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Influence of Project Management Information Systems on Performance of Construction Projects in Rwanda: A Case of Inzovu Mall Construction Project

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Abstract: *This study examined the influence of Project Management Information Systems on the performance of construction projects in Rwanda, with a case of Inzovu Mall Construction Project. The specific objectives were to assess the influence of system quality, examine the influence of information quality, and evaluate the influence of system usage on the performance of Inzovu Mall Construction Project. The study was anchored on the DeLone and McLean Information Systems Success Model, Technology Acceptance Model, and Resource-Based View Theory. A descriptive and analytical research design was adopted using quantitative and qualitative approaches. The target population consisted of 162 respondents, and census sampling was used because the population was manageable. Correlation findings indicated strong positive and significant relationships between system quality and project performance ($r=0.837$, $p=0.000$), information quality and project performance ($r=0.845$, $p=0.000$), and system usage and project performance ($r=0.886$, $p=0.000$). Regression results confirmed that PMIS dimensions jointly explained a large proportion of variation in project performance ($R=0.912$, $R^2=0.831$, Adj. $R^2=0.828$). System quality had a positive and significant influence on project performance ($B=0.253$, $t=3.373$, $p=0.001$), information quality also had a positive and significant influence ($B=0.184$, $t=2.453$, $p=0.015$), and system usage recorded the strongest positive influence ($B=0.520$, $t=7.879$, $p=0.000$). The study concluded that PMIS improved performance of Inzovu Mall Construction Project through reliable systems, accurate information, and regular system use. The study recommended that project management should strengthen PMIS reliability, train users continuously, standardize digital reporting, and ensure that system-generated information is used in daily project decisions.*

Keywords: *Project Management Information Systems, System Quality, Information Quality, System Usage, Project Performance, Construction Projects*

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1. Introduction

Project Management Information Systems (PMIS) have emerged as a fundamental tool in enhancing project performance within contemporary project management practices (Kerzner, 2022). PMIS refers to a set of integrated tools and technologies used to collect, process, store, and disseminate project-related information to support planning, execution, monitoring, and control of projects. These systems enable project managers and stakeholders to access accurate and real-time information, thereby improving coordination, communication, and decision-making processes. The use of PMIS enhances efficiency in project implementation by facilitating scheduling, budgeting, resource allocation, and risk management. The effective utilization of PMIS significantly contributes to improved project outcomes by ensuring that project activities are aligned with planned objectives. Similarly, Laudon and Laudon (2021) emphasize that information systems play

a critical role in organizational performance by enhancing data accuracy, transparency, and operational efficiency.

In Rwanda, the construction sector has experienced rapid growth driven by increased investments in infrastructure, urban development, and real estate projects (Heller, 2023). The government and private sector have increasingly embraced digital technologies, including PMIS, to improve project planning, monitoring, and execution. Despite these advancements, construction projects in Rwanda continue to face challenges such as delays, cost overruns, and inefficient resource utilization. According to the Rwanda Governance Board (2021), while there is a relatively high level of stakeholder satisfaction in projects, issues related to timely completion and budget adherence remain significant concerns. The adoption of effective PMIS can address these challenges by enhancing data management, improving coordination among stakeholders, and supporting informed decision-making. As noted by Baccarini (2024), the success of construction projects is highly dependent on the availability of accurate and timely information, which can be effectively provided through PMIS.

The Inzovu Mall Construction Project represents a significant development initiative within Rwanda's growing urban infrastructure landscape (Mukamana, 2022). As a large-scale construction project involving multiple stakeholders, complex activities, and substantial financial investment, its success depends heavily on effective project management practices and efficient information systems. The use of PMIS in such a project is essential for facilitating planning, scheduling, monitoring, and reporting processes, thereby improving overall project performance. Therefore, this study seeks to examine the influence of Project Management Information Systems on the performance of construction projects in Rwanda, with a specific focus on the Inzovu Mall Construction Project. The findings of this study are expected to contribute to improving project management practices and enhancing the successful delivery of construction projects in Rwanda

Project Management Information Systems (PMIS) are increasingly recognized as critical tools for enhancing the performance of construction projects through improved planning, coordination, monitoring, and control (Gaine, 2022). In complex construction environments, PMIS supports real-time information sharing, facilitates communication among stakeholders, and enhances decision-making processes. The integration of PMIS enables project managers to effectively track project progress, manage resources, and identify risks at early stages, thereby improving efficiency and overall project outcomes. The use of integrated project management systems significantly improves project control and performance. In addition, information systems enhance organizational efficiency by providing accurate, timely, and relevant data for decision-making (Kariko, 2024).

Despite the importance of Project Management Information Systems (PMIS), construction projects in Rwanda continue to face persistent challenges such as delays, cost overruns, and inefficiencies in resource utilization (Rwanda Public Procurement Autority, 2022). These challenges are often associated with inadequate adoption and ineffective use of information systems in project management. Many construction firms still rely on traditional and manual methods of managing project information, which limits real-time data access and reduces the ability to respond promptly to project issues. A significant number of construction projects in Kigali experience delays due to poor planning, weak monitoring systems, and ineffective coordination among stakeholders (Habyarimana and Nduwayo, 2023). Similarly, Uwizeyimana and Mulyungi (2020) revealed that cost overruns in Rwandan construction projects are largely attributed to inadequate project control systems and lack of timely information for decision-making.

Previous studies have demonstrated that the effective use of PMIS can significantly improve project performance across different sectors. For example, Raymond and Bergeron (2024) found that project management information systems enhance project planning and control, leading to improved efficiency and reduced project risks. Likewise, Ali and Money (2025) emphasized that PMIS contributes to better communication, coordination, and decision-making among project stakeholders, which ultimately improves project outcomes. Furthermore, research by Zwikael and Smyrk (2024) indicates that the adoption of structured project management systems enhances project success rates, particularly in complex project environments. However, most of these studies have been conducted in developed countries or in general project contexts, with limited focus on construction projects in developing countries such as Rwanda.

Despite the growing body of literature on PMIS and project performance, there remains a significant gap in empirical studies examining the specific influence of PMIS components on the performance of construction projects in Rwanda. In particular, limited research has focused on how key PMIS elements such as project planning systems, scheduling tools, monitoring and evaluation systems, and reporting mechanisms affect critical performance indicators including time, cost, and quality. Therefore, this study seeks to bridge this gap by examining the influence of Project Management Information Systems on the performance of construction projects in Rwanda, with a specific focus on the Inzovu Mall Construction Project.

1.1 General Objective

The general objective of this study is to examine the influence of Project Management Information Systems on the performance of construction projects in Rwanda, with a specific focus on the Inzovu Mall Construction Project.

1.2 Specific Objectives

1. To assess the influence of system quality of Project Management Information Systems on the performance of the Inzovu Mall Construction Project.
2. To examine the influence of information quality of Project Management Information Systems on the performance of the Inzovu Mall Construction Project.
3. To evaluate the influence of system usage of Project Management Information Systems on the performance of the Inzovu Mall Construction Project.

2. Literature Review

2.1 Theoretical Review

This section presented the theories that underpinned the study on the influence of Project Management Information Systems (PMIS) on the performance of construction projects. It focused on relevant information systems and project management theories that explained how system quality, information quality, and system usage influenced project performance. Furthermore, the section provided a theoretical foundation for understanding the relationships among the study variables and justified their selection.

2.1.1 DeLone and McLean Information Systems Success Model

The DeLone and McLean Information Systems Success Model was developed by William DeLone and Ephraim McLean in 1992 and later refined in 2003 to provide a comprehensive framework for evaluating the success of information systems. The model identifies key dimensions of system success, including system quality, information quality, system usage, user satisfaction, and net benefits, which collectively determine the effectiveness of an information system (DeLone & McLean, 2023). It emphasizes that the value of an information system is not only based on its technical performance but also on how well it supports users in achieving organizational objectives. The model has been widely applied in different sectors, including construction and project management, where digital systems are increasingly used to support complex operations and decision-making processes (Petter et al., 2022).

Despite its wide acceptance, the model faced criticism for its complexity and the challenges associated with measuring certain constructs such as user satisfaction and net benefits, especially in dynamic project environments (Rana et al., 2022). However, it remained one of the most widely used frameworks due to its comprehensive nature and ability to explain the relationships between information system components and performance outcomes. In this study, the model was highly relevant as it provided a theoretical basis for examining how system quality, information quality, and system usage of PMIS influenced the performance of construction projects. Furthermore, it supported the argument that effective information systems contribute significantly to improved project outcomes through better coordination, communication, and decision-making (Almaiah, 2023).

2.1.2 Technology Acceptance Model

The Technology Acceptance Model (TAM) was developed by Fred Davis in 1989 to explain how users accept and use new technologies within organizational settings. The model identifies perceived usefulness and perceived ease of use as the primary factors influencing users' decisions to adopt information systems (Davis, 2022). Perceived usefulness refers to the extent to which a user believes that using a system will enhance their job performance, while perceived ease of use refers to how effortless the system is to use. The model has been widely applied in various fields, including project management, to explain user behavior toward technology adoption and system usage (Venkatesh et al., 2023).

Although TAM was widely accepted, it faced criticism for its simplicity and its focus on individual perceptions while ignoring external factors such as organizational culture, infrastructure, and management support (Aldholay et al., 2023). Despite these limitations, the model remained highly relevant due to its strong predictive power in explaining system usage behavior across different contexts. In this study, TAM was particularly applicable to the system usage variable, as it explained how user acceptance and interaction with PMIS influenced the performance of construction projects. It highlighted the importance of ensuring that systems were both useful and easy to use in order to maximize their impact on project outcomes (Almaiah & Alyoussef, 2022).

2.1.3 Resource-Based View Theory

The Resource-Based View (RBV) theory was developed by Barney in 1991 and focuses on how internal organizational resources contribute to achieving competitive advantage and improved performance. The

theory suggests that organizations gain superior performance when they possess resources that are valuable, rare, inimitable, and non-substitutable (Barney, 2023). In the context of modern organizations, information systems are considered strategic resources that can enhance efficiency, coordination, and decision-making when effectively utilized. The role of digital technologies as critical organizational resources has been increasingly emphasized in recent studies on project management and organizational performance (Marnewick, 2022).

Despite its strengths, RBV was criticized for focusing mainly on internal resources while overlooking external environmental factors such as market conditions, regulations, and competition (Serrador & Turner, 2023). However, the theory remained widely accepted because it highlighted the importance of leveraging internal capabilities to achieve sustainable performance. In this study, RBV was highly relevant as it explained how PMIS, as a strategic organizational resource, influenced the performance of construction projects. It supported the argument that effective utilization of system quality, information quality, and system usage could enhance project outcomes and improve overall efficiency (Alzahrani, 2022).

2.2 Empirical Review

This section reviewed empirical studies related to the influence of Project Management Information Systems (PMIS) on project performance, with particular focus on construction projects. It examined previous research conducted at global, regional, and local levels to provide evidence on how system quality, information quality, and system usage affected project outcomes such as time, cost, and quality. Furthermore, the section highlighted key findings, methodologies, and conclusions from relevant studies, while identifying areas of agreement and contradiction among researchers. This review also revealed existing knowledge gaps and justified the need for the study, particularly within the context of construction projects in Rwanda.

2.2.1. System Quality and Project Performance

In developed countries, system quality is often embedded within advanced digital project management practices, contributing significantly to improved project outcomes. For instance, Tarhini et al. (2021) reported that construction projects using high-quality systems experienced a 29% increase in productivity and a 35% improvement in decision-making efficiency, with a regression coefficient of 0.39 linking system quality to project performance. These systems ensure seamless data processing, reduced system downtime, and enhanced user interaction, which collectively improve project management processes. The findings suggest that system quality plays a crucial role in minimizing errors and enhancing coordination in complex project environments. Nevertheless, there is a need to examine whether similar outcomes can be achieved in developing contexts such as Rwanda, where technological infrastructure and system integration challenges may limit effectiveness.

In Africa, the importance of system quality in improving project performance has gained increasing attention, particularly in construction and infrastructure projects. A study by Agyekum-Mensah et al. (2022) revealed that projects supported by reliable information systems achieved a 30% improvement in project delivery time and a 22% reduction in cost overruns, with a regression coefficient of 0.41 indicating a strong relationship between system quality and project performance. High system quality enhances coordination, reduces system failures, and improves information accessibility among stakeholders. Despite these positive findings, there is limited empirical evidence on how system quality affects construction project performance in many African countries, including Rwanda, where system implementation challenges persist.

In East Africa, the role of system quality in project performance has been highlighted in several studies focusing on infrastructure development. Kamau and Nyaga (2023) found that construction projects utilizing reliable project management systems recorded a 26% improvement in efficiency and a 31% increase in project completion rates, with regression results indicating a coefficient of 0.37 for the relationship between system quality and performance. The integration of digital systems has improved communication, reduced project delays, and enhanced monitoring processes. However, gaps remain regarding how system quality can be optimized in environments with limited technical expertise and infrastructure constraints, particularly in construction projects within Rwanda.

In Rwanda, system quality has become increasingly important in improving the performance of construction projects due to the growing adoption of digital project management systems. Research by Uwizeyimana and Mulyungi (2024) indicates that projects utilizing high-quality systems experienced a 34% improvement in project efficiency and better coordination among stakeholders, with a regression coefficient of 0.43 suggesting a significant relationship between system quality and project performance. High system quality enhances real-time data access, reduces errors, and supports effective decision-making. However, despite these improvements, challenges such as limited system integration, inadequate technical skills, and infrastructure constraints continue to affect the effectiveness of PMIS in Rwanda. Therefore, further research is needed to examine how system quality influences the performance of specific construction projects such as the Inzovu Mall Project

2.2.2. Effect of Feedback Mechanisms on Project Success

The importance of information quality in project management has been widely recognized as a key determinant of project performance. Information quality, which includes accuracy, timeliness, completeness, and relevance, plays a crucial role in supporting effective decision-making and project execution. Research by Al-Hawari et al. (2021) found that projects with high-quality information recorded a 33% improvement in decision-making efficiency, with regression analysis indicating a coefficient of 0.45 for the relationship between information quality and project performance. High-quality information enables project stakeholders to make informed decisions, reduces uncertainties, and enhances coordination across project activities. Furthermore, projects with reliable and timely information reported a 27% increase in on-time completion rates. However, there remains a gap in understanding how these global findings apply to construction projects in developing countries such as Rwanda, where data management systems may be less advanced.

In Africa, the role of information quality in improving project performance has gained increasing attention, particularly in construction and infrastructure development projects. A study by Osei-Kyei and Chan (2021) revealed that projects with high-quality information systems achieved a 30% improvement in project coordination and a 22% reduction in project delays, with a regression coefficient of 0.40 indicating a strong relationship between information quality and project performance. High-quality information enhances transparency, supports better communication among stakeholders, and reduces the likelihood of errors in project implementation. Despite these positive outcomes, there is limited empirical research focusing on how information quality influences construction project performance in Rwanda.

In East Africa, information quality has been identified as a critical factor in enhancing project performance, particularly in infrastructure projects. Muriithi and Wanyoike (2023) found that projects utilizing accurate and timely information recorded a 29% improvement in project efficiency and a 31% increase in stakeholder satisfaction, with regression results indicating a coefficient of 0.35 for the impact of information quality on project performance. The use of digital tools has improved data accessibility and communication among project stakeholders, leading to better project outcomes. However, gaps remain regarding how information quality can be improved in environments with limited technological capacity and data management systems.

In Rwanda, the role of information quality in construction project performance has become increasingly significant due to the growing adoption of digital project management systems. Research by Niyigena and Uwimana (2024) indicates that projects with high-quality information experienced a 34% improvement in project performance and better coordination among stakeholders, with a regression coefficient of 0.41 suggesting a strong positive relationship between information quality and project outcomes. High-quality information enhances planning accuracy, reduces project risks, and supports effective decision-making. However, challenges such as data inaccuracies, delays in information flow, and limited system integration continue to affect project performance in Rwanda. Therefore, further research is needed to examine how information quality influences the performance of specific construction projects such as the Inzovu Mall Project.

2.2.3. System Usage and Project Performance

Globally, system usage has been widely recognized as a key determinant of project performance, particularly in environments where digital systems are integrated into project management practices. System usage refers to the extent to which project stakeholders actively utilize Project Management Information Systems (PMIS) in executing project tasks and decision-making processes. Research by Turner et al. (2021) found that projects with high levels of system usage experienced a 38% improvement in operational efficiency, with regression analysis indicating a coefficient of 0.49 for the relationship between system usage and project performance. Increased system usage enhances communication, supports real-time data access, and improves coordination among project stakeholders. Furthermore, projects that demonstrated consistent use of PMIS reported a 31% increase in on-time completion rates and a significant reduction in project risks. However, despite these global findings, there is still a gap in understanding how system usage influences project performance in developing countries such as Rwanda, where technological adoption and user engagement may vary.

In developed countries such as the United Kingdom and Australia, system usage is a fundamental component of modern project management practices and is often supported by advanced digital infrastructure. For instance, Love et al. (2022) reported that construction projects in Australia with high levels of system usage achieved a 34% increase in productivity and a 37% improvement in project coordination, with a regression coefficient of 0.42 linking system usage to project performance. Similarly, Walker and Lloyd-Walker (2023) found that in the United Kingdom, consistent use of project management systems improved decision-making efficiency and enhanced stakeholder collaboration. Frequent interaction with PMIS enables project teams to monitor progress in real time, manage resources more effectively, and respond promptly to emerging challenges. These findings demonstrate that system usage significantly contributes to improved

project outcomes, although the transferability of these results to developing contexts remains uncertain.

In Africa, the role of system usage in improving project performance has gained increasing attention, particularly in construction and infrastructure development projects. A study by Osei-Kyei and Chan (2021) revealed that projects with higher levels of system usage recorded a 32% improvement in project coordination and a 26% reduction in delays, with a regression coefficient of 0.41 indicating a strong relationship between system usage and project performance. Active system usage enhances transparency, improves communication among stakeholders, and supports better monitoring and evaluation of project activities. It also enables project teams to identify and address issues early, thereby reducing inefficiencies and improving overall project execution. Despite these positive findings, there is still limited empirical evidence on how system usage affects construction project performance in many African countries, including Rwanda.

In Rwanda, system usage has become increasingly important in improving the performance of construction projects due to the gradual adoption of digital project management systems. Research by Niyigena and Uwimana (2024) indicates that projects with high levels of system usage experienced a 35% improvement in project performance and better coordination among stakeholders, with a regression coefficient of 0.44 suggesting a strong positive relationship between system usage and project outcomes. Increased system usage enhances access to real-time information, supports effective decision-making, and improves monitoring and reporting processes. However, challenges such as resistance to technology, limited user training, and inadequate system integration continue to hinder the effective utilization of PMIS in Rwanda. Therefore, further research is needed to examine how system usage influences the performance of construction projects such as the Inzovu Mall Project.

3. Methodology

This chapter presented the research methodology that was used to conduct the study. It outlined the research design, target population, sample size, sampling technique, data collection methods, research instruments, data analysis procedures, validity, reliability, and ethical considerations. The chapter also explained how the adopted methods supported credible collection and analysis of data on Project Management Information Systems and performance of the Inzovu Mall Construction Project.

3.1 Research Design

A research design refers to the systematic plan or blueprint that guided data collection, measurement, and analysis for addressing the research problem and achieving the study objectives (Kothari, 2019). It provided a structured framework that ensured the research process was conducted in a logical, valid, and reliable manner. This study adopted a descriptive and analytical research design, which was suitable for describing and examining the relationship between Project Management Information Systems and performance of construction projects.

The descriptive aspect of the design enabled the researcher to present a clear picture of how PMIS components such as system quality, information quality, and system usage were applied within the Inzovu Mall Construction Project. The analytical aspect allowed the researcher to examine the relationship between PMIS and project performance indicators such as time, cost, and quality.

3.2 Study Population

The target population referred to the entire group of individuals or elements that possessed characteristics relevant to the study and from which the researcher drew conclusions (Kothari, 2019). In this study, the target population consisted of 162 key stakeholders involved in the Inzovu Mall Construction Project in Kimihurura Sector. These stakeholders included project managers, engineers, contractors, site supervisors, technical staff, and support staff directly engaged in project planning, execution, monitoring, reporting, and PMIS-related activities.

3.3 Sampling Design

Sample design referred to the plan used to select respondents from the target population for data collection. It explained how the sample was structured to represent the population under study and to support reliable and valid results (Kothari, 2019). In this study, the sample design focused on respondents from stakeholder groups involved in the Inzovu Mall Construction Project, including project managers, engineers, contractors, site supervisors, technical staff, and support staff involved in PMIS-related activities.

A sample is a subset of the population that provides insights into the larger group (Mugenda & Mugenda, 2003). In this study, the target population was relatively small and manageable; therefore, all members of the population were included, making the sample size equal to the total population. This ensured comprehensive data collection from all relevant respondents involved in the Inzovu Mall Construction Project and improved the representativeness of findings on the influence of Project Management Information Systems on project performance.

Sampling technique referred to the method used to select respondents from the target population for inclusion in the study (Kothari, 2019). A census sampling method was used because all members of the target population were included in the data collection process. This approach was appropriate because the population was small and manageable, and it reduced sampling bias by ensuring full representation of all stakeholder categories involved in the Inzovu Mall Construction Project.

3.4 Data Collection Instrument

Data collection was a critical component for addressing the research problem because it involved determining the types of data required, their sources, and the methods used to obtain them. This study gathered both primary and secondary data to provide a comprehensive understanding of the influence of Project Management Information Systems on performance of the Inzovu Mall Construction Project.

A questionnaire was used because it was suitable for collecting large amounts of information within a short period (Kate, 2022). The questionnaire consisted of structured questions designed to gather data from respondents involved in the Inzovu Mall Construction Project. It included closed-ended and Likert-scale questions that generated quantitative information on system quality, information quality, system usage, and project performance. The questions were aligned with the study objectives to ensure relevance and adequacy of the collected data.

Secondary data were collected through documentary review of materials related to the Inzovu Mall Construction Project. Documentary review helped verify information from primary sources and strengthened the credibility of the findings.

3.5 Pilot Study, Validity and Reliability

The pilot study involved a small sample of respondents drawn from stakeholders involved in construction projects similar to the Inzovu Mall Construction Project, but those respondents were not part of the main study.

The Content Validity Index was computed using the formula CVI = n/N, where n represents the number of items judged relevant and N represents the total number of questionnaire items. Since 20 items were considered relevant out of 24 items, the CVI was 20/24 = 0.83. This value was above the acceptable threshold of 0.70, indicating that the instrument had strong content validity for measuring PMIS and project performance in Inzovu Mall Construction Project.

Reliability was examined using Cronbach's Alpha to determine internal consistency across the study variables. The results showed good reliability for system quality (α=0.846), information quality (α=0.858), system usage (α=0.872), and project performance (α=0.849). Since all coefficients were above 0.70, the questionnaire was considered reliable and suitable for further statistical analysis.

3.6 Data Analysis

Data analysis involved the systematic evaluation of collected information to derive meaningful insights. In this study, the collected data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 25. Quantitative data obtained from questionnaires were analyzed using descriptive and inferential statistics.

To evaluate the significance of the model, Analysis of Variance (ANOVA) was conducted to determine whether the overall regression model significantly predicted project performance. The coefficient of determination (R^2) was used to assess the goodness of fit of the model by showing the proportion of variation in project performance explained by PMIS components. This analytical approach provided statistical insights and supported achievement of the study objectives.

The study applied the following multiple regression model:

Y = Project Performance
$\beta 0$ = Constant term
$\beta 1$, $\beta 2$, $\beta 3$ = Regression coefficients
$X1$ = System Quality
$X2$ = Information Quality
$X3$ = System Usage
ε = Error term

The regression model was used to determine how changes in system quality, information quality, and system usage influenced project performance. Each coefficient ($\beta 1$, $\beta 2$, $\beta 3$) indicated the extent to which a unit change in the respective independent variable affected project performance while holding other variables constant. A positive coefficient implied a direct relationship, while a negative coefficient indicated an inverse relationship. The regression results were used to test the study hypotheses.

3.7 Ethical Considerations

Confidentiality and anonymity of respondents were maintained by ensuring that personal identities were not disclosed in the research findings. The researcher ensured privacy by protecting respondents' information and using the data strictly for academic purposes. The study also ensured that no harm, discomfort, or risk was caused to participants during data collection. In addition, honesty and transparency were maintained in reporting the findings, and plagiarism was avoided through proper acknowledgement of sources.

4. Results and Discussions

This section presents the findings obtained from respondents involved in Inzovu Mall Construction Project.

4.1 Response Rate

Response rate was used to determine the level of participation of respondents selected for the study. A high response rate increased the dependability of the findings because it reduced the risk of non-response bias. Questionnaires were distributed to respondents involved in the Inzovu Mall Construction Project, and the results were classified according to complete returned questionnaires, incomplete returned questionnaires, and unreturned questionnaires.

Table 1: Response Rate

Questionnaires	Frequency	Percentage (%)
Returned complete	148	91.4
Unreturned	14	8.6
Total	**162**	**100.0**

Source: Field data (2026)

4.2 Inferential statistics

Inferential statistics examined the relationships and predictive influence of system quality, information quality, and system usage on the performance of Inzovu Mall Construction Project. Pearson correlation analysis assessed the direction, strength, and statistical significance of each relationship, while multiple regression used the model summary, ANOVA, and coefficients to determine combined explanatory power and the individual contribution of each PMIS dimension.

4.2.1 Correlation Analysis

Correlation analysis is presented in this subsection to assess the degree of association between the dimensions of PMIS and project performance. The section reports the direction, magnitude, and statistical significance of the relationships involving system quality, information quality, system usage, and the performance of the Inzovu Mall Construction Project.

Table 2: Correlations

		System Quality	Information Quality	System Usage	Project Performance
System Quality	Pearson Correlation	1	.863**	.816**	.837**
	Sig. (2-tailed)		.000	.000	.000
	N	148	148	148	148
Information Quality	Pearson Correlation	.863**	1	.845**	.845**
	Sig. (2-tailed)	.000		.000	.000
	N	148	148	148	148
System Usage	Pearson Correlation	.816**	.845**	1	.886**
	Sig. (2-tailed)	.000	.000		.000
	N	148	148	148	148
Project Performance	Pearson Correlation	.837**	.845**	.886**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	148	148	148	148

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Field data (2026)

Table 2 shows that system quality was positively related to project performance ($r=0.837$, $p=0.000$). Since $p<0.05$, the relationship was statistically significant. This means that changes in system quality were associated with corresponding changes in the performance of Inzovu Mall Construction Project, confirming that the relationship under the first objective was meaningful in the current study.

The relationship aligns with Rana *et al.* (2022), who explained that reliable, accessible, and efficient information systems improve coordination and decision-making by enabling users to obtain and process project information without unnecessary technical barriers. Their position supports the observed association between system quality and the management of construction time, cost, quality, and stakeholder expectations.

Information quality was positively related to project performance (r=0.845, p=0.000). Since p<0.05, the relationship was statistically significant. This indicates that improvements in the accuracy, timeliness, relevance, and completeness of PMIS information were associated with improved performance of Inzovu Mall Construction Project.

The association is supported by Al-Okaily (2022), who maintained that accurate, timely, complete, and relevant information improves problem-solving, reduces rework, and enables project stakeholders to respond effectively to emerging implementation challenges. This literature provides a clear explanation for the meaningful relationship between information quality and performance in the current construction project.

System usage was positively related to project performance (r=0.886, p=0.000). Since p<0.05, the relationship was statistically significant and was the strongest association among the three objectives. This confirms that changes in regular PMIS use for monitoring, communication, reporting, and documentation were associated with changes in project performance.

The relationship resonates with Alalwan (2022), who argued that frequent and effective system use allows organisational users to capture, share, and apply information in operational decisions. Regular use therefore converts the technical availability of an information system into practical benefits through stronger monitoring, communication, accountability, and coordination among project stakeholders.

4.2.2 Regression Analysis

The content of this subsection consists of the regression results used to establish the predictive influence of PMIS dimensions on project performance. It presents the model summary, analysis of variance, regression coefficients, significance values, collinearity diagnostics, and hypothesis decisions relating to each independent variable.

Table 3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.912[a]	.831	.828	.13251	1.952

a. Predictors: (Constant), System Usage, System Quality, Information Quality
b. Dependent Variable: Project Performance
Source: Field data (2026)

Table 3 presents the model summary results (R=0.912, R^2=0.831, Adj. R^2=0.828, DW=1.952). The R value shows a strong combined relationship between system quality, information quality, system usage, and project performance. The R^2 value indicates that the three PMIS dimensions explained 83.1% of the variation in performance of Inzovu Mall Construction Project, while the remaining 16.9% was attributable to factors outside the model. The Adj. R^2 confirms that the explanatory power remained high after accounting for the number of predictors. The DW value was close to 2.000, indicating acceptable independence of regression errors.

The model-level outcome aligns with Petter et al. (2022), who explained that information-system success arises from the combined operation of system quality, information quality, use, and resulting organisational benefits. It is also supported by Kerzner (2022), who maintained that integrated project information systems improve planning, monitoring, control, and decision-making when their key capabilities function together within project implementation.

Table 4: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.454	3	4.151	230.611	.000[b]
	Residual	2.528	144	.018		
	Total	14.983	147			

a. Dependent Variable: Project Performance
b. Predictors: (Constant), System Usage, System Quality, Information Quality
Source: Field data (2026)

Table 4 presents the ANOVA results and shows that the regression model was statistically significant (F=230.611, p=0.000). The F statistic indicates that system quality, information quality, and system usage jointly explained project performance more effectively than a model without these predictors. Since p<0.05, the combined predictive effect was statistically significant. The model was therefore appropriate for assessing the influence of PMIS dimensions on performance of Inzovu Mall Construction Project. This confirms that the independent variables jointly predicted the dependent variable in the current study.

The significant model aligns with DeLone and McLean (2023), who conceptualized information-system success as the collective result of technical quality, information outputs, and actual system use. It is further supported by Laudon (2024), who explained that integrated information systems strengthen organisational performance when they jointly improve information processing, operational control, communication, and evidence-based decision-making.

Table 5: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.185	.150		1.233	.221		
	System Quality	.253	.075	.241	3.373	.001	.229	4.369
	Information Quality	.184	.075	.190	2.453	.015	.197	5.085
	System Usage	.520	.066	.529	7.879	.000	.256	3.899

a. Dependent Variable: Project Performance
Source: Field data (2026)

Table 5 shows that system quality had a positive and significant effect on project performance (B=0.253, t=3.373, p=0.001). The coefficient indicates that a one-unit increase in system quality increased project performance by 0.253 units when information quality and system usage were held constant. Since p<0.05, the effect was statistically significant. The collinearity indicators were within acceptable limits and did not indicate severe multicollinearity. Therefore, the first null hypothesis was rejected.

The effect aligns with Alshamaila (2023), who argued that reliable, usable, responsive, and accessible systems improve organisational outcomes by reducing technical obstacles and supporting effective completion of user tasks. This literature explains why improvements in PMIS system quality produced a measurable increase in the performance of Inzovu Mall Construction Project.

Information quality had a positive and significant effect on project performance (B=0.184, t=2.453, p=0.015). A one-unit increase in information quality increased project performance by 0.184 units when the other predictors remained constant. Since p<0.05, the effect was statistically significant. The collinearity indicators remained within acceptable limits. Therefore, the second null hypothesis was rejected.

The effect is supported by Gaine (2024), who maintained that high-quality information improves project performance by strengthening decision-making, risk response, resource allocation, and problem resolution. Accurate and timely PMIS outputs therefore provide project actors with a dependable basis for controlling construction activities and achieving planned performance requirements.

System usage had a positive and significant effect on project performance (B=0.520, t=7.879, p=0.000). The coefficient shows that a one-unit increase in system usage increased project performance by 0.520 units after controlling for system quality and information quality. Since p<0.05, the effect was statistically significant and represented the largest individual contribution in the model. The collinearity indicators were acceptable. Therefore, the third null hypothesis was rejected.

The effect resonates with Aldholay et al. (2023), who explained that active information-system use improves transparency, accountability, collaboration, and responsiveness in organisational operations. Their argument supports the strong contribution of routine PMIS use to construction monitoring, communication, reporting, documentation, and timely managerial action.

The regression constant was positive but not statistically significant (B=0.185, t=1.233, p=0.221). This value represents the predicted level of project performance when system quality, information quality, and system usage are held at zero. Because p>0.05, the constant did not make a statistically significant independent contribution to the model. All predictor coefficients were positive and statistically significant, and their VIF values remained below 10. Consequently, the regression estimates were suitable for interpreting the influence of the three PMIS dimensions.

The adopted regression model was structured as follows: $Y=\beta_0+\beta_1X_1+\beta_2X_2+\beta_3X_3+\varepsilon$, where Y=Project

performance, X_1=System quality, X_2=Information quality, X_3=System usage, β_0=constant, β_1–β_3=regression coefficients, and ε=error term.

Based on the estimated coefficients, the fitted model was:

Project performance=0.185+0.253(System quality)+0.184(Information quality)+0.520(System usage)+ε.

4.3 Decision on Null Hypotheses

This section presents decisions on the null hypotheses using the regression significance values and the 0.05 level of significance. A null hypothesis was rejected where $p<0.05$, indicating a statistically significant influence on performance of Inzovu Mall Construction Project.

Table 6: Decision on Null Hypotheses

Hypothesis	Statement	p-value	Decision
H_{01}	System quality of Project Management Information Systems has no significant influence on the performance of the Inzovu Mall Construction Project.	.001	Rejected
H_{02}	Information quality of Project Management Information Systems has no significant influence on the performance of the Inzovu Mall Construction Project.	.015	Rejected
H_{03}	System usage of Project Management Information Systems has no significant influence on the performance of the Inzovu Mall Construction Project.	.000	Rejected

Source: Field data (2026)

Table 6 shows that the first null hypothesis on system quality was rejected (p=0.001) because the probability value was below 0.05. The second null hypothesis on information quality was also rejected (p=0.015), while the third null hypothesis on system usage was rejected (p=0.000). The decisions confirmed that system quality, information quality, and system usage each had a statistically significant influence on the performance of Inzovu Mall Construction Project.

4.4 Discussion of Research Findings

4.4.1 Influence of System Quality on Performance of Inzovu Mall Construction Project

Table 5 shows that system quality had a positive and significant effect on project performance (B=0.253, t=3.373, p=0.001). The coefficient indicates that a one-unit increase in system quality increased project performance by 0.253 units when information quality and system usage were held constant. Since $p<0.05$, the effect was statistically significant. The collinearity indicators were within acceptable limits and did not indicate severe multicollinearity. Therefore, the first null hypothesis was rejected.

These findings align with Alshamaila (2023), who described system quality through reliability, usability, flexibility, and response time and explained that these characteristics determine whether an information system can support project activities without avoidable errors or delays. The positive assessment in the current study similarly reflects a PMIS that enabled users to obtain and process construction information efficiently during project implementation.

The outcomes resonate with the DeLone and McLean Information Systems Success Model, which identifies system quality as a central determinant of system use, user satisfaction, and net organisational benefits (DeLone & McLean, 2023). A system that is reliable, responsive, accessible, and easy to operate is more likely to support continuous use and contribute to improved project management processes and construction performance.

4.4.2 Influence of Information Quality on Performance of Inzovu Mall Construction Project

Information quality had a positive and significant effect on project performance (B=0.184, t=2.453, p=0.015). A one-unit increase in information quality increased project performance by 0.184 units when the other predictors remained constant. Since $p<0.05$, the effect was statistically significant. The collinearity indicators remained within acceptable limits. Therefore, the second null hypothesis was rejected.

The findings align with Al-Kofahi (2023), who defined information quality in terms of accuracy, timeliness, completeness, and relevance and emphasised that these attributes determine the usefulness of information in project decisions. The favourable perceptions reported in the current study similarly show that PMIS outputs met the principal information requirements of project managers, engineers, contractors, and supervisors.

The pattern resonates with the DeLone and McLean Information Systems Success Model, which regards information quality as a major influence on system use, user satisfaction, and net benefits (DeLone & McLean, 2023). Accurate, complete, relevant, and timely outputs increase confidence in an information system and enable

stakeholders to use its records effectively in managing project time, cost, quality, and coordination.

4.4.3 Influence of System Usage on Performance of Inzovu Mall Construction Project

System usage had a positive and significant effect on project performance (B=0.520, t=7.879, p=0.000). The coefficient shows that a one-unit increase in system usage increased project performance by 0.520 units after controlling for system quality and information quality. Since $p<0.05$, the effect was statistically significant and represented the largest individual contribution in the model. The collinearity indicators were acceptable. Therefore, the third null hypothesis was rejected.

The findings align with Almaiah (2023), who explained that system usage reflects the frequency and effectiveness with which stakeholders apply an information system to planning, monitoring, reporting, and decision-making tasks. The regular use reported in the current study similarly demonstrates that project actors converted system availability into practical action across the principal management processes of the construction project.

The outcomes resonate with the Technology Acceptance Model, which proposes that perceived usefulness and perceived ease of use shape users' acceptance and continued application of information technology (Davis, 1989). Regular PMIS use in monitoring, communication, and reporting indicates that project stakeholders recognised practical value in the system and were therefore willing to integrate it into their daily responsibilities.

5. Conclusion and Recommendations

5.1 Conclusion

The study established that the technical and operational condition of the PMIS contributed meaningfully to the performance of Inzovu Mall Construction Project. Its dependability, ease of access, processing responsiveness, and user-friendly design facilitated smoother execution of project tasks.

Evidence from the study indicated that the value of the PMIS largely depended on the standard of information it generated and communicated. When project information was accurate, current, sufficient, and relevant, stakeholders were better positioned to assess progress, anticipate implementation needs, and take informed corrective decisions.

The findings further demonstrated that project benefits were realised when stakeholders actively incorporated the PMIS into their routine responsibilities. Its application in progress tracking, record management, report preparation, and stakeholder communication converted available project data into useful management practices. System usage therefore promoted transparency, reinforced individual responsibility, and enabled more efficient supervision of the Inzovu Mall Construction Project.

5.2 Recommendations

This section provides recommendations derived from the findings and conclusions of the study. Suggestions for future research are also presented to guide subsequent studies in related areas.

1. Management should establish a standard digital reporting calendar requiring all units to update progress, budget, quality, and site information within agreed timeframes.
2. Contractors and engineers should use PMIS records before making site execution decisions, especially where activities affect cost, time, and quality.
3. Engineering teams should upload inspection reports, material quality records, revised drawings, and progress updates into the PMIS promptly.
4. Local authorities and construction regulatory bodies should encourage large construction projects to adopt integrated PMIS tools as part of monitoring and reporting requirements.
5. Regulatory institutions should design minimum digital reporting standards for major private and public construction projects.

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