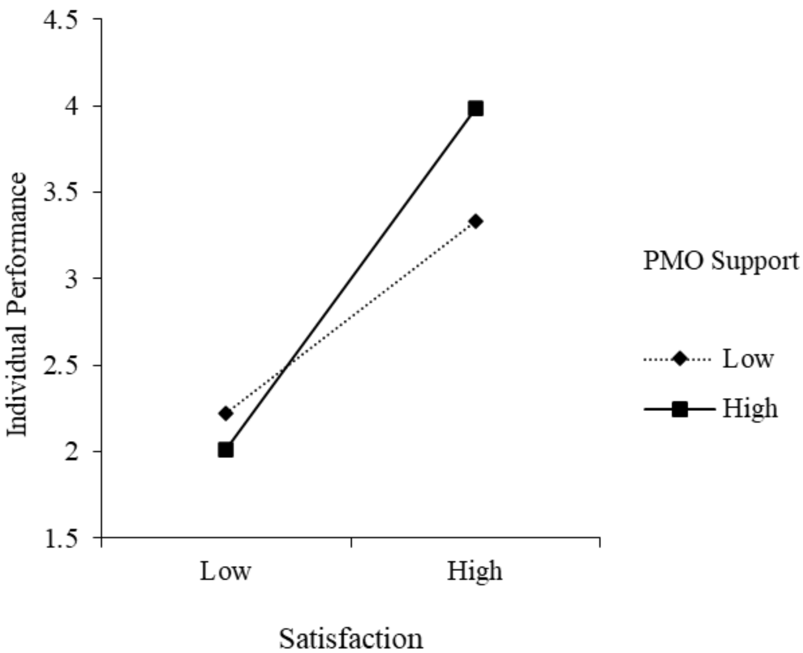

Figure 3. *Slope analysis.*

6. Discussion

As project managers navigate increasingly complex project environments, the ability to access and utilize high-quality information and use advanced technological tools can significantly enhance their decision-making capacity and, consequently, their overall performance. This study has three important contributions.

Firstly, in an era of rapid digitalization, this study underscores the fundamental role of technology in transforming project management practices (Simard and Aubry, 2025), reaffirms that a well-featured PMIS, characterized by high system and information quality, contributes positively to increasing project managers' performance. Recent studies, such as Mahmood *et al*. (2023), show that advances in the integration of artificial intelligence in project management enhance data-driven decision-making, optimizing PMIS processes, tools, and techniques. Through real-time access to project data and automation of routine tasks, PMIS enables project managers to make data-driven decisions, anticipate potential issues, and respond proactively. These findings are critical as they emphasize the importance of organizational investment not only in the technical development of PMIS but also in its alignment with user/project manager expectations regarding functionality and practical utility (Raymond and Bergeron, 2008). A PMIS that is perceived as useful and satisfying is more likely to lead to improved individual performance, particularly in the demanding context of project management.

However, despite the recognized importance of PMIS in improving project execution, a crucial finding from this study is that 19% of respondents reported neither using nor having experience with PMIS. This raises concerns about the adoption of essential tools for some project management professionals to successfully carry out their project activities. It may even be interrogated whether the failure of some projects to meet their expected outcomes is a consequence of not adopting support tools for project management.

Secondly, the introduction of the PMO support as a moderator adds a valuable dimension to this study. The results suggest that the presence of a PMO can significantly enhance the relationship between satisfaction and individual performance. This finding aligns with previous literature, which highlights the role of PMOs in providing support and governance frameworks that can improve project outcomes (Hobbs and Aubry, 2007). Furthermore, it reinforces the significance of alignment between individuals and organizational structures in project governance (Wang et al., 2025), highlighting its crucial role in organizational project management (Malik et al., 2024). By fostering a structured approach to PMIS implementation and usage, the PMO enhances both system adoption and its practical utility, thereby enabling project managers to maximize its benefits in terms of performance improvement. Figure 3 shows that when the PMO plays a more significant role (higher PS), satisfaction leads to greater improvements in performance. On the contrary, with lower PMO involvement, the effect of satisfaction on performance is less impactful, implying that the PMO enhances the influence of satisfaction on individual performance. These results indicate that while PMO support enhances the positive effects of satisfaction on individual performance, it may reduce the importance of how useful the project managers perceive the system to be, potentially due to the PMO's structured support or resources that compensate for the lower perceived usefulness of the PMIS.

Thirdly, given the recent emergence of the PMO as a fundamental component of organizational project management, its adoption has grown significantly in recent years, underscoring its enhanced role in supporting project management (Müller and Wang, 2024).

This observation underscores the ongoing need for the broader dissemination and professionalization of project management practices in organizations, which are typically supported by PMO structures and their associated functions and responsibilities.

A particularly noteworthy finding in this study is that 57% of respondents report performing project management activities in organizations without an established PMO. While this is not a novel finding in isolation, its persistence warrants renewed attention, particularly in light of evolving organizational models for project governance. Recent literature confirms that project management services can be provided through alternative arrangements, such as functional departments, intranet-based tools, or informal knowledge-sharing practices, without the establishment of a formal PMO (Müller *et al.,* 2016). For instance, Müller *et al*. (2024) describe organizations that, despite not having a PMO, effectively manage projects through informal coordination among experienced project managers. Similarly, Artto *et al*. (2011) show how functional structures can deliver PMO-like services without a dedicated unit. These findings suggest that the absence of a formal PMO does not imply a lack of project governance, but rather points to the existence of diverse organizational designs that fulfill similar functions. Thus, our study contributes by reaffirming this evolving landscape and reinforcing the need to consider a broader spectrum of organizational arrangements when evaluating the presence or absence of PMO structures.

7. Theoretical and Practical Implications

The findings of this study offer several important theoretical contributions. First, they reinforce the critical role of technology, particularly the PMIS, in enhancing project management effectiveness and supporting organizational success. By demonstrating the positive influence of PMIS on project manager performance, this study strengthens theories that emphasize the strategic value of information systems in promoting decision-making, accountability, and productivity within project environments. Furthermore, the moderating effect of PMO support on the PMIS–performance relationship offers a meaningful extension to existing knowledge. This finding supports socio-technical theory (Appelbaum, 1977), which posits that optimal performance outcomes arise when social structures (e.g., organizational support mechanisms like PMOs) and technical systems (e.g., PMIS) interact effectively. The study thus bridges technological and organizational dimensions in explaining individual-level project performance, highlighting an intersection that, while increasingly relevant, has not yet been extensively examined in scholarly research.

Practically, the results underscore the importance of strategic alignment between technology use and governance structures. Organizations seeking to maximize the benefits of digital tools must not only invest in PMIS but also ensure that these tools are supported by well-established PMO functions. PMOs that oversee and manage PMIS use are better positioned to provide project managers with timely, relevant, and actionable information—enhancing efficiency, coordination, and execution. However, the findings also reveal that a considerable number of professionals operate in environments without a PMO or do not use PMIS tools at all, potentially relying on ad hoc mechanisms. This signals a lack of professionalization in some organizational settings and highlights the need for decision-makers to critically assess whether adequate support systems and tools are in place to sustain project performance. Establishing such conditions can significantly improve project execution and reduce inefficiencies.

Beyond organizational boundaries, the study has broader societal implications. As digital transformation reshapes how projects are managed across sectors, the proposed model can inform future academic research on the linkage between PMIS, governance mechanisms, and project performance. It may also serve as a reference for policymakers and institutional leaders seeking to guide digital capability-building efforts in public and private organizations.

8. Conclusions

The proposed model clarifies the variables that influence PMIS success. It integrates fundamental constructs to provide a comprehensive assessment. Drawing on the ISS model, the constructs of information quality and system quality are included to evaluate the accuracy, timeliness, and relevance of the information provided by the software. Additionally, individual performance is assessed to determine the direct impact of these qualities on the project manager's effectiveness. Further, incorporating constructs from the ECM, perceived usefulness, and user satisfaction are utilized to understand how the software meets the expectations of project managers and how satisfied they are with its performance. To address the specific context of project management, a new construct, PMO support, is introduced. This construct evaluates the support provided by the PMO in terms of guidance and policies that facilitate the effective use of project management software. Emphasizing

the adoption and proper use of PMIS can lead to more predictable, efficient, and successful project outcomes, aligning with both organizational objectives and project management best practices.
This study presents some limitations that may provide a foundation for future research endeavors. While this research focuses on the PMO as a moderator, other organizational factors such as leadership support, team collaboration, or project complexity can also play a moderating role and should be explored in future studies. Moreover, a still significant number of project management professionals stated that they do not use a PMIS (which was an exclusion criterion). Their roles, experience, and participation in projects remain unknown. However, it is crucial to understand the reasons behind this, especially in the digital era, where decision-making is increasingly supported by technology, and whether this could be linked to potential shortcomings in project execution performance. Furthermore, the study does not account for varying PMO maturity levels, which can impact how PMO support influences the utilization of PMIS and enhances project manager performance.

Additionally, the data were collected through self-reported questionnaires, which may be affected by common method bias and social desirability tendencies, despite the use of established measurement scales and assurances of respondent anonymity. Also, the sample consists of project management professionals who participated voluntarily and were drawn from a specific population. As such, the findings may reflect the characteristics of this particular group and may not be directly generalizable to all project management contexts. Future research could address these limitations by incorporating multi-source data collection, longitudinal designs, or comparative studies across different sectors and countries to enhance external validity.

Appendix: Questionnaire

Screening questions

1. You are actively involved in project development and have been part of project management teams? Y/N
2. Have you ever used, or do you currently use a PMIS to support your activities in project development? Y/N
3. Does the organization where you work have a Project Management Office (PMO)? Y/N

Questionnaire items

Constructs	Items		Adapted from
System Quality			
	SQ1	The PMIS is easy to use.	Tam and Oliveira, (2016) and Urbach *et al*. (2010)
	SQ2	The PMIS allows me to easily find the information I am looking for.	
	SQ3	The PMIS is well structured.	
	SQ4	The PMIS has the functionalities I need to perform my work.	
	SQ5	The PMIS offers appropriate functionality. [(a)]	
	SQ6	The PMIS includes the necessary features and functions for my job. [(a)]	
Information Quality			
	IQ1	The information provided by the PMIS is reliable.	Urbach *et al.* (2010) and Lee and Yu, (2012)
	IQ2	The information provided by the PMIS enables me to do my tasks.	
	IQ3	The information provided by the PMIS is up-to-date.	
	IQ4	The information provided by the PMIS meets my needs.	
	IQ5	Information provided by this PMIS is in a useful format. [(a)]	
Perceived Usefulness			
	PU1	Using PMIS improves my performance on the project.	Daneji *et al.* (2019) and Lee et al. (2015)
	PU2	Using PMIS helps me to better accomplish my project tasks.	
	PU3	Using PMIS improves my decision-making.	
	PU5	Using PMIS improves my work performance. [(a)]	
User Satisfaction			
	ST1	I am satisfied with the system quality.	Caniëls and Bakens, (2012) and Raymond and Bergeron, (2008)
	ST2	I am satisfied with the information quality.	
	ST3	The PMIS supports well my area of work and responsibility.	
	ST4	I really trust the reports from the PMIS. [(a)]	
Individual Performance			
	IP1	The PMIS enhances my effectiveness in my job.	Urbach *et al.* (2010).
	IP2	The PMIS has a positive impact on the results of my projects.	
	IP3	The PMIS gives me greater control over my work.	
	IP4	The PMIS enhances the efficiency of my work.	
	IP5	PMIS enhances my job effectiveness. [(a)]	
PMO Support			
	PS1	The PMO provides clear guidelines for using the organization's PMIS.	Blomquist *et al.* (2016) and Rodney Turner *et al*. (2009)
	PS2	The PMO ensures that the PMIS meets the needs of the project managers and team members.	
	PS3	The PMO promotes an organizational culture that values the effective use of PMIS.	
	PS4	The PMO promotes communication and collaboration between project managers and team members regarding the use of PMIS.	
	PS5	The PMO is consistently aligned with the use of PMIS in the organization. [(a)]	

Note: a) Excluded from the questionnaire in the item generation and refinement.

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