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Project Management Information system success and structure

Master's Thesis in Strategic Project Management
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ABSTRACT:

In the recent project management context, Project Management Information Systems (PMIS) play a prominent role in supporting project execution to project closure. It also supports critical events, such as decision-making, risk identification, and management. However, existing information system (IS) evaluation frameworks like D&M and Ahlemann PMIS framework fail to capture PMIS effectiveness fully, as they prioritize technical metrics (e.g., system quality, information quality) while overlooking project-specific success factors (e.g., stakeholder alignment, dynamic collaboration) emphasized in PMBOK and ISO 21500 standards. This research aims to evaluate the limitations of these models in evaluating PMIS and investigate their application with Critical Success Factors (CSFs) defined by project Management standards such as PMBOK and ISO 21500.

A comprehensive literature review was conducted using peer-reviewed publications and academic databases to evaluate IS success dimensions and propose refinements for a tailored PMIS evaluation framework. Findings reveal that while D&M model offers a validated IS assessment structure, it lacks adaptability to project management's dynamic needs, and although Ahlemann PMIS framework address project management specifics, it falls short in terms of empirical validation and scalability to multi-project environments. Additionally, both models underrepresent soft factors such as stakeholder engagement, leadership, and collaboration, which are prominently recognized in the present Project Management guideline.

This Study emphasizes the need for a comprehensive, tailored PMIS evaluation framework that integrates both hard and soft skill success dimensions, aligned with recognized PM standards, such as the PMBOK and ISO 21500. The findings lay the groundwork for future empirical research and model development, particularly supporting multi-project and industry-specific applications.

KEYWORDS: PMIS success, DeLone & McLean, Ahlemann Framework, critical success factors, PMBOK evaluation, ISO 21500

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1 INTRODUCTION

1.1. The Rise of PMIS in Modern Project Management

Project Management systems (PMIS) have expanded significantly over the past several decades, becoming all-inclusive options that assist complicated projects throughout their lifecycle (Kaiser & Ahlemann, 2010 , pp. 1-12). These software applications enable individuals or organizations to keep monitor on projects from beginning to conclusion, providing project managers and other team members with essential data regarding the distribution of resources, budgeting, supplier management, time management, tasks assigned, quality control, documentation, and collaborative tools (Micale et al., 2021, p. 11233). PMIS aims to enhance effectiveness by making the development cycle accessible as long as all users can monitor individual activities and have a better idea of how the project is moving on (Mukherjee & Roy, 2017, p. 98).

As the theoretical understanding of PMIS developed, researchers began to explore their practical applications in project management. Early research in project management literature recognized the importance of IT-based information systems in supporting project managers' planning, organizing, controlling, reporting, and decision-making processes. According to Cleland & King (1983), the main goal of a PMIS is to provide managers critical information regarding the cost-time performance metrics of a project and the interconnections among these metrics. Raymond & Bergeron (2008, pp. 213–220) further defined PMIS as subordinate to project objectives and strategies, highlighting their function in enhancing project execution (figure 1.1). While these early definitions defined PMIS as crucial tools for project execution, their practical influence on project performance remained mostly theoretical (Winter et al., 2006, pp. 638–649). As PMIS use developed, researchers tried to measure their practical efficacy, leading to empirical studies on their utilization and effects.

Despite the theoretical and practical importance of PMIS, there have been very few investigations on the actual utilization of this system and its effects (Winter et al., 2006, pp. 638–649). Research on PMIS has primarily emphasized mapping the user demographics of project management technology implementation (Liberatore & Pollack-Johnson, 2003, pp. 164–174) and assessing specific applications of these systems or software modules to facilitate project management activities such as planning (Amami et al., 1993, pp. 21–28), communication and reporting, risk management, scheduling, cost estimation (Love & Irani, 2003), and document management (Amami et al., 1993, pp. 21–28). Nevertheless, these studies often neglect comprehensive assessments of PMIS efficacy.

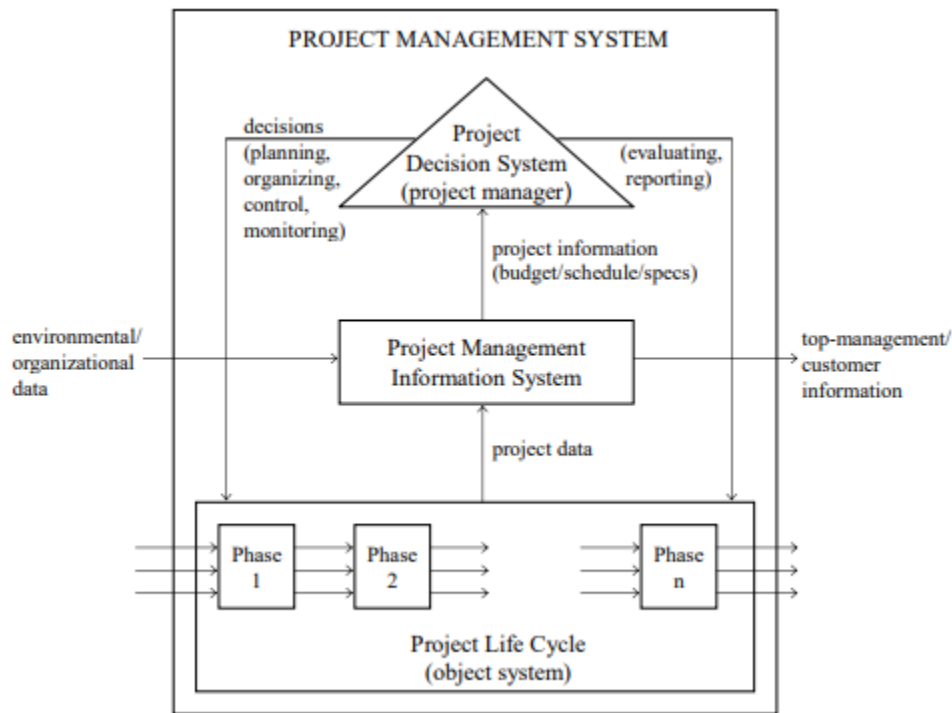


Figure 1-1: The PMIS within the project management system (Raymond et al., 2008, pp. 213–220)

The absence of thorough research grew more problematic as organizations reported inconsistent outcomes from PMIS installations. While some project managers praised these technologies with boosting schedule adherence by 59% and budget compliance by 41% in

controlled circumstances, others emphasized persisting issues in data integration and user resistance (Mwandiki, 2022). These disparities underscore the need for comprehensive assessment frameworks to measure PMIS effectiveness across multiple dimensions, such as technical performance, information quality, and organizational impact. For example, according to Raymond & Bergeron (2008, pp. 213–220), the PMIS success model revealed indirect paths by which system quality affects project results, mediated by aspects including decision-making efficiency and resource optimization (Bergeron, 1986, pp. 225–237). However, their studies also found that 36% of PMIS installations during project beginning phases failed to maintain utilization through subsequent stages, highlighting unsolved challenges in system adaptation and user training (Etezadi-Amoli & Farhoomand, 1996, pp. 65–73).

While much of the early research focused on operational aspects of PMIS, a shift is now occurring towards understanding how these systems impact organizations at a deeper level, including factors that contribute to their successful implementation and user satisfaction (Kerzner, 2009). The development of project management mirrors a broader trend of growing complexity and interconnectedness in projects. As sectors confront rising expectations for speed and responsiveness, project managers must incorporate several approaches to fit their objectives (Kolisch & Hempel, 1996). The merging of conventional methodologies with current agile concepts demonstrates a growing realization that no one strategy can solve the numerous issues of contemporary project management (Liberatore & Pollack-Johnson, 2003, pp. 164–174). Understanding this historical context improves awareness of project management techniques and provides professionals with a diverse toolkit for managing various project types effectively.

However, an organizational analysis of the value of project management information systems has not yet been conducted. The characteristics of a PMIS that have the most impact on its use and users' satisfaction are yet unclear (LARSEN, 2003, pp. 169–246). One reason for a shortage of study on the issue is that the more sophisticated PMIS is still relatively new. multi-project management capabilities have just been added to most

systems in the last five to ten years (Micale et al., 2021, p. 11233). However, projects have become much more relevant as a way to organize companies (Whittington, 2014, pp. 87–91), and as a result, project-related issues have grown in popularity as research topics. Given the increasing importance of project management and the corresponding rise in PMIS installations, the benefits of PMIS must be clearly stated by Love & Irani (2003). It is also vital to understand the elements leading to their utilization and user pleasure (Winter et al., 2006, pp. 638–649). Understanding these challenges might help with PMIS implementations from requirements engineering to change management at launch.

Scholarly work on PMIS has primarily focused on three core areas: assessing commercial project management tools through comparative frameworks (Kolisch & Hempel, 1996), algorithms for process research problems related to project management (Micale et al., 2021), and prototyping and evaluating novel software functionalities (Herroelen, 2005, pp. 413–432). Two recent studies have examined PMIS usage and success: Increasing project complexity and the level of information quality explain PMIS usage, according to Baleni & Gande (2023) study on the impact of organizational and project factors on PMIS acceptance and use (Raymond & Bergeron, 2008, pp. 213–220), a comparable study, and confirmed the importance of data quality. Additionally, they demonstrated that positive outcomes (in the sense of benefits) for the project manager will eventually lead to increased project success.

1.2. The Role of PMIS Success Models: DeLone & McLean vs Ahlemann

PMIS plays a vital role in assessing the effectiveness and impact of these systems in successful model organizations (Karim, 2011). In the most accredited models, the IS of DeLone and McLean (D & M) provides a different complementary perspective when the success system (IS) success model and PMIS Success Framework of Ahlemann (M model) are used to evaluate the success of PMIS.

1. DeLone & McLean Model (DeLone & McLean, 1992, 2003)

The IS Success Model (ISSM), developed by DeLone and McLean, has its roots in research conducted in the 1970s and 1980s. The theoretical foundation of the model is derived from the systemic communication approach (Shannon & Weaver, 1949) and the communication theory of Mason (1978, pp. 219–234). The concept is predicated on a temporal process model that explains how users adopt and implement IS (DeLone & McLean, 1992). System quality and information quality are the two fundamental components that determine an IS's many attributes. Administrators and users engage with the system to experience these features. As a result, individuals are either satisfied or dissatisfied. People's work performance is affected by how the system is used. Eventually, this individual influence might have an impact on the organization. According to DeLone & McLean (2003), the ISSM often requires domain-specific adjustment, which means changing the definition of success measures and the constructs that directly relate to IS salient aspects. However, to compare research findings and validate conclusions, DeLone and McLean suggest reusing as many constructs and metrics as possible. Since its publication, several studies have examined and validated the model's assertions. As a result, it might be considered a strong theoretical foundation for successful research.

2. Ahlemann Model (Ahlemann, 2009)

The Ahlemann (2009) PMIS offers a complete Ref -ModPM framework to assess the performance of the PMIS by incorporating numerous elements of system effectiveness. Their model enhance the traditional information system success model by emphasizing project-specific factors such as project complexity, organizational environment and user behavior (Ahlemann, 2009, pp. 19–30) outlines the primary factors affecting success, including the quality of the system, the quality of information and the quality

of service, affecting success, which collectively affects user satisfaction and system use (Kaiser & Ahlemann, 2010 , pp. 1-12). The model also underlines the need for organizational support and change management in PMIS adoption, arguing that technical efficiency does not ensure successful implementation alone (Kaiser & Ahlemann, 2010 , pp. 1-12). In addition, the M model corresponds with project management functioning, bridging the gap between it and the managerial approach. By offering a structured approach to evaluate the PMIS effectiveness, this model helps organizations assess their system contribution to project success and optimize their project management strategies. Its relevance is increasing because PMIS is developing with digital changes.

While both models offer valuable insights, the framework of D&M is more common, significantly focusing on success factors. In contrast, the M model was explicitly developed for PMIS evaluation, and in the IS evaluation, it integrates the principles of project management. The Ahlemann method gives more practical and holistic knowledge of PMIS effectiveness, particularly in a complex project context where many stakeholders depend on the system. However, the model of D&M is significant as a core evaluation tool, notably in analyzing user satisfaction and system goals.

This research compares these key models and underlines the necessity for a hybrid strategy that integrates general PMIS assessment with the principles of success and project-specific success criteria.

1.3. Challenges in Evaluating PMIS Success

Incorporating technology to improve project management, the IS controls the whole undertaking. These models explain the problems the project manager had while using PMIS. According to Raymond & Bergeron (2008, pp. 213–220), project managers use information systems to make decisions.

A. Quality and Scope of the Project

Each project's design and the software used to achieve the design goals are important components. We cannot cut corners on the design or the design software since any harm would affect the project and all its related elements. According to Baleni & Gande (2023, pp. 1–16), scope involves assessing the assumptions and constraints of the project for which we must execute several activities. After each project module is constructed, it is quicker and more effective to continuously check for problems to get the intended outcomes. It is preferable to check for errors while the modules are small and can be readily modified rather than testing after the project is complete (Love & Irani, 2003). To determine the program errors, we should now be able to combine all the software modules from different computers into a single module. The application should be easy to use and debug, and it should run on a variety of user interfaces.

B. The flexibility of using the software in all Industries

The Lalmi et al. (2021, pp. 921–930) claim that it is difficult to find a suitable software program for the construction job. However, this also applies to all other firms. According to Douglas (2015, pp. 154–155) the software developers and management of such software sell disinformation about universal project compatibility. In many cases, the software is not compatible with the project we are working on. The systems project participants use to construct a project are not adaptable, and employees sometimes must deal with the limitations of the software. According to Micale et al. (2021, p. 11233), the PMIS software is used when many teams collaborate on a project, each having its own software platforms and processes. The one-size-fits-all approach is more challenging to implement in

such instances. Employees will not exhibit much enthusiasm for work, which may eventually impact the project.

C. Improper Network Structure

Frequently submitting duplicate files repeatedly, it may be challenging to identify which file is the final version with all the changes made, and working on a project can be irritating if someone else on the team cannot observe the changes you have made. Therefore, for instance, for everyone in the group to view the files and communicate with one another, all terminals and PCs/laptops must be connected to a shared network (Cleland & King, 1983). There are limitations to using a network as well. Simply, one team member's connection issues may compromise security, or processing the same file more than once could result in errors. According to Raymond & Bergeron (2008, pp. 213–220), project staff members must be connected to a centralized system that allows other team members to assess, edit, and modify data. Nonetheless, access should be granted to qualified staff members according to their standing. It is improper to provide the employees with total access; instead, the project manager should oversee all limitations. To protect the progress, data transformation may require the project managers' prior approval. It is essential to coordinate the use of files appropriately. According to Love & Irani (2003), to complete the task, there should be no communication gaps between staff members.

Even if the project management information system has many shortcomings, these issues may be resolved before they worsen if a project manager implements the required improvements (Kerzner, 2009). There are several difficulties with the project management information system, including managerial and technological issues. Incorporating information systems into project management produces

accurate processed data (Liberatore & Pollack-Johnson, 2003, pp. 164–174). Although adopting a project management information system can be costly, an organization can save money and achieve better results by conducting more research and appropriate studies.

1.4. Research Questions

1. What are the limitations of existing information systems success models, such as DeLone & McLean, when applied to PMIS?
2. How can Ahlemann PMIS model and findings from other literature be combined to propose a tailored framework for project management needs?
3. What are the key success factors for evaluating PMIS effectiveness in alignment with project management standards(PMBOK® Guide (PMI, 2021), ISO 21500)?

1.5. Research Objectives

The key objectives of the research are:

- To critically evaluate existing IS success models, especially DeLone & McLean and Ahlemann, relevant to Project Management Information System (PMIS).
- To identify limitations in how these models address PMIS-specific success dimensions, including project performance domains and stakeholder-related factors.
- To explore and synthesize critical success factors (CSFs) and project management standards (PMBOK, ISO 21500) to enhance the evaluation of PMIS success.

1.6. Significance of Study

1 Contribution to Literature

The discrepancies in existing literature on PMIS evaluation reveal how success is measured, and various models are applied in different contexts (Baleni & Gande, 2023, pp. 1–16). However, there is a lack of an integrated structure that addresses the full scope of PMIS effectiveness, including technical and strategic aspects. This study contributes to the literature by integrating and refining existing assessment models, namely the D&M IS success model and the M model, which creates a more comprehensive and seamless structure to assess the PMIS success. By comprehensively reviewing the current research, this study will provide a holistic approach to the PMIS assessment, identifying major factors contributing to its effectiveness in project management. Additionally, it will highlight gaps and limitations in current models, providing recommendations for future research. This will serve as a basis for further studies on PMIS and its role in the project success.

2 Theoretical Contribution

The theoretical contribution of this research lies in incorporating and clarifying existing models in terms of PMIS evaluation. While D&M success model have been widely enforced in information system research, their limited sufficiency for the project management environment makes them less suitable for the evaluation of PMIS (Harwardt, 2018). On the other hand, the M model provides a more specific approach but requires clarification to address the developed nature of project management and digital changes (Caniels & Bakens, 2012, pp. 162–175). This study will increase theoretical understanding by reducing the difference between these two models and incorporating project management standards such as PMBOK® Guide (PMI, 2021) and ISO 21500.

3 Contribution to Practice

In practice, this study provides valuable insight into organizations that rely on PMIS for project management. The proposed evaluation criteria will allow organizations to systematically assess PMIS effectiveness, considering hard factors (e.g., system quality and user satisfaction) and soft factors (e.g., business alignment and decision-making support). A standardized PMIS evaluation approach enables research organizations to make more informed decisions about adoption, adaptation, and resource allocation (Karim, 2011). This project management supports better alignment between goals and PMIS functionality, eventually improving project results. In addition, the practical implications of this study expand to project managers, IT professionals, and decision-makers who want to ensure that PMIS makes a meaningful contribution to operational efficiency, strategic decision-making, and organizational success (Karim, 2011).

1.7. Method of Study

This study utilizes a comprehensive literature review approach to evaluate PMIS success models. By thoroughly examining existing studies, journal articles, and books, this method enables theoretical models and the widespread discovery of their practical applications without relying on primary data collection. Unlike empirical research or case study approaches, literature allows for a comprehensive synthesis of reviews by scholars, which offers a structured evaluation of PMIS effectiveness.

The research pulls sources from publications, conference proceedings, and official books to ensure dependability and relevance. This research aims to provide a holistic understanding of PMIS success assessment by examining a wide range of scholars' contributions. The analysis will focus on synthesizing key findings from several studies, identifying general subjects, and exposing gaps in existing literature.

According to the research question, the literature review will be structured around three major areas. First, it will study the limitations of existing IS success models in PMIS evaluation. In this area, we will discuss an overview of the IS success model, the application of the D&M model in project management, the identified limitations of existing models, and the need for a PMIS-specific evaluation model. Second, it will study enhancing the M model for evaluation, comparative analysis of other PMIS studies, identifying gaps and overlaps between models, and need of a tailored framework for better evaluation of PMIS. Finally, it will discuss key factors for PMIS evaluation and their alignment with standards. Under this area mainly focus project management standards, CSFs in PMIS evaluation, aligning PMIS evaluation with project performance domains and proposed success factors for future tailored framework.

Through this literature-based approach, the study's objectives are to give a consistent assessment of the PMIS success model, which adds to their efficacy and deep awareness of areas for development.

2 LITERATURE REVIEW

2.1. Limitations of Existing IS Success Models in PMIS Evaluation

2.1.1. Overview of Information System (IS) Success Models

Information has become one of the most critical drivers in the world of the 21st century, shaping communication (Saunders, 1981, pp. 431–442), economy (R. C. Lee, 2012), management, organizations, and consumer behavior (Karim, 2011). As the backbone of the global economy, integrating IS within organizations is necessary to maintain competition in a technology-managed business environment (Hevner et al., 2004, p. 75). Organizations that engage in technology to improve decision-making, operational efficiency, and competitive advantage should assess the effectiveness of their IS. Given the complexity of the modern IS, structured evaluation methods are required to determine its effectiveness and impact. IS success models provide a systematic outline to assess key determinants such as the quality of the model system, user satisfaction, and commercial values (Freeze et al., 2010, pp. 173–184). These models help to organizations for optimize system functionality, improve adoption, and align technology with strategic goals, which require them in today's digital landscape (Iivari, 2005, pp. 8–27).

Organizations that engage in technology should assess the effectiveness of companies working in IS intensive fields and allocate an important part of their budget for IS investment, emphasizing the need for structured evaluation methods. IS success models provide a systematic approach to assess the effectiveness and impact of information systems by defining key determinants of success, identifying the average results and affecting the display that affects the relationship between various factors (Raymond & Bergeron, 2008, pp. 213–220). These model help to organizations for optimize system functionality, increase user satisfaction, and align abilities with aligned strategic business purposes, making them unavoidable tools in today's digital economy (Iivari, 2005, pp. 8–27).

Although success and effectiveness are often used interchangeably, they represent different concepts. IS Effectiveness focuses on how much the information system supports decision making and organizational goals (Karim, 2011). Nicolaou (2000, pp. 91–105) defines IS effectiveness as “the satisfaction of decision makers regarding the accuracy and monitoring effectiveness of information produced as output”. In more conventional studies, (Özyurt & Özyurt, 2013, pp. 371–378) define it as "satisfaction regarding the quality of information in system output"(Nicolaou, 2000, pp. 91–105).

According to Raymond & Bergeron (2008, pp. 213–220), the quality of the IS organization interface, which establishes the components and relationships between the IS and the organization, is correlated with IS effectiveness. "The degree of change provided by IS on organizational effectiveness" or "the degree of success of the organizational unit using the system in achieving goals" are two methods defined by Attri & Grover (2014, pp. 320–328). Measuring IS success or effectiveness is very important in terms of the efficiency and value of IS management activities and IS investments (DeLone & McLean, 2003).

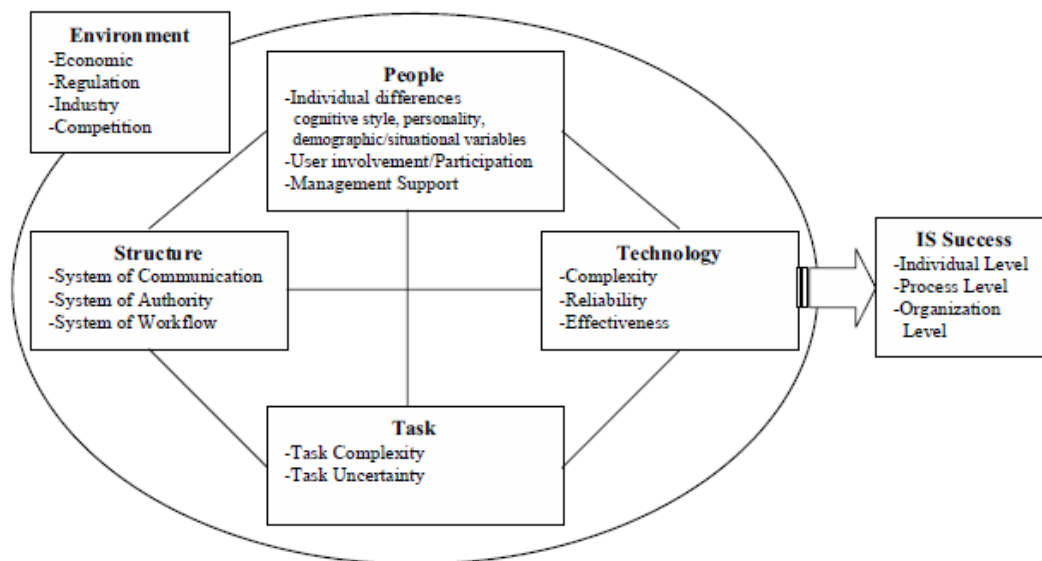


Figure 2-1: Framework for understanding IS success (Garrity & Sanders, 1998)

IS success models play an important role in evaluating the effectiveness and impact of the information system within model organizations (DeLone & McLean, 2003). They offer structured structures to assess significant aspects such as the system's quality, user satisfaction, and commercial values, enabling organizations to measure returns on their IS implementation investment (ROI) (Nicolaou, 2000, pp. 91–105). By identifying strength and weaknesses, these models help decision-makers to customize system performance, increase user experience and align technology with strategic business purposes (Babaei & Beikzad, 2013, pp. 374–381). In addition, IS success models support the continuous improvement by providing insight into adoption, purpose, and overall contributions to organizational success, making them the necessary equipment for both researchers and practitioners the field of information system (LARSEN, 2003, pp. 169–246).

Despite being extensively used in many different fields, IS success models need certain concepts to be applied to PMIS (Karim, 2011). PMIS is intended to make project planning, execution, and monitoring easier, in contrast to general, which serves a variety of business processes (Micale et al., 2021, p. 11233). In addition to system quality and user happiness, PMIS effectiveness is evaluated by how well it can boost project performance, stakeholder support, and decision-making efficiency. To handle these project-specific aspects, it is necessary to carefully adjust successful models for PMIS (Freeze et al., 2010, pp. 173–184).

2.1.2. Core IS Success Models

1. DeLone & McLean Model

The D&M model (DeLone & McLean, 1992,2003) is one of the most well-known models to assess IS success regarding technology uses and its outcomes. The researcher adopted the IS success model as it is one of the most comprehensive theoretical frameworks for evaluating IS success. However, its application in PMIS is critical as PMIS requires a balance between system functionality and its contribution to project results (Karim, 2011). Unlike traditional IS, where the system's success is often associated with long-term business value,

PMIS success is more project-specific, focusing on real-time cooperation, risk management, and performance monitoring (Petter & McLean, 2009, pp. 159–166). The D&M model provides a basis for evaluating both technical (system quality, information quality) and impact (user satisfaction) aspects of IS, which is still a valuable but complex tool for project-based assessment (Zaman et al., 2022).

DeLone & McLean (1992) created the IS success model as a thorough framework for evaluating the effectiveness of information systems. This framework builds upon the D&M IS Success Model (see Fig. 2.2), which identifies that Information Systems success is determined by six interconnected variables: System Quality, Information Quality, Use, User Satisfaction, Individual Impact, and Organizational Impact. Many scholars have provided significant concerns or increased and improved the original D&M model (Pitt et al., 1995, pp. 173–187; Seddon, 1997). The 1992 D&M model's critics maintain that there are sufficient replacements and that it demands adding more components than are essential.

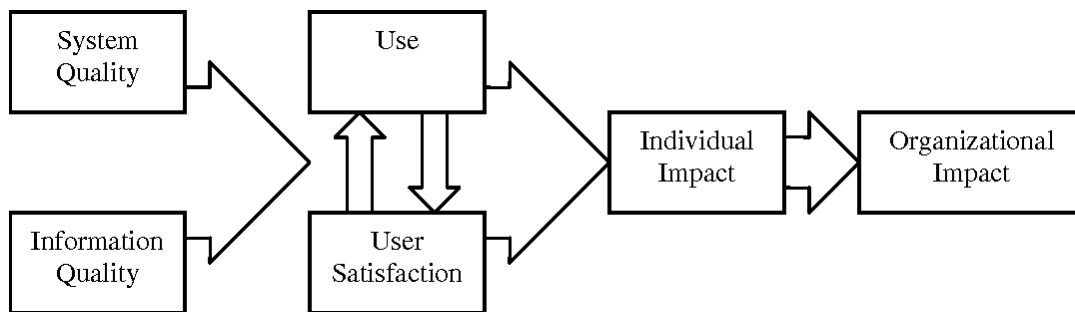


Figure 2-2 D & M IS success model on 1992 (DeLone & McLean, 1992)

DeLone & McLean (2003) updated the IS Success Model in response to recommendations from scholars. System quality (SQ), Information quality (IQ), Service quality (SQ), Use/intention to use, User satisfaction, and Net benefits are the six interconnected components of information systems success. In addition to adding intention to use and

service quality factors, the revised version substitutes a net benefits variable for the previous models organizational and individual effect variables.

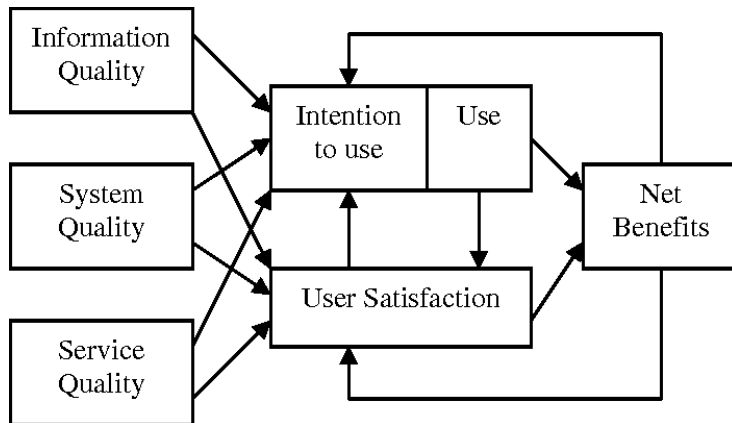


Figure 2-3: Updated D& M success model in 2003 (DeLone & McLean, 2003)

The updated model, incorporating Service Quality and Net Benefits, better aligns with contemporary project management needs. Additionally, the introduction of Functional Quality ensures a more nuanced assessment of PMIS alignment with project-specific requirements (DeLone & McLean, 2003). Further research should explore refinement in the model, adapting it to evolving project management methodologies and technological advancements.

Table 2-1 : Key changes on review after a decade by DeLone and McLean

Dimension	1992 Model	2003 Model	Changes in 2003 (DeLone & McLean, 2003)
1. System Quality	Evaluates the technical performance, reliability, and usability of the system.	Retained from 1992 with a continued focus on system functionality and ease of use.	No significant change.

2. Information Quality	Assesses accuracy, completeness, relevance, and format of system output.	Retained from 1992 with emphasis on high-quality information for decision-making.	No significant change.
3. Service Quality	Not included in the original model.	Added as a new dimension to evaluate user support, responsiveness, and reliability of IS services.	Newly introduced in 2003.
4. Use/Intention to Use	Initially defined as "Use" – measuring actual system usage.	Refined to include both "Intention to Use" (for voluntary systems) and "Use" (for mandatory systems).	Expanded to cover both actual and intended use.
5. User Satisfaction	Measures user perceptions, expectations, and experiences with the system.	Retained from 1992 with a focus on user experience improvements.	No significant change.
6. Net Benefits	Originally defined as "Individual and Organizational Impact" – measuring benefits at different levels.	Replaced "Individual and Organizational Impact" with a broader concept of "Net Benefits" to account for a wider range of stakeholders.	Shifted focus from individual and organizational levels to a more holistic net benefits perspective.

2. IS success model of Gable et al. (2008)

IS success model of Gable et al. (2008) proposed a success model for the Enterprise System (ES) based on the original model of D&M. Shang & Seddon (2000) paper on the dearth of research on IS success, particularly Enterprise Systems Success (ESS), and the advantages of IS success models, they created a model in which SQ, IQ, II, and OI are closely associated to ES success (Gable et al., 2008).

In contrast to the D&M approach, the study offered a measurement approach to determine multidimensional ES success utilizing the five distinct aspects of success. They declared that the proposed measurement model does not account for the variable of usage, does not convey any causation or process, and treats satisfaction as a generic measure of success rather than a dimension (Gable et al., 2008).

3. The extended ERP success model of Ifinedo (2006, pp. 22–44)

In 2006, Princely Ifinedo selected G. G. Gable et al. (2003) work as a foundation and attempted to develop a usable success measurement model (Ifinedo, 2006, pp. 22–44). Markus et al. (2000) extended the traditional IS success model by introducing two additional dimensions—Workgroup Impact (WI) and Vendor Quality (VQ)—to formulate a more comprehensive ERP Success Model. The model was tested via the Structural Equation Model (Esteves & Pastor, 2006, pp. 63–71). In their studies, which Ifinedo (2006, pp. 22–44) based his study on, G. G. Gable et al. (2003) claimed that the use of success dimensions that are either narrowly or limitedly defined is one of the factors contributing to the confusion of the results given on the effectiveness of IS. Therefore, Ifinedo (2006, pp. 22–44) was well-motivated by the fact that certain implementers were unclear of the meaning of measurement and evaluation in relation to ERP systems.

4. Technology Acceptance Model (TAM)

F. D. Davis (1989, pp. 319–340) developed TAM to explain and predict technology adoption behavior, emphasizing perceived usefulness and ease of use as core drivers of acceptance and deployment success. It focuses on the psychological and behavioral factors influencing users' willingness to adopt and use a system (McDonald et al., 2022). In order to predict a theoretical explanation for the effective deployment of technology, the TAM's main goal was to provide light on the processes that underlie technology acceptance (F. D. Davis, 1989, pp. 319–340). The practical purpose of TAM was to inform physicians about

measures they could take before implementing the system. TAM has been extended over time to address additional affected factors. TAM2 (Venkatesh & Bala, 2008, pp. 273–315) introduced social influence and cognitive instrumental processes such as external variables, while TAM3 (Venkatesh & Bala, 2008, pp. 273–315) expanded the model by incorporating factors such as perceived risk, experience, and confidence (Clifton, 2018).

2.1.2.1. General Limitations of IS Success Models in Term of PMIS

The evaluation of IS success has evolved over time, with multiple models developed to assess different aspects of IS effectiveness. However, each model has its own limitations, which necessitates continuous refinement to align with the changing technological landscape. This section explores the general limitations of major IS success models.

Each of the IS success models, Gable et al. (2008) model, Ifinedo (2006, pp. 22–44) extended ERP model, and the Technology Acceptance Model (TAM) (F. D. Davis, 1989, pp. 319–340) has its limitations. The Gable et al. (2008) model lacks a comprehensive framework and does not include key metrics for understanding how system involvement influences success over time. Similar to this, Ifinedo (2006, pp. 22–44) expanded the ERP success model, introducing dimensions like seller quality (SQ) and workgroup impact (WI), which add complexity. However, this depth might make identifying the most noteworthy ERP success difficult. It is also more reference specific, limiting its application to a broader environment. The TAM, on the other hand, primarily concentrates on purported usefulness and simplicity of use, failing to adequately account for the extensive organizational and societal impacts on user or technology adoption problems (F. D. Davis, 1989, pp. 319–340).

These models also share general limitations in their purpose in various contexts and inability to fully address the long-term impact of information systems. A major limitation of traditional IS success models, which is their dependence on static assessment criteria, which cannot catch the needs of a developing project. The iron triangle (cost, time, and

scope) is often used to measure success, but it fails when the user's satisfaction, adaptability, and long-term benefits are ignored (Weaver, 2024). In PMIS, projects can meet budget and schedule goals, yet poor stakeholder engagement may fail due to a lack of integration with engagement, rigid work, or project needs. Traditional models also believe in linear relations among success factors, ignoring dynamic projects such as changing requirements and recurring growth, which makes them less effective for modern PMIS evaluation.

Despite their widespread use, the IS success model has several limitations when applied to PMIS, primarily due to project complexity. A major border is their reference specific nature, as most models like D&M (DeLone & McLean, 1992; DeLone & McLean, 2003), Gable et al. (2008), and the technology acceptance model (TAM) (F. D. Davis, 1989, pp. 319–340), initially designed for traditional IS, ERP system or user adopting studies. These models cannot fully capture the unique features of PMIS, which require integration with project management methods, team cooperation, and dynamic decision-making processes (Kaiser & Ahlemann, 2010 , pp. 1-12). Traditional IS models are often designed for long-term, stable IT implementations, whereas PMIS must operate within dynamic and temporary project environments (Freeze et al., 2010, pp. 173–184). Project complexity, including multiple stakeholders, evolving objectives, and changing resource availability, makes it difficult to apply a static IS success model effectively (Kaiser & Ahlemann, 2010 , pp. 1-12). For example, in large-scale projects, a PMIS might be technically sound but fail to deliver real-time collaboration or adapt to shifting project requirements, leading to inefficiencies despite high system quality ratings. This misalignment highlights the need for IS successful models to accommodate project-specific challenges (Ahlemann, 2009, pp. 19–30).

Another major limitation of the current success model is their tendency to evaluate success at the same time, rather than accounting for the use of PMIS throughout the project life cycle. Unlike normal IS, which is relatively stable post-implementation, the PMIS project develops dynamically in stages (Petter & McLean, 2009, pp. 159–166). For example, in the

planning phase, success can be determined by accurate scheduling and resource forecasting. In contrast, in the execution phase, real-time data sharing and risk management become more important. A PMIS that performs well in a phase but fails to adapt to the demands of the latter project yet may be considered 'successful' under the traditional model despite clear functional shortcomings. This highlights the need for a life cycle-based success evaluation in the PMIS evaluation structure (Retnowardhani & Suroso, 2019, pp. 160–164).

Furthermore, the issues of work causes present another challenge, as success models often consider linear relations between factors such as the quality of the system, user satisfaction and overall success (Freeze et al., 2010, pp. 173–184). However, in fact, these relationships are interdependent and reference-operated, with factors such as dynamic culture, regulatory obstacles and user behavior with factors such as PMIS effectiveness (Raymond et al., 2008, pp. 213–220). These limitations highlight the requirement of a more adaptive and sewn approach when applying for successful models for PMIS evaluation.

2.1.3. Application of DeLone & McLean Model in PMIS

According to Gartner (2019) projects utilizing PMIS support have a 75% success rate, whereas those without such systems face a 75% failure rate, highlighting the critical role of technology in project management outcomes. Raymond & Bergeron (2008, pp. 213–220) the nature and function of a PMIS inside a project management system are essentially subservient to the success of project goals and the implementation of project strategies. D&M success models, including PMIS, have been used widely to evaluate information system effectiveness. According to DeLone & McLean (2003), the six independent variables are information quality; system quality; service quality; use, user satisfaction, and net benefits. When applied to PMIS, these factors help determine that the system projects the project plan, execution and monitoring. For example, the quality of the system reflects the reliability and performance of the PMIS, while the quality of information determines the

accuracy and relevance of the project data (Wang et al., 2023, pp. 1–20). System usage and user satisfaction are also crucial as they influence project managers and teams adoption rates (Petter & McLean, 2009, pp. 159–166). This project becomes a valuable tool for assessing system performance in the environment because the PMIS model offers an organized way to evaluate effectiveness.

However, despite its advantages, the D & M model does not fully address the complexities of project management, especially in terms of soft approaches (Petter & McLean, 2009, pp. 159–166). The project's success is not only on the system's quality but also on human integration, cooperation and organizational culture. It is evident that the model ignores elements that are critical to PMIS acceptance and use, such as stakeholder participation, communication efficacy, and resistance to change (Syuki & Ombui, 2017). Project teams may, in fact, object to the deployment of PMIS if it interferes with the current workflow or does not provide sufficient training assistance. Additionally, while net profit systems focus on system results, they do not always capture project-specific success indicators such as project changes, knowledge sharing, or adaptability to leadership effects (Petter & McLean, 2009, pp. 159–166). To bridge this gap, integrate soft approaches (Kerzner, 2009) such as change management strategies, leadership participation, and team cooperation metrics - can increase the evaluation of PMIS effectiveness beyond traditional measures of success.

2.1.3.1. Limitations of DeLone & McLean Model

D&M model is a leading framework for evaluation of the IS (DeLone & McLean, 1992) but this IS model had several limitations. A major problem was the lack of a direct measurement of business impact. While the model included the quality of the system, the quality of information, use, user satisfaction and personal effects, it did not clearly define how these factors were translated into organizational performance or strategic advantage (DeLone & McLean, 1992). This lapse was particularly problematic for systems such as PMIS, where success is often measured by the ability to increase the cooperation of the

system, improve decision making and adapt the project results (Jeyaraj, 2020). Without a well-defined relationship between IS success and organizational performance, the model provided an incomplete picture of the IS, providing an incomplete picture of effectiveness, making it difficult for decision -makers to justify investment in mass systems such as PMIS (Iivari, 2005, pp. 8–27).

While the updated DeLone & McLean, (2003), which has improved the original by introducing the original benefits as a major success dimension, yet there were many limitations. A major issue was its continuous dependence on a generalized structure, making it difficult to apply to special domains such as PMIS (Petter & McLean, 2009, pp. 159–166). The model admitted that the quality of the system, the quality of information and the quality of service were the primary driver of IS success, but it was not entirely responsible for reference-specific factors such as collaborative workflows, project complexity or regulatory requirements, which are important in the PMIS environment (Gable et al., 2008). Additionally, while incorporating net benefits helped measure the organizational impact of IS, the model did not provide clear guidelines about how to determine these benefits, which faced challenges in practical implementation and measurement (Petter et al., 2008, pp. 236–263). Another limit is the perception of the cause and linear relations, which looked at dynamic interactions between success factors, especially in large -scale enterprise systems where success is often affected by external environmental factors, user training and developing business needs (Shim & Jo, 2020, p. 137). These deficiencies highlight further refinement and adaptation of IS success models to better align with specific requirements of PMIS and other domain specific information systems.

2.1.4. Need for a PMIS-Specific Evaluation Model

In the present scenario, project managers deal with rapid, complex projects using organizational and technical approaches (Karim, 2011). Traditional attention to structured

success factors, such as scope, cost, and time (Iron Triangle), is no longer enough to evaluate the success of PMIS (Freeze et al., 2010, pp. 173–184). However, the Project Management Body of Knowledge (PMBOK) 7th edition expands the definition of the project's success beyond the "Iron Triangle", including stakeholder engagement, stability, and business value (Guillen, 2021). Although current IS success models remain largely structured, mainly assessing system performance and efficiency without addressing soft success factors, such as stakeholder cooperation, knowledge management, and long-term project effects (Alias et al., 2014, pp. 61–69).

In this context, the PMIS is useful tool and technique to collect, integrate and transmit the outputs of project management processes (Braglia & Frosolini, 2014, pp. 18–29), support the PM in various complexity projects plan, organize and control. As a result, a wide range of PMIS software is available on the market (Liberatore & Pollack-Johnson, 2003, pp. 164–174). Unlike customized versions, commercial PMIS software is ready for mass products that are aimed at generic users (Caniels & Bakens, 2012, pp. 162–175), and their choice is a difficult task. A committee of authors and industry specialists further examined the resultant features to find or combine similar ones (Aga, 2016, pp. 517–525). This procedure aims to explain how key PMIS characteristics are formed, guaranteeing that the assessment model satisfies the requirements of contemporary project management techniques.

Two strategies must be provided regarding a project's success (Shenhar et al., 2001, pp. 699–725). Even if project management does not adhere to time, budget, and quality standards, it is still possible to meet all business objectives. An alternative viewpoint is that project management is possible. For instance, the project falls short of the client's scope, quality, and money expectations. Because specific assessment criteria may be satisfied and others may not, it can be challenging to determine if a project was successful. In other words, success is not always possible in every sense and might be partial (Baccarini, 1999, pp. 25–32). To assess project performance, Serrador & Rodney Turner (2014, pp. 75–84) identify three key reference points: the effectiveness of the implementation process, the

realized value of the project, and stakeholder satisfaction with distributed deliverables. According to Shenhar et al. (2001, pp. 699–725) there are four dimensions of success:

- Project efficiency

This short-term parameter measures each project process's management efficiency. It serves as proof that the project was finished on schedule and within the allocated budget. But it's a solution that only shows effective project management; it doesn't assist with measuring long-term performance. This is an important aspect as the market is changing quickly, competition is becoming fiercer, and life cycles are getting shorter.

- Impact on the customer

The end-user or client controls this dimension. The significance of adhering to their specified demands and requirements is addressed by this solution. New follow-up initiatives, improved iterations of the same product, or outcomes crucial to the organization's success can all be linked to customer happiness.

- Business success

This dimension focuses on the potential effects of the project on the company, such as whether it increased market share, sales, profits, or business outcomes.

- Preparation for the future

Dimensions pertaining to the future contribution of technological and organizational structure. Preparing for prospects, finding new markets, ideas, technologies, and products, and creating new critical skills and capabilities are all part of this long-term dimension.

It is important to differentiate between success factors and criteria to evolve the understanding of success. According to Westerveld (2003, pp. 411–418) effective project management requires balancing result-oriented criteria (e.g., deliverables, timelines) with organizational enablers (e.g., leadership, resources), as both collectively determine project outcomes. Success factors are linked to conditions, facts, and influences (Lim & Mohamed,

1999, pp. 243–248). Success criteria are the dependent structures that determine whether a project is successful (Karim, 2011).

Soft success factors, which concentrate on organizational and interpersonal dynamics including knowledge management, communication, teamwork, and stakeholder involvement, are given more weight in contemporary project management (Raymond et al., 2008, pp. 213–220). These soft techniques are crucial to a project's success, particularly when it gets more complicated and involves various teams and stakeholders (Kerzner, 2013). While traditional project management success criteria often focus on average results such as time, cost, and scope, modern project management assumes that soft elements, such as faith, leadership, and organizational cultures, are equally important in achieving permanent success (Karim, 2011).

PMIS evaluation should incorporate real-time data analytics, stakeholder feedback, and strategic alignment to provide a holistic success measurement framework (Ahlemann, 2009, pp. 19–30). Beyond technical performance, PMIS must assess how well it facilitates collaboration, supports decision-making, and enhances business outcomes. For example, a PMIS may deliver high-quality reports, but if stakeholders find the system too complex to use, overall success is compromised. Integrating both structured (efficiency, reliability) and soft (stakeholder engagement, knowledge sharing) metrics will ensure that PMIS success evaluation reflects modern project management needs. Table 2.2 illustrates a success factor with the traditional comparison of the traditional PMIS specific requirements.

Table 2-2 Comparison of Traditional IS Success Models and Specific PMIS Needs Based on DeLone & McLean Model

D&M Success Factor	Traditional IS Models	Specific PMIS Needs
System Quality	Focuses on system performance, reliability, and usability.	Requires real-time collaboration, project tracking, and integration with project management

		tools (eg: MS Project, Primavera).
Information Quality	Emphasizes data accuracy, timeliness, and relevance.	Must provide project-specific metrics, risk reports, resource allocation data, and real-time updates.
Service Quality	Evaluates IT support, system maintenance, and user assistance.	Requires proactive system support, issue tracking, and minimal downtime to avoid project delays.
Use/Intention to Use	Measures frequency and extent of system utilization.	Critical for ensuring stakeholder engagement and adoption by project teams. PMIS must be mandatory and seamlessly integrated into workflows.
User Satisfaction	Assesses user perception of system effectiveness and usability.	Needs to align with project management best practices and be customizable for different project environments.
Net Benefits	Focuses on organizational improvements, efficiency, and ROI.	We should measure project success in terms of cost control, time efficiency, risk mitigation, and decision-making support.

For instance, D&M model, while comprehensive, tends to focus primarily on user satisfaction, system quality, and information quality as key indicators of success (Iivari, 2005, pp. 8–27). However, it overlooks the critical factors specific to project management, such as project risk management, adaptability to changing project scopes, and integration across different project teams and systems.

This literature review identifies these gaps and establishes the need for a refined PMIS-specific evaluation framework. The findings support integrating factors such as real-time

data analytics, stakeholder engagement, and project success metrics into IS evaluation models. This research will build on these insights to show the need for a tailored framework that better aligns IS success assessment with the unique requirements of PMIS.

2.2. Enhancing Ahlemann PMIS Model for Evaluation

2.2.1. Introduction to Ahlemann PMIS Framework

2.2.1.1. Ahlemann PMIS model

Ahlemann (2009, pp. 19–30) developed a specific framework aimed at evaluating the effectiveness and success of PMIS. Unlike traditional IS success models, which mainly focus on the system quality, user satisfaction, and information accuracy, Ahlemann model (M model) emphasizes project-specific factors such as organizational integration, project performance metrics and stakeholder engagement (Kaiser & Ahlemann, 2010 , pp. 1-12). Organizational integration assesses how well the PMIS project aligns with workflows, technical requirements and overall commercial purposes ensures that the system effectively supports project execution (Taherkhani, 2018, pp. 1667–1677). Despite disparities in project outcomes, research indicates that 99% of organizations now rely on information systems to manage scheduling and time-related activities, underscoring their indispensability in operational workflows (Gable et al., 2008). Instead of supporting multi-project management, the M-Model enables single-project management (Caniels & Bakens, 2012, pp. 162–175). It employs the Unified Modelling Language (UML) Version 2 and is predicated on a single, consistent information system architecture named the M-Model (Caniels & Bakens, 2012, pp. 162–175). Additionally, Stakeholder Engagement highlighted the role of users' participation, cooperation, and communication in PMIS adoption and ensured its effectiveness in various levels of project management (Ahlemann, 2009, pp. 19–30).

Software, hardware, and the surroundings of organizational structure comprise IS, which is socioeconomic. When designing and implementing information systems, “M” model is essential. The “M” model tries to fix the problems with the current reference models by including more aspects of project management and giving data structures and procedures that have been tested in the real world and found to be reliable, flexible, and common by experts in the field (Ahlemann, 2009, pp. 19–30). This approach allows assessing how well the PMIS project contributes to managing and achieving goals (Retnowardhani & Suroso, 2019, pp. 160–164). The model's emphasis on project-specific success factors ensures that the performance of PMIS is evaluated within the unique reference of each project, allowing more targeted improvement and better management of project risk and challenges (Kaiser & Ahlemann, 2010 , pp. 1-12).

Project-specific references are one of the “M” model’s main strengths, and it works incredibly well for assessing PMIs in single-project contexts (Caniels & Bakens, 2012, pp. 162–175). Project initiation, planning, execution, and termination are all included in the “M” model. It describes the several management layers involved in the across the organization project management process (project lifecycle) (Ahlemann, 2009, pp. 19–30) A number of issues occurred about by the organizations many PMIS, including inconsistent data, redundant work, negative user experiences, and trouble handling the PMIS landscape's complexity. (Aazar & Gamdrup, 2023).

The Ahlemann approach offers important insight into how PMIS aligns with organizational and project-specific criteria in project management. The “M” model expands on several concepts from earlier research to meet new needs. Because it has a much broader scope, covering not only project planning and execution but also the initiation and termination phase, and has been designed to serve single project management purposes and does not fully address every knowledge area or process group defined in PMBOK® Guide (PMI, 2021). Instead, it focuses on specific aspects relevant to single-project management while significantly contributing to PMIS reference models by integrating key concepts from the

PMBOK® Guide (PMI, 2021) framework for practical application (Ahlemann, 2009, pp. 19–30).

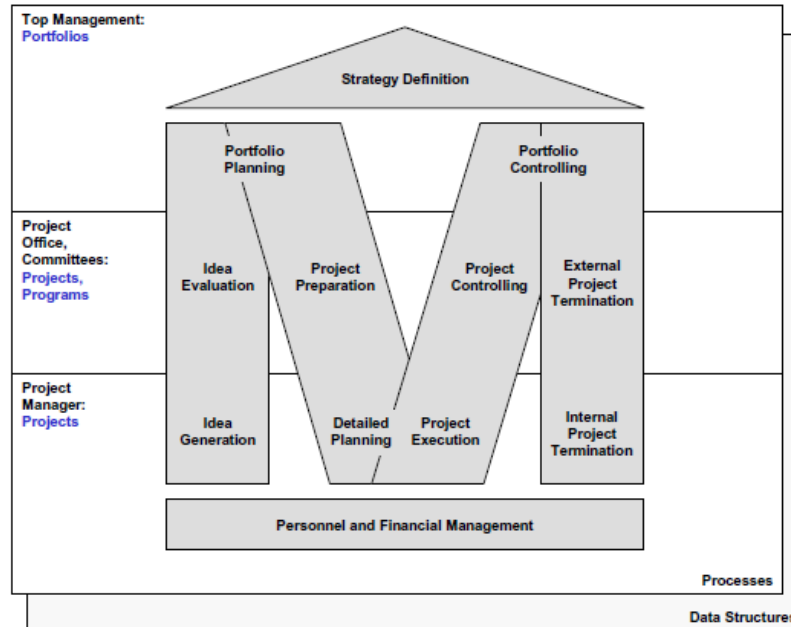


Figure 2-4 The M-Model (Ahlemann, 2009, pp. 19–30)

2.2.1.2. The relevance of Ahlemann model to PMIS evaluation

The “M” model is different from the traditional IS success model in many significant ways, which is highly relevant to evaluating the PMIS (Ahlemann, 2009, pp. 19–30). Traditional IS success models, such as the D & M success models, focus on comprehensive success factors such as system quality, information quality, service quality, and user satisfaction, which apply to all types of information systems in industries (DeLone & McLean, 2003). Although these factors are necessary, they cannot directly address project management systems' unique characteristics and demands.

Even in a single project context, project management is challenging due to the numerous activities, uncertainties, and complexity involved (Mota et al., 2009, pp. 175–181). One project manager frequently oversees several ongoing projects at the same time in a multi-

project setting (Patanakul et al., 2010, pp. 41–66). This change from general is the factor of success for project-specific evaluation criteria, which applies more to the “M” model to PMI, where the system's effectiveness is naturally associated with the project results (Ahlemann, 2009, pp. 19–30).

The relevance of the “M” model for PMIS evaluation focuses on organizational integration, project performance metrics, and stakeholder engagement, which are important for the success of the project (Ahlemann, 2009, pp. 19–30). Traditional success models are often prevalent and do not insist on how well the system is integrated into an organization’s specific project workflows or how it supports the management of project-specific results (DeLone & McLean, 2003). In contrast, the M model addresses these elements in detail, which provides a more comprehensive approach to the evaluation of PMIS performance (Kaiser & Ahlemann, 2010 , pp. 1-12). For example, in a traditional context, the user's satisfaction and the quality of the service quality system can be sufficient to evaluate. However, in PMIS, tangible, time-sensitive results and success metrics such as time, cost, and quality performance are more relevant (Ahlemann et al., 2013). This targeted approach ensures that the evaluation of projects align with the objectives of the project management process, allowing more action in the performance of the system for more actionable insight (Kerzner, 2009).

2.2.2. Gaps and Strengths in Ahlemann PMIS Model

2.2.2.1. Strengths of Ahlemann PMIS Model

The “M” model is used to analyze the success of PMIS implementations by considering their technical quality, organizational fit, and strategic impact (Ahlemann, 2009, pp. 19–30). The model centers on the alignment of PMIS with overarching project management objectives instead of focus on controlling project performance metrics such as cost, time, and scope (Ahlemann et al., 2013). By encouraging greater information flow and decision-making based on the “M” model, effective PMIS can improve scheduling, quality control, and cost

management. Nevertheless, the model does not create operational processes for these domains (Baleni & Gande, 2023, pp. 1–16). This model is beneficial for organizations that manage complex projects due to its capability to integrate several performance measures towards providing a balanced view on the success of PMIS.

Another strength of “M” model is the emphasis on stakeholder engagement and participation, which is important to ensure that the system meets the diverse requirements of its users (Ahlemann, 2009, pp. 19–30). The inclusion of various stakeholders such as the project manager, team members, and the customer helps in designing a PMIS that is usable and has been in line with stakeholders’ expectations. This collaborative approach fosters ownership and commitment from the stakeholders which results in a higher system of adoption and more efficient use of PMIS (Karim, 2011). Even more, the adaptability of the “M” model allows it to be tailored to certain types of projects, industries, and organizational structures, which increases its usefulness in many settings (Ahlemann, 2009, pp. 19–30). This flexibility increases its practicality and ability to evaluate the effectiveness of PMIS in different project environments (Micale et al., 2021, p. 11233).

2.2.2.2. Gaps in Ahlemann PMIS Model

As pointed out by Kahura (2013, pp. 104–116), M model has a specific design capturing the assessment of a project's value on its cost, time, and scope. Though the model is ideally suited for gauging project performance, several shortcomings must be fixed to increase its efficacy when considering the information system's overall success.

1. Lack of Universal Validation (Testor, 2020, pp. 179–181)

One of the primary limitations of the Ahlemann (2009, pp. 19–30) model is the absence of widespread empirical verification in various industries and contexts. Unlike the IS success model constructed by D & M, which has been comprehensively tested and

validated across numerous domains, Ahlemann model suffers from a lack of empirical exposure. Previous literature (DeLone & McLean, 2003), highlights the importance of validated success factors like system quality, information quality, and service quality in evaluating IS effectiveness. Including these elements from the D&M model, taking advantage of the constructions installed, the reliability of the M model will increase, which is empirically valid in diverse environments.

2. Insufficient Focus on IS-Specific Metrics

The Ahlemann model emphasizes project performance metrics but does not adequately address information system-specific success factors such as user satisfaction, information quality, or quality of service (Kaiser & Ahlemann, 2010 , pp. 1-12). Previous researcher, Gable et al. (2008) underlines the importance of assessing user satisfaction, especially in IS success evaluation. Users' perceptions about system purpose, accountability and output accuracy is important for determining the overall success of PMI, yet these aspects have not been adequately highlighted in M model structure (Kaiser & Ahlemann, 2010 , pp. 1-12).

3. Stakeholder Perspectives

While the M model acknowledges stakeholder engagement, the model does not emphasize how stakeholder satisfaction is directly linked to the overall success of PMIS (Ahlemann, 2009, pp. 19–30). Success in literature (DeLone & McLean, 2003) emphasizes the importance of user satisfaction in the success of an information system and understanding the participation of various stakeholders. Strengthening this aspect of the M model by focusing on the satisfaction of the user with the elements of the D&M model can provide a more overall approach to stakeholder partnership in the success of PMIS (Jeyaraj, 2020).

4. Scalability and Generalizability

The M model is designed with a specific focus on individual project references, which can limit its scalability to a large, multi-plan environment or enterprise-wide PMIS

(Caniels & Bakens, 2012, pp. 162–175; Patanakul et al., 2010, pp. 41–66). As organizations increasingly adopt more complex systems, the ability to evaluate the success of PMIS in various projects or organizational units becomes necessary. Previous studies (Iivari, 2005, pp. 8–27) argue for the need for models that can be generalized in diverse organizational contexts, and the M model lacks this flexibility.

2.2.3. Identify the Similarities and Gaps between the models

2.2.3.1. Similarities of DeLone & McLean Model & Ahlemann PMIS model

The Ahlemann model emphasizes project performance metrics but does not adequately address information system-specific success factors such as user satisfaction, information quality, or quality of service (Jeyaraj, 2020). Despite their distinctions, they share many fundamental similarities in their approach to IS's performance.

First, both models, DeLone & McLean (1992, 2003) and Ahlemann (2009, pp. 19–30) emphasize the importance of system quality as the primary determinant of success. DeLone & McLean (2003) define the quality of the system in terms of purpose, display, and reliability, which effectively supports its users. Similarly, the M model involves system functionality and integration with project workflows, ensuring that the PMIS increases the project execution (Ahlemann, 2009, pp. 19–30). A well-designed system with high technical performance is important for success in both models.

Another shared element is information quality, which refers to the accuracy, relevance, and timeliness of the data provided by the system. D&M model users highlight the quality of information as a major driver of satisfaction and decision making (Petter & McLean, 2009, pp. 159–166). Similarly, the M model admits that the information of a high-quality project is necessary for project managers and stakeholders to make informed decisions

(Ahlemann, 2009, pp. 19–30). This aspect is crucial in project management to track milestones, manage risks and maintain transparency.

Both models also recognize the role of user satisfaction in evaluation of effectiveness. D&M model clearly incorporate the user's satisfaction as a success measure, arguing that positive user experience with a leads to high engagement and better system use (DeLone & McLean, 2003). The M model, while focusing on the project management environment, is similarly considering satisfaction as a major success factor with stake engagement and PMIS functionalities (Ahlemann, 2009, pp. 19–30). In both outlines, the system adopts, and user reactions are integral to determine long -term effectiveness.

In addition, the service quality is a dimension that both models address, especially in their updated forms. The modified DeLone & McLean (2003) model includes the service quality as a measure of system support, accountability, and reliability. The model also accepts the importance of continuous system support in the PMIS, ensuring that the software remains effective and adaptable throughout the project life cycle (DeLone & McLean, 2003). Given that PMIS often involves cooperation among many stakeholders, it plays an important role in maintaining the success of the ongoing technical and functional support system (Micale et al., 2021, p. 11233).

Finally, both models believe that the last measure of success is spread beyond using an immediate system for organizational benefits. D&M introduced the net benefit concept to assess IS's impact on commercial performance, efficiency, and decision making (DeLone & McLean, 2003). Similarly, M model evaluates the success of PMIS by contributing to project performance, cost savings and strategic alignment with organizational goals (Ahlemann, 2009, pp. 19–30). In both cases, IS considered successful only when it gives concrete benefits to the organization.

These similarities highlight the shared foundation between the two models in the evaluation. However, while DeLone & McLean (2003) model take a wide perspective applied to a wide variety of information systems and M model (Ahlemann, 2009, pp. 19–30) refines these concepts specifically to the project management environment. When creating a traditional outline that combines the advantages of both models for PMIS success evaluation, it is crucial to understand these broad terms.

2.2.3.2. Gaps between Delone & McLean model and Ahlemann PMIS model

Despite the shared emphasis on the quality of the system, the quality of information, user satisfaction and organizational impact, the IS success models of D&M model (DeLone & McLean, 2003) and M model (Ahlemann, 2009, pp. 19–30) show several important gaps when they are implemented to the PMIS. A major gap is the context-specific applicability of each model. The D&M model were developed as a common structure for evaluation of information systems in various industries (Urbach & Mueller, 2011, pp. 1–18) which means that it naturally does not address the unique demands of the project management environment (DeLone & McLean, 2003). In contrast, the M model clearly corresponds to PMI, but the D&M model lacks widespread empirical verification obtained in diverse settings (Ahlemann, 2009, pp. 19–30). Consequently, D&M is very common for IS applications (Petter & McLean, 2009, pp. 159–166), while the M model is particular to be widely implemented beyond project-based outfits (Ahlemann, 2009, pp. 19–30).

Another significant gap lies in the engagement and system usability. While M model accounts for stakeholder participation in success (Kaiser & Ahlemann, 2010 , pp. 1-12), it does not widely measure the user's satisfaction and usability, which is central for the D & M model (Jeyaraj, 2020). In contrast, while D&M user highlights satisfaction, it does not clearly consider the dynamic role of various stakeholders in the project-based environment, where the process of cross-functional cooperation and decision making has

a significant impact on success (Rai et al., 2002, pp. 50–69). PMIS must accommodate many users with different expectations and system interactions in project management, including the project manager, team members, and officials (Karim, 2011).

Additionally, scalability and adaptability offer another difference between two models. M model mainly focuses on single-project PMIS applications (Massimo et al., 2025, pp. 1739–1747), which means that this multi-project environment or enterprise-wide PMIS integration (Caniels & Bakens, 2012, pp. 162–175) is not adequately responsible for the complications of M model. This capability is vital for addressing the complexities of today's fast-paced business landscape, where managing dependencies and ensuring consistent communication across multiple initiatives can significantly impact organizational success. Conversely, while the D&M model is widespread (DeLone & McLean, 2003), it does not clearly define how success should be measured when an organization uses PMIS in several projects with intelligence (Petter & McLean, 2009, pp. 159–166). In large enterprises, project portfolio often requires real-time data sharing and interoperability, which neither models the direct address (Borštnar & Pucihar, 2014, pp. 14–23; Patanakul et al., 2010, pp. 41–66).

In addition, the structure does not cover performance measurements and project-specific success factors adequately (Isaac et al., 2019, pp. 113–129). While traditional project performance metrics, such as cost, time, and quality, are important, the M model does not center exclusively on these measures. Instead, it evaluates success through broader dimensions like technical quality, organizational fit, and strategic impact. Consequently, it does not explicitly include additional dimensions of success, such as service quality and net benefits, which are highlighted in frameworks like D&M model (Ahlemann, 2009, pp. 19–30; DeLone & McLean, 2003). Meanwhile, D&M does not clearly define how the success of the project success is translated into the performance, risk mitigation, or strategic alignment - PMIS Importance (Petter et al., 2008, pp. 236–263). Consequently, a tailored

framework is required to bridge the difference between normal, successful measurement and PMIS-specific performance assessment.

2.2.4. Need for a Tailored Framework for Project Management Needs

2.2.4.1. The Need for an Integrated Approach

According to Ahlemann (Ahlemann, 2009, pp. 19–30), PMIS have evolved into "all-inclusive systems that support the entire life-cycle of projects, project programs, and project portfolios". The M model has made a substantial contribution to the discipline by providing a methodical way to assess the efficacy of PMIS. It's projective in other project types and sectors were limited by its major focus on project-specific issues (Caniels & Bakens, 2012, pp. 162–175). Because of this limitation, the model is unable to sufficiently address strategic or comprehensive organizational goals that are crucial for evaluating PMIS effectiveness in diverse situations (Choudhury, 2014).

Neither M model nor D&M model success model is enough to widely evaluate PMIS effectiveness because the M model is well suited to project-specific assessment, which focuses on important metrics such as cost, time and quality (Ahlemann, 2009, pp. 19–30). However, it is widespread that the quality of the system, the quality of information and the quality of service, such as success dimensions, are essential for the evaluation of user experience and long-term system stability (Jeyaraj, 2020). As the M model is an ideological reference model for PMIS, it will be especially useful in cases where organizations try to introduce a new project management software or by developing a in house built system (Ahlemann, 2009, pp. 19–30). On the other hand, the D&M model is broadly valid, and it provides a structural framework for successful evaluation, which is linked to stakeholder participation. In addition, both models fail to capture the rapid emphasis in modern project management soft approaches that greatly affects project outcomes (Jaya & Suroso, 2022). According PMBOK® Guide (PMI, 2021), traditional IS success models rarely capture

stakeholder emotions or organizational culture factors, yet these are essential elements in modern project evaluations (Jamali & Oveisi, 2016, p. 142).

Integrating both models into a tailored framework provides a more comprehensive evaluation by incorporating IS-specific and project-specific success factors while addressing soft dimensions. The valid success dimensions of D&M, such as systems quality, information quality and user satisfaction, can focus on the project performance metrics and organizational integration (Jaya & Suroso, 2022). Additionally, modern project management practices, such as PMBOK® Guide (PMI, 2021) and ISO 21500, emphasize the importance of soft factors, such as stakeholder cooperation, leadership dynamics, and adaptation ability to change (Jamali & Oveisi, 2016, p. 142). These factors directly affect project execution, system adoption and long-term effectiveness, yet they are inferior to the current IS and PMIS assessment models (Yazici, 2007). Even if a project has completed a phase but lacks profitability and feasibility, or its strategic positioning is inappropriate, it could still be terminated immediately (Watanabe et al., 2024). Ignoring these aspects in the PMIS evaluation can lead to incorrectly presenting the project's success, as the PMIS can lead to implementation failures despite the user resistance, lack of connectivity, or poor alignment of technical display criteria with organizational culture. By integrating these elements, a structure ensures that both tangible and abstract factors that affect the success of PMIS are effectively occupied.

Clear definitions of strategic and project planning, projects and project characteristics, project management, project management tools, program and portfolio management, and project management structure should also align with the integrated PMBOK® Guide (PMI, 2021) and ISO 21500. The PMBOK® Guide (PMI, 2021) especially emphasizes the performance domain, which includes both technical and soft success, ensuring that PMIS assessments consider human-focused elements such as user adoption, stakeholders purchase-in and organizational culture. Incorporating such concepts into a tailored framework helps the PMIS evaluation to better align with the complexities of actual

projects. Moreover, allowing for a standardized benchmarking approach, including these standards, ensures stability in evaluating PMIS effectiveness in various industries and project environments. This alignment eventually enhances the model's praise, which is a strong tool for assessing the success of PMIS in both technical and strategic dimensions.

2.2.4.2. Key Components of a Tailored Framework

A comprehensive PMIS success assessment model should mix key elements from both IS and project performance domain (Brioso, 2015, pp. 76–84). Integration of these components ensures an overall and adaptable structure that can address the needs and environment of diverse projects. Each of the proposed components, DeLone & McLean (2003) IS success model, plays an important role in shaping the effectiveness of the tailored framework by expanding the M model (Ahlemann, 2009, pp. 19–30) and newly identified success factors.

The main dimensions of the IS success model of D&M create the basic structure of evaluation, providing the necessary metrics that measures the overall success of PMI (Jeyaraj, 2020). With six dimensions of the D&M model incorporated, the “tailored framework” addresses the system's technical and user-oriented dimensions. These dimensions ensure that the system's functionality, user engagement, and the impact on organizational performance are systematically assessed, portraying the extent to which the PMI fulfils its purpose and measuring overall success (DeLone & McLean, 2003).

Project-specific factors of the M model sharpen the structure on project outcomes and give it an added level of detail. Organizing organizational integration, optimizing project performance metrics (cost, time, scope), and enhancing stakeholder engagement are crucial for directly evaluating project-specific success norms (Ahlemann, 2009, pp. 19–30). These factors ensure that a tailored framework is beyond technical success and the real - world project is beyond the accounts for the performance of PMIS in the project

management contexts (Kaiser & Ahlemann, 2010 , pp. 1-12). Unlike conventional evaluation models that primarily assess success post-project closure, the tailored framework evaluates PMIS effectiveness continuously from project initiation to closure.

Including newly recognized success factors based on literature is an additional layer of relevance and outline. Compliance with the PM standards guarantees that the assessment is crafted in accordance with established industry standards and best practices (Brioso, 2015, pp. 76–84), which facilitates evaluating the effectiveness of PMIS within a broader, systematically organized framework (Karim, 2011).

Finally, these aspects as well as those from other industries (Rai et al., 2002, pp. 50–69), make the framework applicable to a wide range of organizations and projects alongside scalability and generalizability.

Together, these components interact cooperatively to form a robust and flexible framework encompassing the entire spectrum on the success of PMIS, ranging from technical achievements to project outcomes and strategic integration (Karim, 2011). Integration of success factors with project management-specific elements defined by PMBOK® Guide (PMI, 2021) and ISO 21500 ensures a more structured approach for performance evaluation, aspects such as scope, schedule, cost, quality and risk management (Brioso, 2015, pp. 76–84). Newly identified factors provide a comprehensive tool to assess PMIS effectiveness, ensuring that the evaluation is aligned with both practical and industry standards.

Table 2-3 Expected improvements in the proposed tailored framework

Coverage Area	D & M model	M model	Improvements proposed in the tailored framework
System Quality	Focus on system functionality and performance	Limited focus on system quality metrics	Expanded to integrate system quality, with empirical validation

			from D&M model, ensuring robust evaluation (Fitriati et al., 2005).
Information Quality	Measures the quality of information provided by the system	Limited direct emphasis on information quality	Incorporates D&M's information quality dimension to better assess the accuracy, relevance, and timeliness of data (Jaya & Suroso, 2022).
Service Quality	Focus on user support and service dimensions	Minimal focus on service quality	Includes D&M's service quality metrics, ensuring comprehensive evaluation of user support and service delivery (Yazici, 2007).
User Satisfaction	Explicit focus on user satisfaction	Limited focus on user satisfaction	Integrates user satisfaction as a key factor, ensuring the system meets user expectations and improves engagement (Jaafreh, 2017).
Net Benefits	Emphasizes overall benefits, including economic, strategic, and social	Not directly covered	Incorporates net benefits to evaluate the tangible and intangible outcomes of using PMIS in project settings (Sarasi et al., 2023).
Organizational Integration	Not addressed	Focus on organizational alignment and system integration	Retains Ahlemann organizational integration focus to ensure the system fits

			within broader organizational processes (WA link).
Project Performance (Cost, Time, Quality)	Not specifically covered	Focuses on project performance metrics (cost, time, quality)	Enhances project-specific evaluation by integrating performance metrics to evaluate system effectiveness in meeting project goals (Peterka, 2024).
Stakeholder Engagement	Not addressed	Focus on stakeholder involvement and communication	Adds stakeholder engagement as a core factor, aligning system success with stakeholder satisfaction and communication (Prebanić & Vukomanović, 2023).
Alignment with PM Standards (PMBOK® Guide (PMI, 2021)/ISO 21500)	Not included	Not addressed	New factor that aligns the PMIS evaluation with recognized project management standards, ensuring broader applicability (Kelechava, 2021).
Dynamic Interaction	Not addressed	Not included	Introduces dynamic interaction to assess adaptability to changing project conditions and evolving requirements (Scherer, 2015).
Scalability & Generalizability	Not explicitly covered	Limited scalability in application	Adds scalability and generalizability to make the framework applicable to a wide

			range of industries and project types (Malsam, 2024;Caniels & Bakens, 2012).
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The proposed tailored framework to evaluate PMIS effectiveness is designed to be flexible and optimal in various project types and industries. Future recognition of the framework will involve putting it to a real-world project case study in order to guarantee its practical applicability. A more profound comprehension of the integrated model's performance in various project contexts will be possible courtesy to this application, which will also enable the capture of both the technical and strategic aspects of PMIS success (Ispas & Mironeasa, 2022, p. 3559). Looking at the application of frameworks in various project environments, valuable insights can be collected on their strengths and ability to address the complex requirements of modern project management (Harake, 2024). Additionally, conducting empirical studies, such as survey and interviews with PMIS users and stakeholders, how to interact in framework components and whether they effectively assess the full spectrum of PMIS success factors, will provide first data on this (Raymond & Bergeron, 2008, pp. 213–220).

Furthermore, PMIS will provide a crucial feedback loop for improving the empirical verification methodology by interacting directly with stakeholders and consumers (Pant et al., 2022, p. 13). Surveys and interviews will collect qualitative and quantitative data on user satisfaction, system adoption, project performance, and organizational integration, ensuring that the outline remains aligned with relevant and real-world challenges. This direct input of those who interact with PMI in practice will help identify potential intervals in the framework and refine success factors to better address the needs of project teams, organizations and stakeholders (Prebanić & Vukomanović, 2023, p. 1785). By involving this reaction in the verification process, conforming framework will develop to become a

comprehensive and reliable tool to evaluate PMI in a variety of organizational and project contexts.

2.2.4.3. Justification for Combining Ahlemann Model with IS Success Frameworks

Current IS success models mainly emphasize technology-operated evaluation matrix, focusing on system performance, user satisfaction and net benefits (DeLone & McLean, 2003). While these dimensions are important to assess general information systems (Karim, 2011), they do not fully address specific demands of PMIS, where the effectiveness of the system is closely linked to project-specific success factors such as costs, time, quality and stakeholder engagement (Ahlemann, 2009, pp. 19–30). The M model provides a structured approach by emphasizing the project-specific aspects. However, it does not fully address comprehensive industry context and lack integration with the key, the quality of the system, the quality of information and the success such as user satisfaction (Ahlemann, 2009, pp. 19–30).

The established success of the D&M model provides a more comprehensive evaluation structure to integrate the metrics with the structure of the M model (Kaiser & Ahlemann, 2010 , pp. 1-12). By incorporating dimensions from the D&M model, the tailored framework gains empirical recognition, drawing on a wide set of metrics that have been proven to effectively assess the success of information systems (Petter & McLean, 2009). This integration strengthens the structure by broadening its appropriateness and ensures that this PMIS captures the technical, user-centered, and organizational aspects of success (Radujković & Sjekavica, 2017, pp. 607–615).

The inclusion of M model organizational and performance-centered measures is further enhanced by the relevance of the framework for PMI (Karim, 2011). The M model attention on factors like organizational integration, project performance indicators, and stakeholder

engagement is of equal importance, and captures the attention of the evaluation focus from the standpoint of the primary factors which drive the project success (Ahlemann, 2009, pp. 19–30). This project-specific lens certain that the framework is accountable that the PMIS facilitates the project execution which may ensure alignment of the system performance with the objectives of the project and the stakeholder expectations (Kerzner, 2009).

Furthermore, the success alignment of PMIS with other comprehensive project management frameworks such as PMBOK® Guide (PMI, 2021) and ISO 21500 (Brioso, 2015, pp. 76–84), enhances the comprehensive structure by providing an industrially accepted standardized approach. This alignment guarantees that the framework is not limited in assessing system success but rather ensures that the widely accepted projects management method performs in accordance with industry standards and best practices (Aga, 2016, pp. 517–525).

Thus, combining the M model with IS success frameworks enhances the evaluation of PMIS by merging the strengths of both models, technical and project-specific metrics, while aligning with established industry standards. This combination ensures that the evaluation framework is valid and useful, also allowing for a more comprehensive examination of PMI's effectiveness in different project contexts.

2.3 Key Success Factors for PMIS Evaluation and Their Alignment with Standards

After the evaluation of the current information system success model in Section 2.1, it became clear that there are limitations of models such as D&M when applied to PMIS, due to their normal approach. Section 2.2 addressed these limitations by incorporating conclusions from M model and conclusions from other literature to develop a more sewn

structure for PMIS evaluation. Building on these insights, this section focuses on identifying the major success factors which are required for evaluating the section PMIS effectiveness. It checks how artifacts align with recognized project management standards such as PMBOK® Guide (PMI, 2021) and ISO 21500, to ensure that the PMIS implementation contributes effectively to the overall project success.

2.3.1. Project Management Standards

These days, many organizations are forced to make decisions on the use of the project management standard. Such implementation costs high and therefore it is not unexpected that responsible managers try to reduce the risk (Lech, 2016, p. 238). There are a variety of factors when a standard project could be implemented in an organization. This might be a request from a customer who wants a certain standard to be followed when managing the work. But there can also be a desire to increase transparency with the aim of getting better results (Ford & Gosling, 2024). When several organizations or sections of organizations join in a project, the significance of a standard appears to be quite great (Urbinati et al., 2020, pp. 1595–1624).

Project management standards are a set of established guidelines, frameworks, and best practices that provide a systematic approach to managing projects (Grau, 2013, pp. 10–20). These standards are crucial for ensuring consistent and effective management across various types of projects, regardless of industry or scope (Hall, 2012). The primary purpose of project management standards is to enhance the probability of project success by establishing common processes, tools, and techniques that project managers can rely on (Pirotti, 2021). The Project Management Institute's PMBOK® Guide (PMI, 2021), the International Project Management Association's IPMA Competence Baseline (ICB), the Office of Government Commerce UK's ISO 9000, ISO 21500, and Prince2, the Capability Maturity Model, the Project and Program Management by the Engineering Advancement Association of Japan, and the Chinese PM conference's C- PMBOK® Guide (PMI, 2021) are

only a few of the numerous standards and techniques for PM practices (Grau, 2013, pp. 10–20). Table 2.4 provides a clear illustration of the project management standards, guidelines, and procedures as well as the classification.

Table 2-4 Summary of Classification of Project Management Standards, Guides and Method

Project Management Practice	Type of Classification	Organization Issued	Country of Origin	Language Used & Year of First Edition	Latest Edition Available (as of 2024)
PMBOK® Guide (PMI, 2021)	Standard	Project Management Institute (PMI)	USA	English (1996)	7th Edition, August 2021
IPMA Competence Baseline (ICB)	Competency Framework	International Project Management Association (IPMA)	Switzerland	English (1999)	ICB 4.0, 2015
PRINCE2 (Projects IN Controlled Environments)	Methodology	AXELOS	UK	English (1996)	7th Edition, September 2023
ISO 21500	Standard	International Organization for Standardization (ISO)	Switzerland	English (2012)	2nd Edition, March 2021
P2M (Project and Program Management)	Methodology	Engineering Advancement Association of Japan (ENAA)	Japan	Japanese (2001)	Latest edition details not available
C-PMBOK (Chinese Project Management)	Standard	Project Management Research	China	Chinese (2006)	Latest edition details not available

Body of Knowledge)		Committee (PMRC)			
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The PMBOK® Guide and ISO 21500 are two of the most well-known project management standards (Brioso, 2015, pp. 76–84). These standards offer comprehensive guidelines on how to plan, execute, monitor, control, and close projects, thereby ensuring that projects are aligned with organizational goals and delivered within scope, time, and budget constraints (Sanjuan & Froese, 2013, pp. 91–100).

Although PMBOK® Guide and ISO 21500 are organized recommendations for project management standards and project execution, their implementation for PMIS evaluation requires detailed planning (PMI, 2021). For instance, PMBOK® Guide (PMI, 2021) performance highlights project management standards and domains that impact project success; nevertheless, this criterion does not offer a clear framework for evaluating a project's efficacy (Guillen, 2021). For example, the PMBOK® Guide (PMI, 2021) is the industry standard for project management in scope, cost, time, quality, human resources, communication, and stakeholder management. However, it does not provide a direct methodology for assessing how well a PMIS supports these domains (Pirrotti, 2021).

Project management standards must be incorporated into PMIS evaluation to bridge this gap by identifying critical success factors. These factors guarantee that PMIS complies with technical specifications and realistic project management practices. For instance, PMIS offers the support that PMBOK® Guide (PMI, 2021) and ISO 21500 managing time, costs, and stakeholders require (Čabarkapa, 2019). Furthermore, leadership and the role of the project manager have been identified CSFs influencing project outcomes. For instance, Aga (2016, pp. 517–525) offered a theory on the importance of leadership in project success, while Sanchez et al. (2017) came to the conclusion that the project manager significantly affects success, especially on the time success dimension (Tonchia, 2018).

Current research support the PMBOK® Guide (PMI, 2021) compelling argument for stakeholder engagement, especially when it comes to defining the project success criteria (Smith, 2000, pp. 173–200). According to the PMBOK® Guide (PMI, 2021), stakeholders are individuals or organizations that actively engage in the project or whose interests may be influenced, either positively or negatively by its execution or completion. The mix of stakeholders will probably depend on the circumstances and differ depending on the project and the organization (Brioso, 2015, pp. 76–84). To support this, a well-designed PMIS should include features such as real-time reporting (Saputra et al., 2023) automated information sharing (Khaidar et al., 2024), and interactive collaborative dashboards (Massimo et al., 2025). In a comparable manner, ISO 21500 highlights the need for proper resource allocation and risk management, which a PMI must facilitate with modules for risk assessment and resource monitoring (Kelechava, 2021).

The importance of matching project management standards with PMIS evaluation is further supported by earlier research. The PMBOK® Guide (PMI, 2021) emphasizes project management artifacts. However, ISO 21500 only discusses project personnel. In fact, the PMBOK® Guide (PMI, 2021) has a more comprehensive scope than ISO 21500. Organizational impact is the term used to describe the effects that one organization may have on the progress of a project (Tavan & Hosseini, 2016). These studies suggest that while existing project management standards do not provide explicit PMIS evaluation criteria, they offer valuable benchmarks that can be used to assess whether a PMIS effectively supports project management processes (Pirotti, 2021). Although PMBOK and ISO 21500 offer structured project management rules, their use for PMIS assessment requires a tailored approach (Brioso, 2015, pp. 76–84). Organizations can ensure that their PMIS is not only technically strong but also in line with best practices in project execution and management by recognizing and incorporating CSFs from these standards.

A previous study further supports the importance of aligning PMIS evaluation with project management standards. This study found that there are no accurate PMIS evaluation

criteria in the existing project management standard, which would have provided an advantageous beginning for measuring the extent to which the PMIS supports project management procedures. Although PMBOK® Guide (PMI, 2021) and ISO 21500 offer structured project management standards, its use necessitates a similar methodology to that of PMIS evaluation (Brioso, 2015, pp. 76–84).

2.3.2. Critical Success Factors in PMIS Evaluation

Researchers must understand the CSFs for PMIS to consistently improve its effectiveness. This implies that the needs of customers should be determined and handled more carefully (Alias et al., 2014, pp. 61–69). Research on general IS success variables and success models has been extensive in the same context (Alotaibi, 2014). However, there haven't been any comprehensive studies on CSFs for PMIS (Kim Jean Lee & Yu, 2004) or on the practical uses and impacts of these systems (Raymond et al., 2008, pp. 2013–2220) have been conducted.

Finding CSFs is essential for assessing the PMIS effectiveness and making sure the system is successfully fulfilling the organization's needs (Naseer et al., 2022; Lee et al., 2012). A project is considered successful if the expectations of each participant-owner, planner, engineer, contractor, or operator are satisfied. Each participant may have different expectations (Sanvido et al., 1992), and research on project success and CSFs are frequently regarded as one of the most important methods to increase the efficacy of project delivery (Chan et al., 2004).

Project management is one of the most well-known CSFs for success. Pinto & Slevin (1987, pp. 22–27) emphasize that effective communication between stakeholders is paramount to ensure all parties are aligned with project goals, deadlines, and scope. In the context of PMIS, this communication is made easier through facilities such as real-time project updates, associate equipment, and centralized document management (Jitpaiboon et al., 2019, pp. 271–287). For instance, miscommunication and project delays will likely occur if

a PMIS does not facilitate unplanned communication between project teams and external stakeholders (Rasch, 2007). Therefore, the capacity to encourage transparent and consistent communication at all project levels is a critical success factor for assessing PMIS performance.

According to Lim & Mohamed (1999, pp. 243–248), senior management support is another essential CSF feature. Top management commitment plays an important role in the success of PMIS implementation, as it ensures that the required resource systems, including budget, time and personnel, are allocated. PMIS initiatives can face difficulties, including poor strategy alignment, inadequate training, and employee resistance to adoption when senior leadership is not actively involved (Alotaibi, 2014). Additionally, senior management may utilize PMI to boost organizational commitment and enhance customer experience by fostering a culture that values project management standards. The Lim & Mohamed (1999, pp. 243–248) state that a PMIS can only be successful if it is supported by organizational leadership that supports its usage and technological infrastructure.

Rahmani et al. (2018, p. 38) stress the value of system integration, data quality, and managerial support. The integrity of IT processes is crucial to PMIS. Making informed judgments in project management requires accurate, timely, and consistent data. A PMIS capacity to offer insights and direct the project choices will be constrained if it cannot capture and analyze high-quality data, resulting in an ineffective project execution (Jitpaiboon et al., 2019, pp. 271–287). In addition, the integration of PMIS with other organizational systems, such as finance (Pells, 2024), HR (Lloyd-Walker, 2013, pp. 827–830), and procurement systems (de Araújo et al., 2017, pp. 353–377), ensures that project managers have an integrated approach to all project-related information, which is important to coordinate tasks, manage resources, and ensure that the project stays on track. Even with the most advanced functionalities, a PMIS will not succeed if it is not user-friendly. Project teams must get assistance and training to use the system efficiently. If a PMIS has a learning state or complex interfaces, it can obstruct the system and lead to

resistance from users (Kalankesh et al., 2020). Therefore, user-friendly design, adequate training, and continuous support are important for the system success.

The alignment of PMIS with best practices is a significant CSFs project management covered in a number of studies with regard to real-world implementations (Rasch, 2007). The Brioso (2015, pp. 76–84) found that the system supports the entire project management structure when the PMIS evaluation is in line with established standards like ISO 21500 and PMBOK® Guide (PMI, 2021). These standard scopes emphasize essential project management processes such as management, time management, cost control and risk management, which are directly supported by PMIS functionalities (Choi et al., 2021, pp. 2046–2057). For example, PMBOK® Guide (PMI, 2021) attention on scope management requires that the PMIS contains strong equipment for defining, tracking, and controlling project scopes. A PMIS offers a more organized and consistent framework for assessing its performance if it can conform to these requirements (Varajão et al., 2025).

Critical success factors are characteristics, factors, or variables that significantly affect a project's success when properly maintained, controlled, and sustained (Alias et al., 2014). Project managers' benefit from PMIS as it ensures quick decision-making and project success. Project managers can estimate project costs, budget, and profits using PMIS (Murithi Ian Mutwiri & Dr. Muchelule Yusuf, 2022). For instance, if a PMIS project is unable to expand with an increase in its scope or complexity, it may quickly become problematic and unable to satisfy the needs of the organization (Choi et al., 2021, pp. 2046–20257). A successful PMIS should be adaptable enough to change to the evolving technological landscape as well as the project dynamics (Sohi et al., 2020). PMIS is evaluated by determining the level of functioning of different systems and related tools (Raymond et al., 2008, pp. 213–220).

2.3.3. Aligning PMIS evaluation with project performance domains

Initiating, planning, executing, monitoring, controlling, and closing are some of the process areas that are part of PMBOK® Guide (PMI, 2021). Additionally, it identifies several "knowledge areas" for process organization, such as procurement, integration, scope, schedule, cost, resource, quality, risk, and stakeholder communication (Varajão et al., 2025). According to the PMBOK® Guide (PMI, 2021), each domain consists of connected activities essential to effectively completing projects. Instead of being carried out in an orderly manner, the actions within domains interact throughout the project (Faraji et al., 2022, p. 210). Although positive relationships with stakeholders are essential to project outcomes and stakeholder management, for example, it is an artifact defined by the PMBOK® Guide (PMI, 2021) relevant to stakeholder performance domain. Similarly, risk management aligns with uncertainty and planning domains, which focuses on reducing risks, as well as develops a strong project plan (Alias et al., 2014). By aligning CSFs with these performance domains, the evaluation of a PMIS can be structured to assess both tactical project success (e.g., efficiency, budget adherence) and broader strategic impacts (e.g., stakeholder satisfaction, long-term benefits realization).

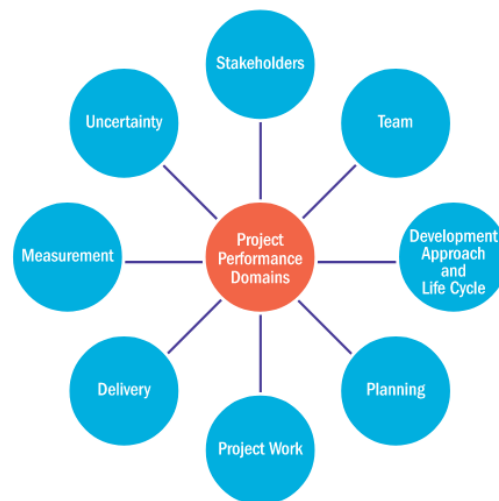


Figure 2-5 Project Performance Domains defined by PMBOK® Guide (PMI, 2021)

The alignment between CSFs and PMBOK® Guide (PMI, 2021) performance domains ensures that an Evaluation of a PMIS is widespread, not only the operation aspects of the project execution, but also a strategic goal that contributes to organizational success (Rostami & Ahangari, 2022, pp. 1–10). For instance, the system and information quality are crucial components of a PMIS within the planning domain. These features of the system guarantee that the right tools and processes are reliable and will support the strategy on schedule (Jitpaiboon et al., 2019, pp. 271–287). A PMIS that provides high quality data and reporting, with a user-friendly interface, significantly increases the planning phase of projects, ensuring better decision making and more reliable forecasts (Micale et al., 2021, p. 11233). Similarly, user satisfaction becomes a key success factor under the delivery domain. PMIS has a major contribution to project management because, while it may not be enough to ensure project success, it is essential for the effective and efficient administration of such projects and assists in decision-making (Monem & El-Demerdash, 2025, pp. 29–45). These domains, which concentrate on operational factors like system and information quality and user satisfaction, partly or fully use existing models like the M model and the D&M model. These models highlight the importance of system quality, information quality, and user satisfaction in the broader context of evaluating an information system, reinforcing the need for a comprehensive approach to PMIS evaluation (Karim, 2011).

In the previous section (2.2), the traditional assessment model was identified when applied to PMI. Traditional success models such as D&M and M models focus a lot on technical performance (system quality, information quality), but cannot fully address human-focused aspects of project management, such as stakeholders' engagement and user satisfaction, emphasized in PMBOK® Guide (PMI, 2021) performance domain (Jamali & Oveisi, 2016, p. 142) . For example, PMBOK® Guide (PMI, 2021) stakeholders' domains defined artifact such as communication strategies and stakeholder satisfaction - elements that cannot be sufficiently captured by traditional models. Similarly, the planning domain

requires deep integration of the quality of the system and information, which affects the quality of the project delivered (Guillen, 2021). By aligning these CSFs with the same performance domain in PMBOK® Guide (PMI, 2021), it becomes clear evident that a tailored PMIS must integrate both technical measures (eg: system quality, information quality) and soft success factors (eg: user satisfaction, stake engagement).

Aligning CSFs with PMBOK® Guide (PMI, 2021) performance domains intends to demonstrate why a complying PMIS is necessary to satisfy project requirements. Several researchers have proposed alternative sets of CSFs in the literature, such as the IS Success Model, with an emphasis on distinct PMIS components in projects (S. Lee et al., 2012). Investigating these aspects' relative importance and groups is essential (Milosevic & Patanakul, 2005, pp. 181–192). Although CSFs may become the focus of activities included in the project, identifying variables that contribute to project success and failure naturally flows into project planning (Jitpaiboon et al., 2019, pp. 271–287). Although areas of strength or opportunity can be further enhanced or leveraged, critical success factors that are currently a weakness may be addressed with improvements or protections.

Additionally, it indicates that PMIS assessment is a continuous process that may be suitable for improving the project requirements by referring to the gaps found in previous chapters and incorporating display domains associated with the PMBOK® Guide (PMI, 2021; Rostami & Ahangari, 2022, pp. 1–10). Therefore, the tailored PMIS, aligned with both CSFs and PMBOK® Guide (PMI, 2021) performance domains, is a dynamic tool that ensures project success is evaluated holistically, covering technical performance and softer, human-oriented factors. This approach enables organizations and project managers to make real-time choices that support their strategic goals, project outcomes, and organizational performance.

The project management literature generally acknowledges the following 12 CSFs, which are derived from both professional and educational sources. They have been derived from

influential academic studies (e.g: Pinto & Slevin, 1987, pp. 22–27; Fortune & White, 2006, pp. 53–65; Raymond et al., 2008, pp. 213–220), major project management research surveys such as PMI’s Pulse of the Profession, and comprehensive literature reviews on project success (e.g: Ika, 2009, pp. 6–19; K. Davis, 2014, pp. 189–201). Although the phrase " Critical Success Factors" is obviously not used in the seventh edition of the PMBOK® Guide (PMI, 2021), it adds ideas closely related to these CSFs, such as performance domains, systems thinking, and enablers of success. For instance, the stakeholder’s domain places a significant emphasis on "stakeholder engagement" and "communication," while the team domain emphasizes "leadership," "cooperation," and " team performance. The CSFs shown in the table (2.5) below are more reliable and relevant because of these linkages.

Table 2-5 Mapping of Project Success Factors to PMBOK® Guide (PMI, 2021) Performance Domains

Critical Success Factor (CSF)	Supported By
Stakeholder engagement	PMBOK® Guide (PMI, 2021) (Stakeholders Domain), (K. Davis, 2014)
Top management support	Pinto & Slevin (1987); (Ika, 2009)
Clear goals/objectives	Fortune & White (2006); PMBOK® Guide (PMI, 2021)
Communication	PMBOK® Guide (PMI, 2021) (Stakeholders + Team); (K. Davis, 2014)
Team competence	PMBOK® Guide (PMI, 2021) (Team); (Raymond et al., 2008)
Risk management	PMBOK® Guide (PMI, 2021) (Uncertainty); ISO 21500
Monitoring/control	PMBOK® Guide (PMI, 2021) (Delivery); (Ika, 2009)
User satisfaction	PMIS success literature ; (Delone & McLean, 2003)
Culture/leadership	PMBOK® Guide (PMI, 2021) (Governance); (K. Davis, 2014)
Planning/scheduling	PMBOK® Guide (PMI, 2021) (Planning Domain)
PMIS tools	PMIS-specific research (Ahlemann, 2009); (Raymond et al., 2008)
Quality management	PMBOK® Guide (PMI, 2021) (Delivery); ISO 21500

The alignment of PMIS evaluation with project performance domains can be further strengthened by incorporating guidelines given in ISO 21500 (Kelechava, 2021). The concepts and procedures that are appropriate project management practices are described at a high level in this international standard. Although projects are positioned inside programs and project portfolios, this International Standard does not include comprehensive guidelines for managing programs and project portfolios (Brioso, 2015, pp. 76–84). The evaluation of PMIS effectiveness within these structured subject areas ensures a more comprehensive evaluation of its impact on the performance of the project.

Furthermore, PMIS capabilities have a direct impact on many of the CSFs that ISO 21500 highlights as being necessary for the project to succeed (Cabana, 2019, pp. 41–53). For instance, well-integrated PMIS technology may significantly improve stakeholder engagement, risk management, and project planning. By mapping these CSFs in relevant ISO 21500 subject areas, organizations can better assess whether their PMIS align with industry standards and contribute to project efficiency (Kelechava, 2021). A structured mapping of CSFs in the ISO 21500 subject areas is shown in the table below, which also describes how PMIS evaluation may be integrated with project performance domains.

Instead, the ISO emphasizes 21500 principles, practices, and guidance that closely align with these CSFs, especially in areas such as stake engagement, leadership, communication, risk management, quality, and resource planning (Brioso, 2015, pp. 76–84). For example, the ISO 21500 highlights the need for effective stakeholder engagement and clear communication in the project's life cycle - elements that mirror the CSFs recognized in educational literature (Kelechava, 2021). It also underlines the importance of management of uncertainty (risk), ensures quality, and the competent teams supported by leadership, which are fundamental to the success of all projects (Čabarkapa, 2019). Therefore, the alignment of these CSFs with ISO 21500 further values their purpose and relevance in directing successful project distribution in standardized context globally.

Table 2-6 Mapping of Project Success Factors to ISO 21500 standards

Critical Success Factor (CSF)	ISO 21500 Subject Area / Process Group	Supported By
Stakeholder engagement	Stakeholder	(K. Davis, 2014); ISO 21500 Stakeholder subject area
Top management support	Integration / Stakeholder	(Pinto & Slevin, 1987) ; ISO 21500 Integration area
Clear goals/objectives	Scope / Integration	(Fortune & White, 2006); ISO 21500 Scope area
Communication	Communication	(K. Davis, 2014); ISO 21500 Communication area
Team competence	Resource	(Raymond et al., 2008); ISO 21500 Resource area
Risk management	Risk	ISO 21500 Risk subject area
Monitoring/control	Controlling (Process Group) / Integration	(Ika, 2009); ISO 21500 Controlling process group
User satisfaction	Stakeholder / Communication	(DeLone & McLean, 1992); stakeholder focused IS success models
Culture/leadership	Integration / Stakeholder	(K. Davis, 2014); ISO 21500 Integration/Stakeholder area
Planning/scheduling	Time / Integration / Planning (Process Group)	PMI (2013); ISO 21500 Time & Planning
PMIS tools	Communication / Integration / Resource	(Ahlemann, 2009) (Raymond et al., 2008); ISO 21500 Communication/Resource
Quality management	Quality	ISO 21500 Quality subject area

2.3.4. Addressing Gaps between Practice and Standard

According to ISO 21500 or PMBOK® Guide (PMI, 2021), every project needs a business justification, which is recorded in the business case and includes the following: the reasons for initiating the project, the available business options, anticipated costs, risks (both opportunities and threats), benefits, potential wastes, terms, and projected investment, among other things (Brioso, 2015, pp. 76–84). These guidelines encourage thorough

project inspection, including risk management, benefits realization, and stakeholder engagement (Čabarkapa, 2019). However, PMIS equipment focuses on more concrete aspects of project execution in the real-world project environment, such as scheduling, budgeting, and resource allocation, while disregarding expansive, strategic success criteria that are based on international standards.

The inconsistent support of the domain performing on the PMIS platforms is one of the key justifications for this lack. Many devices, for instance, offer comprehensive scheduling and cost control features, but involvement by stakeholders is minimal, and both PMBOK® Guide (PMI, 2021) and ISO 21500 explicitly target beneficial facilities (Čabarkapa, 2019). This gap becomes crucial, when organizations aim to improve long-term satisfaction among stakeholders or match project outcomes with business strategy. Although PMIS was successful in supporting usual matrix functions like cost and schedule control. Raymond & Bergeron (2008, pp. 213–220) claimed that it lacked the capacity to systematically manage communication and generate a response from stakeholders. A PMIS may find strategic value in this inconsistency, particularly if the soft success factors is critical to the project success (Peterka, 2024).

The PMIS models limited adaptation for specific organizational references and stage of maturity is another common gap (Retnowardhani & Suroso, 2019). PMIS deployment often relies on conventional templates or components that overlook the distinct reporting, governance, and communication systems in different organizations. Therefore, organizations struggle to incorporate standards-based processes into their PMIS, which leads to a gap between the system's functioning and the project's requirements (Retnowardhani & Suroso, 2019).

Organizations use these objective measurements because they offer reliable information for accountability and decision-making. However, this limited focus frequently overlooks

the project's performance, which is crucial for stakeholder satisfaction and long-term stability (Korhonen et al., 2023).

Even with their analytical competence, traditional PMIS frameworks frequently come up lacking in capturing qualitative factors like user satisfaction, stakeholder engagement, team morale, and knowledge retention (Radujković & Sjekavica, 2017, pp. 607–615). These elements, while difficult to measure, significantly affect the results of the project. Even if a project is completed on schedule and on budget, it may still be deemed a failure if the main stakeholders are not positive, the staff disappears, or the end result falls short of user expectations (Mahmood et al., 2015). Despite being measurable, these factors have significant effects on the project's outcome. A project can still be considered a failure even if it is finished on time and under budget. If the primary stakeholders are not advantageous, the employee leaves, or the user's expectations lower the final product (Murithi Ian Mutwiri & Dr. Muchelule Yusuf, 2022).

Integrating soft success metrics into PMIS enhances project evaluation by offering a more holistic view of performance (Khaidar et al., 2024, pp. 843–857). Project success may be determined from factors like staff engagement levels, sentiment analysis from project communications, and stakeholder feedback ratings. These qualitative factors aid in detecting emerging risks, measuring teamwork, and determining if project results are in line with corporate goals (Howsawi et al., 2014, pp. 1–15). By including adaptive reporting and a real-time feedback system, PMIS can support active decision-making and foster a culture of strategy alignment and continuous improvement (Serrador & Rodney Turner, 2014).

Lastly, the evaluation of PMIS efficacy increases the gap between standards and practice (Karim, 2011). Many evaluations ignore the complete CSFs listed in the project management standards instead of focusing on technical features like the interface's goal, integration capabilities, and real-time data reporting (Fortune & White, 2006, pp. 53–65). These include strategic alignment, stakeholder engagement and leadership commitment,

which are essential for long-term project success. As a result, even when a PMIS performs technically well, it may fail to support the project environment ruled by standards such as PMBOK® Guide (PMI, 2021) or ISO 21500. To address these evaluation gaps requires a more overall evaluation framework that aligns system facilities with hard and soft success factors emphasized by the installed project management method.

2.3.5. Proposed Success Factors for Evaluating PMIS

Traditional PMIS evaluation models, such as D&M success models and M models, mainly rely on predefined, static metrics to assess system effectiveness (Fortune & White, 2006, pp. 53–65). These models often focus on factors such as the quality of the system, the quality of information and user satisfaction, which provide valuable insight, but the modern project fails to capture the dynamic nature of the environment (Ika, 2009, pp. 6–19). As project management has developed to be more agile and data-informed, the methods of static assessment struggle to reflect real-time performance fluctuations, stakeholders' emotions and adaptive decision-making needs (Karim, 2011). In addition, these traditional models are not sufficiently responsible for continuous response loops and recurring improvements that are important for complex, multi-step projects (Saputra et al., 2023). Without real-time evaluation mechanisms, the project managers cannot identify potential risks, disabilities, or stakeholders' concerns until significant delays or cost overruns occur.

Traditional IS despite the widespread use of successful models, such as DeLone & McLean (2003) and Seddon (1997). These structures often fail to capture the unique success factors required for PMIS evaluation. Most traditional frameworks place a strong emphasis on technical performance (system, information, and service quality), but they fall short in addressing project-specific success factors, including risk management, multi-non-interest participation, and real-time collaboration (Ahlemann, 2009, pp. 19–30). On the other hand,

dynamic project execution, ongoing decision-making, and integration across many project stages should all be supported by PMIS.

Given the limitations of traditional IS success models, a sophisticated PMIS-specific evaluation structure should integrate both structured success matrix (efficiency, reliability) and soft success factor (stakeholder engagement, adaptability, knowledge share). Together with the essential Ahlemann project-specific evaluation dimension can offer a more thorough framework for accurately assessing PMIS effectiveness in complicated projects. For instance, automatic compliance tracking and future prediction analysis for risk management are now available in AI-managed PMIS equipment. These features are still crucial in traditional IS models but are required to make project choices (Micale et al., 2021, p. 11233).

1 Stakeholder Feedback Mechanisms

The evaluative data, responses, and reactions get from stakeholders are known as stakeholder feedback. In other words, the opinions of the individuals, teams, and institutions that are affected by, have an impact on, or are interested in the project. According to the Project Management Institute (PMI), engagement from stakeholders is crucial to the success of an ordinary project. The traditional PMIS model lacks the structured mechanism to capture the frequent ongoing stakeholder input, instead focus on periodic assessment or post-project reviews (Gumiński et al., 2023). Stakeholders are categorized and recognized based on their relative importance, impact to a certain extent, and areas of interest. The outcomes of this categorization are shown on an importance-influence diagram, which is used to identify and interview the stakeholders who have the most significance and influence combined (Peterka, 2024). Interactive dashboards, real-time surveys, and feedback loops allow project teams to identify and address stakeholder concerns early, leading to improved project adaptability and success. Actual end users and customers, their management, the main supplier of their current suite of information services, the company in charge of operations and maintenance support, the management

in charge of supervising the opportunity assessment, and policymakers are frequently among those interviewed (Rabechini Jr. et al., 2022, p. 62).

2 Sentiment Analysis

Beyond the conventional performance metrics, sentiment analysis offers a data-driven method for assessing the project's success (Lazrig & Humpherys, 2022, pp. 13–21). Effective communication and stakeholder satisfaction are emphasized by PMIS and other project management frameworks, however traditional PMIS models heavily rely on subjective responses and established assessment criteria. Project managers may obtain real-time insights into stakeholder input and team morale by utilizing sentiment analysis techniques (Mata et al., 2021). The findings support early detection of any issues, improve teamwork, and preserve a positive project atmosphere. Sentiment analysis improves all aspects of project management by turning unfiltered input into useful insights. However, its full potential is seen in stakeholder involvement, when a project's success or failure depends on an understanding of feelings or criticism (Mao et al., 2024, pp. 385–391).

3 Dynamic Reporting

Current data visualization, automatic report creating, and interactive dashboards that update in real time with changes in the project data itself are all provided by dynamic reporting. Managers are forced to wait for run-scheduled reports since projects are ongoing. Teams can identify dangers monitor progress, and make informed decisions instantly using dynamic reports, which provide real-time findings without requiring system-generated summaries (Ashfaq et al., 2014, pp. 104–125). Teams, project managers, and stakeholders may view real-time project changes in a shared workspace using Quantim's dynamic reporting. This guarantees that everyone remains consistent with the project's goals, improves openness, and makes decision-making easier (Collyer & Warren, 2009, pp. 355–364). This approach aligns with PMI's focus on continuous improvement and adaptive planning, ensuring that project managers are equipped with up-to-date, actionable information (Collyer & Warren, 2009, pp. 355–364). With more than 200 built-in reports,

configurable dashboards, and real-time analytics, Quantum gives you more power than traditional systems that force users into preset templates.

3 METHODOLOGY

This chapter describes the methodological approach used to determine the limitations of the existing information system success models in the real-world project environment and assess how they are applied to the PMIS. The research employs a qualitative, literature-based methodology, examines scholarly correspondence, uses existing models (such as DeLone, McLean, and Ahlemann), and compares the assessment framework using project management standards (PMBOK® Guide (PMI, 2021) and ISO 21500) in the PMIS evaluation. By comprehensively reviewing and synthesizing these sources, the research identifies CSFs and gaps in the current model, providing a basis for refining PMIS assessment practices without proposing a new model. This structured analysis ensures a rigorous, theory-driven exploration of PMIS effectiveness in alignment with IS and project management principles.

3.1. Research Purpose and Approach

The primary objectives of this research are to explore how a PMIS can be evaluated using existing IS success models and to define the limitations of these models in a real project context. The PMIS projects play an essential role in supporting the project plan, execution, and monitoring (Weinert & Banaś, 2024, pp. 59–67), and their success is often evaluated using a traditional IS model. This study highlights the main limitations of traditional methods, particularly regarding adaptation, stakeholder engagement, and project management standards (e.g., PMBOK, ISO 21500). Therefore, this study aims to assess the current models critically, point out the advantages and disadvantages of each regarding Project Management Information (PMI), and recommend reforms that improve PMIS success without introducing an entirely new model by making necessary adjustments for the new model. By doing this, it attempts to pursue theoretical understanding that

addresses the difference between the general IS success evaluation and the specific needs of project-driven environments.

A qualitative, conceptual, and literature-based research approach was used to achieve these objectives. Research exclusively employs academic models, peer-reviewed publications, and internationally accepted standards, such as secondary data sources like PMBOK and ISO 21500, rather than gathering new empirical data through surveys, interviews, or case studies. This approach helps the researcher understand how the standard alignment or success measurement concept focuses on PMIS evaluation. Furthermore, the findings indicate ideological shortcomings and recommend further empirical study and model improvement. They also look for theoretical and practical implications for using the existing model for PMIS evaluation.

3.1.1. Research Focus

This study addresses the limitations of existing IS success models, such as the DeLone & McLean (D&M) model, regarding PMIS. The research seeks to improve the evaluation structure by closely examining these gaps and considering project-specific elements, including organizational integration, stakeholder engagement, and dynamic project performance metrics. The study explore how Ahlemann PMIS model can be refined and combined with IS's successful frameworks to create a more holistic evaluation tool. This involves identifying synergies between the models and addressing their shortcomings to better align with the complexities of modern project management.

Furthermore, the study addresses key success elements for PMIS efficacy while maintaining compatibility with established project management standards like ISO 21500 and PMBOK® Guide (PMI, 2021). By integrating both technical and soft success metrics—such as stakeholder feedback mechanisms, sentiment analysis, and dynamic reporting—the study aims to propose enriched evaluation criteria while identifying gaps between models that bridge the gap between theory and practice.

3.2 Method of Data Collection

The data collection process for this research was entirely literature-based, relying on secondary data from a wide range of academic and professional sources, including Google Scholar, IEEE, Emerald Insights, and Science Direct. None of the primary data was collected through interviews, surveys, or field studies. Instead, relevant information was gathered by comprehensive reviewing published academic works, project management standards, and studies related to information system success models. Key sources included peer-reviewed journal articles, conference papers, industry reports, and internationally recognized standards such as the Project Management Body of Knowledge (PMBOK® Guide (PMI, 2021)) and ISO 21500. Special emphasis was placed on selecting studies that were academically credible, papers were also considered which provided more validated information, CSFs, and information system success measurement.

To organize the collected literature, a structured search strategy was employed using targeted keywords of “PMIS success”, “critical success factors” ,“PMBOK evaluation” ,“DeLone and McLean model”, “Ahlemann model”, and “ISO 21500.” The Zotero software was utilized to manage references and categorize sources thematically. Papers were grouped into major thematic areas such as IS success models, CSFs in project management, PM standards, and domain-specific applications of PMIS. This thematic organization helped ensure that the analysis remained focused and allowed for more effective cross-comparison of insights from different models and standards. By adopting this structured and systematic approach to literature collection and organization, the research maintains high academic rigor and relevance.

3.3 Validity and Reliability

A thorough literature review that indicates that well-known models like the Ahlemann PMIS framework and DeLone and McLean (D&M) are success models ensures the validity of this study. Synthesizing findings from peer-reviewed studies, industry reports, and project management standards (eg: PMBOK, ISO 21500) creates validity by accurately depicting key success factors for research PMIS evaluation. Additionally, content validity is achieved by aligning the proposed framework with real-world project management needs, ensuring that the identified metrics (e.g., system quality, stakeholder engagement, dynamic reporting) are relevant and measurable.

To ensure reliability, the study employs a structured methodology, reviewing existing models comprehensively to identify gaps and opportunities for integration. The use of well-documented theoretical frameworks (D&M and Ahlemann) and alignment with industry standards enhances consistency in measurement. Future empirical validation could be achieved through case studies or stakeholder surveys which further strengthen reliability by testing a proposed frameworks' applicability across different project environments. The findings are dependable and replicable by grounding the research in established theories and practical benchmarks, providing a robust foundation for evaluating PMIS effectiveness.

3.4 Limitation

This study is based entirely on comprehensive literature derived from secondary sources, including academic literature, established IS success models, and project management standards. As such, it does not incorporate empirical validation through expert interviews, case studies, or industry-specific data collection (e.g., from IT, construction, or supply chain sectors). While the research identifies CSFs and gaps in PMIS evaluation frameworks, these insights remain theoretical rather than tested in real-world project environments.

Additionally, while soft success factors such as stakeholder satisfaction and informal leadership are discussed based on existing standards and literature, they are not systematically reviewed or empirically verified, which may limit the practical applicability of the findings.

The recommendations presented in this study are intended to guide future empirical research, encouraging scholars to test and refine the proposed evaluation framework through structured methodologies such as surveys, case studies, or expert interviews. By validating these conceptual insights in diverse industries (e.g., IT, construction, healthcare), researchers can strengthen the reliability and generalizability of PMIS success models. Further studies could also explore the quantitative measurement of soft success factors, ensuring a more holistic assessment of PMIS effectiveness in dynamic project environments. This would bridge the gap between theoretical frameworks and practical implementation, ultimately enhancing project management practices.

4 DISCUSSION

4.1. Evaluation of Existing IS Models in PMIS Context

DeLone & McLean (1992,2003) IS success model is a basic outline for evaluating success through six dimensions. While the D & M model adequately captures information-related aspects, the model does not fully address the complexities of collaboration and team dynamics contained in the project atmosphere (Al-Mamary et al., 2014, pp. 121–126). On the other hand, Ahlemann (2009, pp. 19–30) PMIS success model was created specifically for project management contexts and focuses heavily on project management contexts, emphasizing system functionality, project outcomes, and managerial perceptions. Compared to D & M, M model’s approach provides higher project uniqueness. However, it primarily emphasizes a single project focus, which limits its use in multi-project PMIS contexts.

Table 4-1 Comparison of DeLone & McLean and Ahlemann Models in PMIS Context

Feature	DeLone & McLean IS Success Model	Ahlemann PMIS Model
Main Focus	Overall Information System success across industries	PMIS success in single project settings
Key Dimensions	Information Quality, System Quality, Service Quality, Use, User Satisfaction, Net Benefits	Technical Quality – System features, functionality, and integration. Organizational Fit – User adoption, training, resistance to change. Strategic Impact – Contribution to project success and business goals
Strengths	Broad applicability; emphasizes information/service quality	Tailored to project environments; clear link to project outcomes
Limitations in PMIS Context	Lacks focus on team collaboration and dynamic project roles	Assumes single-project view; limited for enterprise/portfolio PMIS

Missing PMIS Elements	Soft metrics (team satisfaction, stakeholder engagement), dynamic collaboration	Multi-project project management, program governance, strategic alignment
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When effectively applied to PMIS, both models' distinct advantages and disadvantages are evident. Deep arguments in these models are frequently overlooked by such implementations, particularly when they support the system's operation based on stake dynamics or strategic flexibility. A more significant viewpoint is that neither model sufficiently captures the reality of modern projects, when collaboration, adaptability, and cross-project learning are critical. According to Petter et al. (2009), focusing on D&M model information and system quality effectively captures PMIS technical performance. However, the model does not encompass soft factors like team collaboration, stakeholder management, or leadership engagement, which are crucial for PMIS success. Although the Ahlemann framework successfully connects system use to project management performance, recent research has shown that it fails to adapt to the reality that PMIS must work in several enterprise projects, programs, and portfolios (Caniels & Bakens, 2012, pp. 162–175). Another remaining challenge between the stakeholder partnership models is that the Ahlemann model takes organizational adoption more broadly into consideration, while the D&M model views user satisfaction as a result. When stakeholder response is essential to success, this difference may result in unequal procedures for evaluation. This gap reduces organizational learning, project interdependence, and strategic alignment with broader business goals.

Findings from this study demonstrate these scholarly insights. While users appreciate D & M model focus on system and information quality, this research showed that it is difficult to measure stakeholder satisfaction, communication effectiveness, collaboration success, and soft matrices that are not accurately represented. Similarly, this study stated that although M-model assess PMIS based on individual project success, the models limited scope focusses on the overall project performance and control which needs of large

organizations managing multiple ongoing project (Kaiser & Ahlemann, 2010 , pp. 1-12;Caniels & Bakens, 2012, pp. 162–175). Therefore, existing models applicable for only a partial view of PMIS performance. This bias shows that practitioners cannot depend entirely on these models to conduct a thorough PMIS evaluation. A more flexible framework is needed instead, one that covers both single and multi-project contexts, combines hard and soft aspects, and adapts to evolving team structures and equipment (Langston & Ghanbaripour, 2016).

4.2. Analysis of CSFs and Model Gaps

A comprehensive review of the current IS model shows that many CSFs for PMIS performance are not adequately considered. Specifically, the D&M model (DeLone & McLean, 2003) and M model (Attri & Grover, 2014, pp. 320–328) have a low percentage of factors such as user satisfaction, stakeholder engagement, leadership support, and team collaboration. Technical (e.g., system availability, integration), organizational (e.g., leadership support, training), and behavioral (e.g., user satisfaction, communication, collaboration) are the three theme categories into which these times frames may be properly categorized. This categorization helps in examining how each model overlooks crucial elements necessary for PMIS performance. Therefore, user satisfaction is central to IS success, yet the D&M model treats it more as a consequence rather than an integrated evaluative dimension (Petter & McLean, 2009, pp. 159–166). Similarly, while the M model rightly focuses on the project environment, it does not fully consider the influence of stakeholders on implementation processes and their impact on overall project and management outcomes (Ahlemann, 2009, pp. 19–30).

According to this research, currently, the most essential factors for assessing PMIS effectiveness are soft factors such as user satisfaction, communication quality, and stakeholder engagement. Previous scholars consistently expressed that although technical performance metrics like Information quality and system availability are crucial (S. Lee et

al., 2012), they are insufficient to ensure PMIS success in the real world. These results are consistent with previous studies that show that soft factors frequently influence whether the PMIS improves project performance (Jamali & Oveisi, 2016). Stakeholders may not support limitations and long-term strategic outcomes if such behavior and organizational CSF are not included in the assessment. The consequent PMIS may be technically sound but poorly supported by users. These oversights ultimately threaten the system's efficacy and properness. Furthermore, the PMBOK® Guide (PMI, 2021; Guillen, 2021) and other key project management standards highlight the significance of communication strategies and stakeholder management, although these components are still additional to the existing IS model.

Reasonable limitations in PMIS evaluation procedures are the cause of the disconnected flow between critical success factors and model structures (Alias et al., 2014, pp. 61–69). The D & M and M model provides incomplete success by focusing too heavily on the system or project output while ignoring the mutual dynamics fundamental to project success (Iivari, 2005, pp. 8–27). This overemphasis on structural and technical metrics misaligns evaluation frameworks with modern PM standards that advocate a balance between process, people, and technology (Gable et al., 2008). Organizations that depend exclusively on these models may thus lack all aspects of PMIS impacts, particularly in areas like stakeholder satisfaction and team collaboration that are becoming increasingly significant in the project context.

Findings from this research point out these scholarly concerns, illustrating that information system mostly reliance on hard skills which leads to a lack of holistic understanding of PMIS performance. Also, the PMIS offers lower assistance with decisions for strategy alignment and assessment system development when soft success factors are not implemented. For example, while a PMIS can report to a high system uptime and functionality score, it can still be weakened by poorly adopted rates, project teams' resistance, or ineffective stakeholder communication, any of which is adequately occupied by traditional models.

Therefore, to ensure a thorough and strategic assessment of PMIS effectiveness, it is essential to move towards an established evaluation framework that combines technical and soft factors.

4.3 Mapping PM Standards to CSFs and PMIS Evaluation

Project management standards such PMBOK® Guide (PMI, 2021) and ISO 21500 (ISO, 2021) (Brioso, 2015, pp. 76–84) suggest a more comprehensive approach to project success that extends beyond traditional metrics such as time, cost and scope. These standards highlight the importance of stakeholder engagement, leadership involvement, communication management, and team collaboration as integral to successful project delivery. Also, it is important to measure the success of the project within life cycle of the project, for instance project kick off to closure. According to Serrador & Rodney Turner (2014, pp. 75–84), relationship management and soft skills are similarly important to the success of a modern project as technical execution. However, the prominent success models such as D & M model and the M model, do not fully align with this widespread understanding. Their primary focus is on the system's output and immediate project results to identify the critical aspects highlighting PM standards.

There are apparent gaps in current PMIS evaluation models when we compare their coverage of critical success factors with those emphasized in PM standards. The research suggests that PMBOK® Guide (PMI, 2021) performance areas such as organizational alignment, user engagement, satisfaction, teams, and delivery domains are preferred. Table 4.2 demonstrates that while PMBOK® Guide (PMI, 2021) and ISO 21500 consistently support various CSFs, the D&M and Ahlemann models show visible gaps, particularly in soft success factors like stakeholder engagement, communication, and leadership. These gaps highlight disconnect between theoretical evaluation frameworks and the comprehensive expectations outlined in industry standards. Thus, this visual comparison reinforces the

need to evolve PMIS evaluation beyond rigid, technical criteria by integrating success dimensions that reflect both structured and unstructured (soft) project realities.

Table 4-2 Mapping of Critical Success Factors (CSFs) against PM Standards and Existing Models

CSF	Covered in PM Standards	Covered in DeLone & McLean	Covered in Ahlemann
Stakeholder engagement	Yes	Partially	Partially
Top management support	Yes	No	Indirectly
Clear goals/objectives	Yes	No	Yes
Effective communication	Yes	No	Partially
Team competence	Yes	No	No
Risk management	Yes	No	Partially
Monitoring & control	Yes	Yes	Yes
User satisfaction	Yes	Yes	No
Culture and leadership	Yes	No	No
Planning & scheduling	Yes	No	Yes
PMIS functionality/tools	Implied	No	Partially
Quality management	Yes	No	Partially

Stakeholder engagement is a significant area where the practice differs from the guidelines. PMBOK® Guide (PMI, 2021) emphasizes that the entire project is required to give attention to attractive stakeholders in the entire project lifecycle (PMI, 2021). However, the findings of this research show that many PMIS implementations still prioritize work tracking, scheduling and reporting on active stakeholder collaboration. Project management tools often prioritize management reporting over collaborative decision-making, which limits stakeholder involvement (Müller & Turner, 2010, pp. 437–448). As a result, PMIS becomes less effective as a strategic tool and contributes to the use of narrow or inadequate evaluate success metrics. This research emphasized these concerns, explaining that although PMIS systems adequately manage schedules and resources, they offer minimal

support for stakeholder feedback loops, engagement tracking, or communication management. It showed technical achievements higher than a specific strategy for project success and financial distribution in general. Without the comprehensive evaluation mechanism for soft factors, organizations disappeared significant insights into PMIS performance. Traditional PMIS models still focus too much on rigid structures and ignore important human and relational success factors. Even though project managers suggest using a mix of both, the models haven't caught up and need major updates to stay useful.

4.4 Synthesis and Practical Implications

However, key findings highlight the apparent gap between the real-world evaluation needs of a PMIS and the existing IS success model. The traditional model successfully addresses system quality, service quality, and basic information output, but it fails to capture the multiple project successes emphasized in ISO 21500 (ISO, 2021) and PMBOK® Guide (PMI, 2021). Soft aspects like stakeholder involvement, leadership involvement, team collaboration, and user satisfaction are neglected or overlooked.

In addition, this study also finds that traditional IS models focus too much on technical or structured metrics. Recalling detailed indications of project success and stakeholder satisfaction, the organization may believe the project has failed to include CSFs related to organizational and human components. This limited perspective may result in poor decision-making, incorrect system improvement, and low adoption rates. Considering the hard and soft factors evaluation PMIS success, a tailored framework must conform to globally accepted project management standards and guidelines such as ISO 21500 and PMBOK® Guide (PMI, 2021), which provide a proper basis for evaluating project and system performance.

These findings are sure that the assessment for PMIS practitioners cannot succeed if it concentrates on the current approach. Stakeholder satisfaction, team engagement,

leadership support, and communication effectiveness metrics should all be included in the evaluation criteria used by professionals. Including these soft factors in the PMIS assessment structure can greatly improve decision-making, system design and stakeholder satisfaction. But there are risks associated with using a mixed strategy. Project areas such as difficulty in assessment, subjective interpretation of success, and potential inconsistency in project data collection are introduced when the hard and soft matrix components are balanced. In long evaluation processes, organizations must also be careful about stakeholder participation and resource efficiency. This change requires a more thorough performance evaluation that takes into consideration the objectives of the project as well as the organization which are going beyond the basic technical component. In addition, practitioners should proactively map their assessment structure against PM standards to ensure strategic alignment and better predict the real-world impacts of PMIS implementation.

It is essential that to enhance future models, a tailored framework that incorporates success elements and the standard project management framework must be developed. The systematic technique to evaluate teamwork, leadership impact, stakeholder involvement, and organizational change adaptability should be added to the model. Future research should identify a tailored framework that integrates both concepts, encompassing defined performance domains that substantiate both success theory and success. Such an approach will help close the gap between PMIS theory and practice, pointing to those systems that not only work well technically, but also actively measure project success and organizational value.

5 CONCLUSION AND RECOMMENDATIONS

In the context of PMIS, the study looks at the well-known IS success model, particularly that developed by D&M, and Ahlemann PMIS framework. It highlights out limitations in these models, particularly the lack of focus on alignment with project-specific elements like stakeholder engagement, dynamic collaboration, PMBOK® Guide (PMI, 2021) and ISO 21500. One significant finding is that the current PMIS framework frequently emphasizes the evaluation of hard or soft skills, which are CSFs that are carefully considered. This study underscores the necessity for a balanced PMIS evaluation approach that integrates both hard and soft metrics, even though it does not present a fully developed hybrid framework. The need for empirical verification is highlighted by the reliance on secondary data, which implies that future studies should create and test such a construct in real-world contexts.

5.1. Summary of Research Findings

This paper focusses at the limitations of current success models in the PMIS framework, particularly regarding the Ahlemann Framework and the D&M model. While these models try to evaluate technical factors such as systems, information and service quality, they decrease in addressing the dynamic and stakeholder-driven nature of PMIS. Limited attention to CSF, including stakeholder participation, organizational strategy, and optimization with shifting project demands, are among the key gaps that have been identified. Furthermore, these models frequently overlook the assessment of both hard and soft factors, which are crucial for PMIS evaluation. This implies that the basic IS success model must be significantly modified to allow for the complexity and stakeholder relationships related to project management in order to be a useful evaluation tool for PMIS.

This study shows Ahlemann capacity to integrate the PMIS model with previous works of literature in order to enhance the establishment of a tailored framework that responds to

particular project management needs. The model works well for organizational integration and performance when projects follow standard guidelines and frameworks. A more comprehensive PMIS assessment structure that emphasizes the user satisfaction and net profit can be supported by incorporating elements of D&M model. By integrating both hard and soft success factors, a tailored framework increases the accuracy and effectiveness of the PMIS evaluation.

Finally, in accordance with project management standards like ISO 21500 and PMBOK® Guide, the study developed success artifacts/competence elements for evaluating the effectiveness of PMIS (PMI, 2021). The study reveals that traditional project management models often neglect essential components such as dynamic reporting, real-time collaboration, and stakeholder feedback mechanisms. A comprehensive review of PMIS, aligned with established standards, ensures that system performance and strategic project outcomes are effectively considered.

5.2. Theoretical Contribution and Practical Implications

The study offers a significant theoretical contribution by integrating insights from established models, notably those of D&M and Ahlemann, with recognized project management standards such as ISO 21500 and the PMBOK® Guide (PMI, 2021). PMBOK® Guide (PMI, 2021). By comparing different outlines, research usually reveals wide diversity. Ignoring common, useful standards that are critical to structural and technical success (such as system quality and information quality) but necessary for PMIS performance. The findings emphasize the importance of incorporating soft success factors, such as stakeholder involvement, leadership involvement, team collaboration, and technical measures, into the PMIS evaluation framework. By bridging the gap between theory and real-world project management needs, the combined method provides a more comprehensive framework for evaluating PMIS performance.

The study provides organizations using PMIS with useful information from a practical perspective. This implies that, in addition to hard metrics components, the evaluation framework should include soft metrics components that affect project success. Decision-makers are advised to evaluate PMIS performance solely based on system output (such as uptime or data accuracy), as this considers crucial factors, including user adoption, cross-functional collaboration, and strategic alignment. Stakeholder engagement, team dynamics, and deliverables are examples of how research practitioners can gain valuable insights into PMIS evaluation by aligning the CSFs of operational efficiency and long-term project value with the performance domain outlined in the PMBOK® Guide (PMI, 2021).

Furthermore, the study highlights the importance of dynamic evaluation mechanisms, such as real-time stakeholder feedback, dynamic reporting, and sentiment analysis, in meeting the project's design requirements. Using these data, organizations may improve their PMIS implementation methods and ensure that technology investment results in average project success. In the end, this study moves the focus from the solely technical assessment of the PMIS to a balanced, practical framework that acknowledges the interplay of systems, people, and processes in the project environment.

5.3. Research Limitations

This study has several limitations that should be acknowledged. First, because it is a literature-based analysis, it is not empirically verified through case studies or field tests, which limits the practical verification of a framework. Although the study looks at current models and standards, the findings are theoretical rather than supported by empirical data from actual PMIS deployment.

Second, the study relies on the project management standards and theoretical models that are accessible during the research. A few findings might need to be updated to reflect new best practices as PMIS functionality and technologies advance.

Lastly, although the study highlights the significance of soft success factors like leadership effectiveness and stakeholder engagement, these aspects were examined philosophically rather than quantitatively. Future studies should use empirical techniques to identify these human-centric factors and confirm how they contribute to the efficacy of PMIS.

5.4. Recommendation for Future Research

A significant limitation of the traditional PMIS assessment model is its narrow focus on the single-project environment, which insufficiently addresses the complexities of multi-project and enterprise-wide settings. These traditional structures are often less effective in assessing essential aspects such as cross-project resource coordination, portfolio-level cost forecasting, and strategic decision-making support. To bridge this gap, future research should prefer to develop advanced evaluation approaches specially designed for a multi-project environment. This advancement will enable organizations to evaluate the PMIS performance in a complex project portfolio more effectively, supporting strategic commercial objectives.

A critical need exists for developing flexible, tailored PMIS evaluation models that incorporate validated IS success dimensions while aligning with project management standards, which should subsequently undergo empirical testing in real-world project environments. The importance of including hard (technical) and soft (human-centered) aspects of success in evaluation criteria is directly related to this strategy, because such a complete evaluation framework system will close the gap between the performance metrics and the objectives of the stakeholders. Researchers can better meet real project needs by using flexible models that include both hard and soft success factors across different organizational settings.

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