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PROJECT MANAGEMENT INFORMATION SYSTEM PRACTICES AND PERFORMANCE OF WORLD BANK FUNDED PROJECTS IN NAIROBI CITY COUNTY, KENYA

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ABSTRACT

World Bank-funded projects in Nairobi City County face performance challenges due to inadequate project management practices. This study aimed to examine the effect of Project Management Information System (PMIS) practices on the performance of these projects. The specific objectives were to assess the impact of cost management and data integration on project performance. The study was guided by Cost Control Theory and Systems Theory. A cross-sectional design was used, targeting 123 respondents from 41 ongoing or recently approved World Bank-funded projects. A census approach was applied, and data were collected using structured questionnaires. A pilot test confirmed the validity and reliability of the instrument, with Cronbach's alpha values above 0.7. Data were analyzed using descriptive and inferential statistics, including correlation and regression analyses using SPSS version 26. From the analysis, descriptive statistics revealed positive mean scores for each variable: cost management (mean = 3.804) and data integration (mean = 3.822). Correlation analysis demonstrated significant positive relationships between variables and project performance, with data integration having the strongest correlation ($r = 0.793$, $p = 0.000$), followed by cost management ($r = 0.762$, $p = 0.000$). Regression analysis indicated that these PMIS practices explained 74.3% of the variance in project performance. Data integration emerged as the strongest predictor ($B = 0.395$, $p = 0.000$), followed by cost management ($B = 0.348$, $p = 0.003$). The study concludes that PMIS practices significantly enhance project performance, with data integration playing the most crucial role. Key recommendations include implementing real-time cost and resource tracking systems, and adopting centralized data platforms to improve coordination, decision-making, and overall project outcomes.

Key Words: World Bank-funded projects, Project Management Information System, Cost Management, Data Integration, Project Performance

Background of the Study

In recent years, Project Management Information Systems (PMIS) have become an integral part of managing development projects globally. PMIS enhances the monitoring, evaluation, and reporting processes, ensuring that large-scale development projects, such as those funded by the World Bank, are delivered within scope, budget, and timelines. The integration of PMIS into project management has shown significant potential in improving project performance, especially in projects that require multi-stakeholder coordination, vast resources, and complex timelines (Kerzner, 2019).

For World Bank-funded projects, which often involve multi-stakeholder participation and complex implementation processes, PMIS is essential for tracking project progress, managing resources, and ensuring that projects stayed within their set timelines and budgets. The system's ability to generate real-time data allow project managers to make informed decisions and adjustments, thereby improving the overall performance of these projects (Mir & Pinnington, 2019).

Statement of the Problem

World Bank-funded projects have played a pivotal role in supporting Kenya's socio-economic development, particularly in sectors such as infrastructure, water and sanitation, education, and health. Despite the critical importance of these projects, they are often plagued by inefficiencies in execution. For instance, a World Bank report (2021) revealed that over 45% of World Bank-funded projects in Kenya, including those in Nairobi City County, have experienced significant delays and cost overruns. The Kenya Urban Roads Authority (KURA), overseeing many of these projects, reported that road infrastructure projects in Nairobi had, on average, exceeded their planned completion times by 18 months, resulting in an additional KSh 5.5 billion in project costs over the last five years (KURA, 2020). These inefficiencies in project delivery raise serious concerns about the effectiveness of current project management practices, particularly in the use of Project Management Information Systems (PMIS).

The cost management aspect of World Bank-funded projects in Nairobi City County has been particularly problematic. A study by Otieno and Gachoka (2020) found that approximately 60% of infrastructure and urban development projects funded by the World Bank experienced cost overruns, largely due to inadequate resource management, inefficient cost-tracking mechanisms, and poor integration of financial data. Another study by Wambugu (2020) indicated that out of 80 projects evaluated, only 30% utilized PMIS effectively for cost management, leading to project budget overruns of between 10% and 30% of the initial cost estimates. For example, the Kenya Informal Settlements Improvement Project (KISIP), aimed at upgrading infrastructure in Nairobi's informal settlements, reported a budget increase of 28%, attributed to delays in procurement processes and mismanagement of resources (Mwangi & Mutua, 2021). These issues underscore the need for more effective project management systems that can track and integrate project costs in real time.

Several empirical studies have demonstrated the potential of PMIS to improve project performance through better planning, cost management, resource allocation, and data integration. For example, Wanjiru and Kimani (2020) conducted a study on healthcare projects in Nairobi and found that projects utilizing PMIS reported a 22% improvement in budget adherence and a 25% reduction in project delays compared to those not using such systems. Additionally, a study by Ahsan and Gunawan (2021) on the impact of PMIS in large-scale infrastructure projects across sub-Saharan Africa found that effective use of PMIS reduced project delays by 30% and improved resource allocation efficiency by 40%. However, despite the documented benefits of PMIS, its adoption in World Bank-funded projects in Nairobi City County remains limited, with many projects still relying on manual processes or fragmented systems that do not offer real-time data integration (Wambugu, 2020). This gap in the use of PMIS practices, particularly in planning, cost management, resource management, and data

integration, has led to persistent challenges in project execution. The present study sought to fill this gap by examining the effect of PMIS practices on the performance of World Bank-funded projects in Nairobi City County, with the goal of providing empirical evidence on how these practices can improve project outcomes.

Objectives of the Study

The general objective of this study was to examine the effect of project management information system practices on performance of world bank funded projects in Nairobi City County, Kenya

The study specifically sought to;

i. To assess the effect of cost management on performance of world bank funded projects in Nairobi City County, Kenya.
ii. To determine the effect of data integration on performance of world bank funded projects in Nairobi City County, Kenya.

LITERATURE REVIEW

Theoretical Review

Cost Theory

The Cost Theory, also known as Cost Control Theory, originates from classical economic theory and was later adapted to project management by scholars such as Peter Drucker in the 1950s (Drucker, 1954). It posits that effective management of costs is essential for ensuring that projects are delivered within budget and that financial resources are optimally utilized. The theory suggests that through systematic monitoring and controlling of project costs, organizations can achieve better financial performance and reduce the risk of budget overruns (Drucker, 1954).

Cost Theory has been supported and expanded upon by project management scholars such as Kerzner (2019), who emphasized the importance of integrating cost management with other project management practices, such as risk management and quality control. Kerzner's work highlighted how real-time cost tracking systems, like those provided by PMIS, can significantly improve budget adherence by providing project managers with accurate financial data at all stages of the project lifecycle.

In World Bank-funded projects, Cost Theory has been applied to monitor budget allocation and prevent financial mismanagement. For example, in the Water and Sanitation Service Improvement Project (WASSIP) in Kenya, PMIS tools were used to track project expenditures in real time, which helped mitigate budget overruns caused by delayed payments and procurement inefficiencies (Mwangi & Mutua, 2021). The theory also provides a rationale for using cost estimation and financial tracking systems to enhance accountability in large-scale infrastructure projects.

Despite its widespread use, Cost Theory has faced criticism for being overly focused on cost minimization at the expense of other important project objectives such as quality and stakeholder satisfaction (Brown & Adams, 2000). Critics argue that an excessive emphasis on cost control can lead to underfunding of critical project elements, ultimately compromising the overall success of the project. Furthermore, traditional cost control methods have been critiqued for their rigidity and failure to account for unexpected changes in the project environment, such as inflation or fluctuations in material costs.

Despite these critiques, Cost Theory is particularly relevant to the current study, as cost management remains one of the most significant challenges in World Bank-funded projects. The frequent budget overruns observed in projects highlight the need for effective cost control mechanisms. In this study, cost management is linked to Cost Theory, as it provides a

framework for understanding how PMIS practices can enhance the financial performance of projects.

Systems Theory

Systems Theory, developed by Ludwig von Bertalanffy in 1936, posits that complex systems, whether biological or organizational, are composed of interrelated and interdependent parts that must work together to achieve common goals. In project management, Systems Theory emphasizes the importance of integrating various project components—such as people, processes, and technology—into a cohesive whole to ensure that the project functions efficiently and meets its objectives (Bertalanffy, 1950).

Systems Theory has been widely applied in the field of information systems, with scholars such as Checkland (1999) emphasizing its relevance in understanding how different project components interact to affect overall project performance. In World Bank-funded projects, the integration of data from different departments and sectors is crucial for achieving project objectives. For instance, PMIS tools have been used in the Water and Sanitation Service Improvement Project (WASSIP) to integrate data from procurement, finance, and engineering departments, ensuring that all project activities are aligned and that decision-makers have access to accurate, real-time information (Mwangi & Mutua, 2021).

Despite its usefulness, Systems Theory has been critiqued for its complexity and for being difficult to apply in practice, particularly in large-scale projects with multiple stakeholders and competing interests. Critics like Jackson (2003) argued that the theory's emphasis on the interdependence of systems can make it challenging to isolate individual issues, leading to difficulties in pinpointing specific areas for improvement. Additionally, Systems Theory has been critiqued for its assumption that all system components can be integrated seamlessly, which is often not the case in real-world projects where conflicting priorities and limited resources exist.

Despite these critiques, Systems Theory is highly relevant to this study, particularly in the context of data integration. World Bank-funded projects in Nairobi City County often involve multiple stakeholders, and integrating data from various sources is critical for ensuring that projects are executed efficiently. By using PMIS to facilitate data integration, project managers can improve decision-making and ensure that project resources are aligned with project goals.

Conceptual Framework

A conceptual framework is a logically developed, described and elaborated network of interrelationships among variables integral in the dynamics of a situation being investigated (Mugenda & Mugenda, 2018). In this study, the independent variables are cost management and data integration. The dependent variable is Performance of World Bank-Funded Projects.

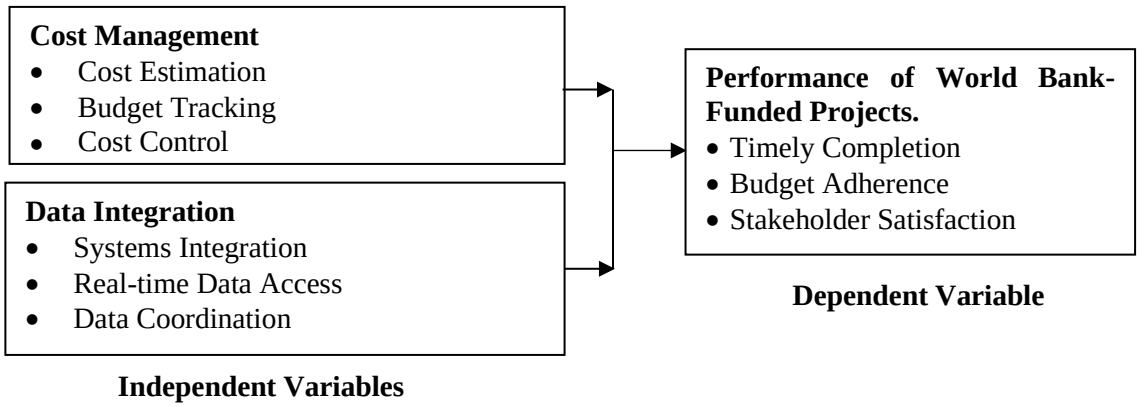

Figure 2. 1: Conceptual Framework

Cost Management

Cost management refers to the process of planning, estimating, budgeting, and controlling costs to ensure that the project is completed within the approved budget. According to Kerzner (2019), effective cost management involves several key activities, including cost estimation, cost tracking, and cost control, which are crucial for ensuring that financial resources are properly allocated and utilized. Cost management is especially important in World Bank-funded projects, where delays or budget overruns can jeopardize the project's success and impact (Ahsan & Gunawan, 2021).

The first construct of cost management is cost estimation, which involves predicting the financial resources required to complete the project. Accurate cost estimation is critical for setting a realistic budget and minimizing the risk of cost overruns (Schwalbe, 2020). Budget tracking, the second construct, ensures that all project expenses are monitored throughout the project lifecycle, helping managers identify potential budget deviations and take corrective action (PMI, 2019). The cost control, involves implementing measures to ensure that project expenses do not exceed the allocated budget and that resources are used efficiently. Cost control is essential for avoiding financial waste and ensuring that the project remains financially sustainable (Nicholas & Steyn, 2020).

In World Bank-funded projects, cost management tools such as PMIS have been instrumental in tracking and controlling project expenses. For example, in the Water and Sanitation Service Improvement Project (WASSIP) in Nairobi, PMIS was used to monitor costs in real time, ensuring that project funds were allocated efficiently and that expenses were within the approved budget (Mwangi & Mutua, 2021). Cost estimation tools within PMIS allow for more accurate forecasting of material and labor costs, helping project managers adjust the project scope when necessary (Otieno & Gachoka, 2020).

Budget tracking is particularly important for large-scale projects that involve multiple stakeholders and complex funding structures. For example, delays in disbursement or procurement inefficiencies can lead to significant budget overruns. World Bank projects benefit from advanced PMIS systems that can integrate data from different departments, allowing for more transparent and timely financial reporting (Wambugu, 2020). Cost control measures, such as cost variance analysis, help managers compare actual expenses with budgeted costs and adjust their spending plans accordingly, thus improving project financial performance (Nicholas & Steyn, 2020).

Cost management is the process of planning, estimating, budgeting, tracking, and controlling project costs (Yismalet & Alemu, 2018). Cost management practices in project management require a structured approach that involves cost estimating, budgeting, cost tracking, cost control, resource management, contract management, and risk management. By implementing these practices, project teams can manage costs effectively, control project spending, and ensure that projects are completed within budget. Cost management practices include cost estimation, budgeting and cost control (Albtoush, Doh & Albtoush, 2020).

Cost estimation is the process of predicting the cost of a project or product. Cost estimation is a dynamic process that should be revisited and refined throughout the project lifecycle. As new information becomes available, project teams should adjust their cost estimates to ensure that they remain accurate and up-to-date. Cost estimation requires a thorough understanding of the project requirements, as well as the availability and cost of resources such as materials, labor, and equipment (Fazil, Lee & Fadzline, 2021). By implementing effective cost estimation practices, project teams can develop accurate project budgets, ensure that resources are used efficiently, and minimize the risk of cost overruns.

Budgeting is the process of creating a financial plan for a project, organization, or individual. It involves estimating the expected income and expenses for a specific period and allocating

resources accordingly (Okereke, Mohammed & Eze, 2022). Budgeting is a critical aspect of road projects as they require significant investment, and cost overruns can be detrimental to the project's success (Egboga & Hauwa, 2022). Budgeting is an important aspect of project management because it helps project managers allocate resources effectively and make informed decisions about project priorities.

Cost control in project management is the process of monitoring and managing a project's expenses to ensure that they stay within the project's budget. Effective cost control is essential to the success of a project (Yusuf, 2018). By monitoring costs and taking corrective action when necessary, project teams can ensure that the project stays within budget and is completed on time. This helps ensure that the project provides maximum value to the community and meets its intended goals and objectives (van Besouw, 2021).

Data Integration

Data integration refers to the process of combining data from different sources into a single, unified view. In the context of project management, data integration ensures that all project information—such as financial data, resource data, and performance data—is consolidated and accessible to project managers and stakeholders. According to Kerzner (2019), data integration is essential for effective decision-making, particularly in large-scale projects where multiple teams and departments are involved.

The first construct of data integration is systems integration, which involves linking different software systems or databases so that information can be shared seamlessly. Real-time data access refers to the ability of project managers to access up-to-date information at any point during the project, allowing them to make timely decisions (Schwalbe, 2020). Finally, data coordination ensures that all project data is organized and synchronized so that stakeholders are working with consistent information (PMI, 2019).

In World Bank-funded projects, data integration tools within PMIS allow project teams to consolidate information from different departments, such as procurement, finance, and engineering, ensuring that decisions are based on complete and accurate data (Otieno & Gachoka, 2020). For instance, in the Water and Sanitation Service Improvement Project (WASSIP), PMIS facilitated systems integration, linking financial systems with project performance data, thereby improving overall project coordination (Mwangi & Mutua, 2021).

Real-time data access is especially important in large-scale projects, where delays in information flow can lead to significant project inefficiencies. In projects like the Kenya Informal Settlements Improvement Project (KISIP), real-time access to project data allowed project managers to make informed decisions about resource allocation and project adjustments (Wambugu, 2020). Data coordination tools within PMIS help ensure that all project stakeholders—whether in finance, procurement, or field operations—have access to the same, up-to-date information, improving project transparency and accountability (Nicholas & Steyn, 2020).

Data integration is the process of combining data from multiple sources into a unified view to facilitate better analysis and decision-making. It involves identifying, extracting, transforming, and loading data from various sources into a single data repository (Akselrod, Shpakov & Shpakova, 2022). Effective data integration practices require a structured approach that involves identifying data sources, defining data requirements, establishing data standards, and implementing a data integration solution that supports the business objectives. Data integration enables project teams to access and analyze data from various sources to inform decision-making and improve project outcomes (Demirkesen & Ozorhon, 2017). Data integration practices include data acquisition, data storage and data analysis and sharing.

Data acquisition is the process of obtaining data from various sources for use in a project. Data acquisition practices involve identifying the types of data needed, determining the best sources of that data, and acquiring it in a timely and cost-effective manner (Yousif, Zakaria & Shamsuddin, 2021). They require a structured approach that involves defining data requirements, identifying data sources, collecting and managing data, and using data analysis techniques to inform decision-making. By acquiring and analyzing the right data, project teams can improve their ability to manage projects effectively, make informed decisions, and achieve project objectives.

Data storage is the process of securely storing and managing project-related data in a centralized location. This data can include project plans, schedules, budgets, progress reports, and other project-related documents (Ali & Al-Kodmany, 2018). Data storage involves ensuring the data is accessible, secure, and properly organized (Ejel, 2018). Data storage practices in project management require a structured approach that involves using a centralized data storage system, establishing data access controls, organizing data in a structured manner, regularly backing up data, and implementing data retention policies.

Data analysis and sharing are important practices in project management that help teams to make informed decisions, track progress, and achieve project objectives. In addition, a project teams should establish clear protocols for data analysis and sharing to ensure that everyone on the team understands how data will be collected, analyzed, and shared (Kombe, 2015). Project teams should share project-related data with stakeholders, including clients, partners, and team members, to ensure that everyone is informed about project progress and can make informed decisions (Braglia & Frosolini, 2018). Data analysis and sharing practices require a structured approach that involves establishing clear protocols for data analysis and sharing, using data analytics tools, sharing data with stakeholders and protecting sensitive data.

Performance of World Bank-Funded Projects in Nairobi City County, Kenya

Project performance refers to the degree to which a project achieves its objectives, typically measured in terms of scope, time, cost, and quality. According to Kerzner (2019), successful project performance is characterized by completing the project within the planned budget, timeline, and scope, while also meeting the quality standards set by stakeholders. In World Bank-funded projects, performance is typically evaluated based on how well the project meets its goals in improving infrastructure, social services, and overall development outcomes.

The three main constructs of project performance in this study are timely completion, budget adherence, and stakeholder satisfaction. Timely completion refers to the extent to which the project is completed within the agreed-upon timeline. Budget adherence focuses on whether the project was completed within the allocated budget, while stakeholder satisfaction refers to the degree to which the project meets the expectations and needs of stakeholders (Schwalbe, 2020).

In World Bank-funded projects, performance is critical, as delays or budget overruns can have significant social and economic implications. For instance, delays in road construction projects can impact access to critical services, while budget overruns can strain public finances (Otieno & Gachoka, 2020). PMIS tools help ensure timely completion by tracking project progress in real time, allowing managers to address potential delays before they escalate (Mwangi & Mutua, 2021). Budget adherence is supported by PMIS through cost tracking and variance analysis, ensuring that projects remain financially viable. Finally, stakeholder satisfaction is enhanced through transparent communication and data-sharing platforms that ensure all stakeholders are informed of project developments and outcomes (Wambugu, 2020).

Empirical Review

Cost Management

Mir and Pinnington (2019) conducted a study on the impact of cost management practices on project performance in European construction projects. The study, based on Cost Control Theory, aimed to examine how effective cost management influences the overall success of large infrastructure projects. A survey research design was used, targeting 100 project managers from various construction firms across Europe. A sample size of 85 managers was selected through simple random sampling, and data were collected using online questionnaires. Multiple regression analysis was employed to assess the relationship between cost management practices and project performance. The study found that projects with robust cost-tracking systems were 40% more likely to stay within budget. The study concluded that effective cost management is crucial for maintaining financial discipline in projects and recommended the use of advanced cost-tracking tools to reduce budget overruns.

In India, Patel and Walker (2020) examined the role of cost estimation in large-scale government infrastructure projects. The study was grounded in Cost Estimation Theory and sought to understand how accurate cost estimation impacts the financial performance of government projects. A descriptive research design was used, targeting 120 project managers from government-funded projects. A sample of 90 managers was selected using stratified random sampling. Data were collected through surveys and interviews, then analyzed using descriptive statistics and factor analysis. The findings showed that accurate cost estimation reduced the likelihood of budget overruns by 35%. The study concluded that cost estimation is a critical factor in project success and recommended that regular cost estimation reviews be conducted throughout the project lifecycle to maintain financial accuracy.

Boateng and Agyemang (2020) conducted a study in Ghana to explore the effects of cost management practices on road construction projects. The study was based on Cost Control Theory and employed a cross-sectional survey design targeting 70 road construction project managers. A sample size of 55 managers was selected using convenience sampling, and data were collected through questionnaires. Correlation analysis was used to determine the relationship between cost management practices and project success. The results indicated a positive correlation ($r = 0.62$) between effective cost management and the successful completion of road construction projects. The study concluded that cost management practices are essential for controlling expenses and recommended the use of integrated cost management software to enhance financial control.

Wambugu (2020) explored cost management practices in water and sanitation projects in Nairobi, Kenya. The study, based on Cost Theory, focused on understanding how cost control measures influence the financial performance of large-scale infrastructure projects. A case study design was employed, targeting 40 project managers involved in water and sanitation projects. A purposive sample of 35 managers was selected, and data were collected through interviews. Thematic analysis was used to analyze qualitative data. The study found that projects with detailed cost estimates and regular financial audits were 30% more likely to be completed within budget. The study concluded that cost management is essential for the success of public infrastructure projects and recommended regular financial audits and the use of real-time financial tracking systems to enhance cost control.

Data Integration

Schwalbe (2020) conducted a study on the role of data integration in enhancing project management efficiency in IT projects in Europe. Grounded in Systems Theory, the study aimed to assess how real-time data integration influences decision-making and project success. A cross-sectional survey design was used, targeting 150 IT project managers from various European countries. A sample of 120 managers was selected through simple random sampling,

and data were collected using online surveys. Regression analysis revealed that real-time data integration improved decision-making efficiency by 35%. The study concluded that data integration is essential for IT project success and recommended adopting advanced data integration platforms for better decision-making.

In India, Patel and Walker (2020) studied the impact of data integration on government projects, applying Systems Theory to explain how integrating data from various departments affects project outcomes. A descriptive research design was employed, targeting 100 project managers from government-funded projects. A sample of 80 managers was selected using random sampling, and data were collected through surveys and interviews. Descriptive statistics and factor analysis were used to analyze the data. The study found that proper data integration improved project completion rates by 32%. The study concluded that effective data integration is critical to project success and recommended adopting integrated data platforms for seamless information flow.

Boateng and Agyemang (2020) conducted a study on the role of data integration in enhancing road construction projects in Ghana. The study relied on Systems Theory to examine how integrated data management affects project performance. A cross-sectional survey design was used, targeting 90 road construction project managers. A sample of 70 managers was selected through simple random sampling, and data were collected using questionnaires. Correlation analysis revealed a strong positive relationship ($r = 0.68$) between data integration and project success. The study concluded that data integration significantly improves project outcomes and recommended using advanced data integration tools for better project coordination.

Wambugu (2020) examined data integration in Kenyan infrastructure projects, applying Systems Theory to assess the impact of data coordination on project performance. A case study design was employed, targeting 40 project engineers from infrastructure projects in Nairobi. A purposive sample of 35 engineers was selected, and data were collected through interviews and project records. Thematic analysis was used to analyze qualitative data. The study found that projects with integrated data systems were 30% more likely to meet their deadlines and budgets. The study concluded that data integration enhances project coordination and recommended that infrastructure projects adopt integrated data platforms to improve project performance.

RESEARCH METHODOLOGY

A cross-sectional research design was employed in this study. For this study, the target population comprised of 41 ongoing or recently approved World Bank-funded projects in Nairobi City County, which serve as the unit of analysis. In total, the target population included 123 individuals: 41 project managers, 41 supervisors, and 41 team leaders. These roles were chosen as they represent the key stakeholders who oversee the application of PMIS practices in project planning, cost management, resource management, and data integration. This study employed a census approach, involving all 123 individuals (41 project managers, 41 supervisors, and 41 team leaders) from the 41 ongoing or recently approved World Bank-funded projects in Nairobi City County. The study used primary data gathered using questionnaire. The study adopted the Mixed methods data analysis method where inferential and descriptive analysis were performed using SPSS version 26. In order to allow data to be entered into the software, the questionnaires was referenced and the data coded. Quantitative data collected was analysed using descriptive statistics techniques. Pearson R correlation was used to measure strength and the direction of linear relationship between variables. Multiple regression models were fitted to the data in order to determine how the predictor variables affect the response variable.

RESEARCH FINDINGS AND DISCUSSION

A total of 123 questionnaires were distributed, with 12 used for the pilot study, leaving a sample of 111. Out of these, 84 questionnaires were returned, giving a response rate of 75.7%. According to Mugenda and Mugenda (2023), a response rate above 70% is considered excellent for analysis, indicating that the data was sufficient for robust statistical analysis. The response rate of 75.7% was excellent, demonstrating the effectiveness of the data collection methods and the engagement of respondents.

Descriptive Analysis

Descriptive statistics were used to analyze the respondents' perceptions of cost management and data integration. The responses were measured on a 5-point Likert scale where 1 = Strongly Disagree, 5 = Strongly Agree. The means and standard deviations were used to interpret the findings where a mean value of 1-1.4 was strongly disagree, 1.5-2.4 disagree, 2.5-3.4 neutral, 3.5-4.4 agree and 4.5-5 strongly agree. On the other hand, a standard deviation greater than 1.5, suggests that the responses were more diverse, with a wider range of scores across the participants.

Cost Management

The first objective was to assess the effect of cost management on the performance of World Bank-funded projects. Descriptive statistics for cost management focus on how well projects adhere to budgets and manage costs throughout the project lifecycle. Table 4.5 presents the findings

Table 1: Descriptive Statistics for Cost Management

Statements	Mean	Std. Dev.
The project adhered to the approved budget.	3.785	0.889
Clear cost management practices were followed.	3.799	0.873
Financial resources were adequately allocated for tasks.	3.792	0.864
Regular cost reviews were conducted throughout the project.	3.819	0.876
Contingency costs were included in the financial planning.	3.804	0.858
Project costs were monitored using financial tracking systems.	3.818	0.869
Cost overruns were promptly addressed.	3.812	0.881
Initial cost estimates were accurate.	3.803	0.874
Aggregate Score	**3.804**	

The findings in Table 1 indicate that respondents generally agreed that the projects adhered to their approved budgets (M = 3.785, SD = 0.889). Clear cost management practices were followed (M = 3.799, SD = 0.873), and financial resources were adequately allocated for tasks (M = 3.792, SD = 0.864). Respondents also agreed that regular cost reviews were conducted throughout the project (M = 3.819, SD = 0.876), and that contingency costs were included in financial planning (M = 3.804, SD = 0.858). Costs were monitored using financial tracking systems (M = 3.818, SD = 0.869), and cost overruns were promptly addressed (M = 3.812, SD = 0.881). Finally, initial cost estimates were considered accurate (M = 3.803, SD = 0.874).

The aggregate score of 3.804 shows that respondents agreed cost management practices had a positive impact on project performance. Effective cost management, including regular cost reviews and the prompt addressing of overruns, is essential in ensuring that projects stay within their budgets. This finding is supported by Mir and Pinnington (2019), who emphasized the importance of cost control in project performance, stating that projects with robust cost-tracking systems are significantly more likely to stay within budget. Additionally, Patel and Walker (2020) highlighted that accurate cost estimation reduces the likelihood of budget overruns, further reinforcing the importance of strong cost management. In the context of

World Bank-funded projects, these findings suggest that effective financial planning and monitoring are critical to avoiding cost-related disruptions.

Data Integration

The second objective was to determine the effect of data integration on the performance of World Bank-funded projects. The descriptive statistics here reflect how the integration of data systems and real-time access to information impact project coordination and decision-making. Table 2 presents summary of findings obtained.

Table 2: Descriptive Statistics for Data Integration

Statements	Mean	Std. Dev.
The project used integrated data systems for management.	3.825	0.879
Real-time access to project data was available.	3.845	0.858
Data sharing among project teams was seamless.	3.819	0.872
A centralized system stored all project records.	3.808	0.856
Data integration improved project coordination.	3.821	0.854
Project data was regularly and accurately updated.	3.812	0.873
Data integration improved stakeholder reporting.	3.818	0.869
The project's data systems were secure and reliable.	3.823	0.862
Aggregate Score	**3.822**	

The findings in Table 2 show that respondents agreed that integrated data systems were used in project management (M = 3.825, SD = 0.879), and real-time access to project data was available (M = 3.845, SD = 0.858). Data sharing among project teams was seamless (M = 3.819, SD = 0.872), and a centralized system was used to store all project records (M = 3.808, SD = 0.856). Respondents agreed that data integration improved project coordination (M = 3.821, SD = 0.854), and project data was regularly and accurately updated (M = 3.812, SD = 0.873). Data integration also improved stakeholder reporting (M = 3.818, SD = 0.869), and project data systems were secure and reliable (M = 3.823, SD = 0.862).

The aggregate mean score of 3.822 indicates that respondents agreed data integration significantly improves project performance. Real-time access to data and the use of integrated systems are seen as critical for enhancing project coordination and decision-making. Schwalbe (2020) found that real-time data integration improves decision-making efficiency by 35%, highlighting the value of integrated systems in large-scale projects. Additionally, Patel and Walker (2020) demonstrated that proper data integration contributes to a 32% improvement in project completion rates, reinforcing the idea that seamless data sharing is essential for effective project management. These findings imply that integrating data systems is crucial for the successful implementation of World Bank-funded projects, enabling better coordination, accurate reporting, and timely decision-making.

Performance of World Bank-Funded Projects in Nairobi City County, Kenya

This section focuses on assessing the overall performance of World Bank-funded projects in Nairobi City County, Kenya, based on key performance indicators. The results provide insights into how Project Management Information Systems (PMIS) practices influence the successful implementation and outcomes of these projects. The findings are presented in Table 3.

Table 3: Descriptive Statistics for Performance of World Bank-Funded Projects

Statements	Mean	Std. Dev.
The project is on track to meet its completion timeline.	3.836	0.874
The project is adhering to its financial targets (budget compliance).	3.812	0.861
Stakeholder expectations are being met throughout the project.	3.798	0.883
Project objectives are being achieved successfully.	3.804	0.872
The project is delivering high-quality outputs.	3.819	0.879
Communication is effective among project stakeholders.	3.845	0.854
The project's risks are being managed effectively.	3.782	0.868
Overall, the project is progressing successfully.	3.792	0.888
Aggregate Score	**3.811**	

The overall performance of World Bank-funded projects was rated positively by respondents, with an aggregate mean score of 3.811, indicating that the projects were progressing well across key performance indicators. Respondents agreed that the projects were on track to meet their timelines (M = 3.836, SD = 0.874), which suggests that the use of PMIS tools is contributing to effective schedule management. Budget compliance was also rated positively (M = 3.812, SD = 0.861), highlighting the role of financial management practices in ensuring the projects stay within financial limits.

Stakeholder expectations were being met (M = 3.798, SD = 0.883), and project objectives were being successfully achieved (M = 3.804, SD = 0.872), demonstrating that PMIS practices were helping to maintain project alignment with goals. High-quality project outputs (M = 3.819, SD = 0.879) further reinforce the idea that PMIS practices positively impact project deliverables. Effective communication among stakeholders (M = 3.845, SD = 0.854) and risk management (M = 3.782, SD = 0.868) were also viewed as strengths, which are essential components in managing complex, large-scale projects like those funded by the World Bank.

These results align with findings from Muchelule (2018), who noted that the integration of PMIS enhances public sector project performance by improving project communication and risk management. Additionally, Mwangi and Jagongo (2019) highlighted that proper project management tools contribute to better project control and timely delivery, reinforcing the positive impact of PMIS practices on the performance of World Bank-funded projects in this study.

Correlation Analysis

Pearson correlation was used to assess the strength and direction of the relationship between the independent variables (PMIS practices) and the dependent variable (project performance). The relationship was considered to be: small if $\pm 0.1 < r < \pm 0.29$; medium if $\pm 0.3 < r < \pm 0.49$; and strong if $r > \pm 0.5$.

Table 4: Correlations Matrix

		Project Performance	Cost Management	Work culture
Project Performance	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	84		
Cost Management	Pearson Correlation	.762**	1	
	Sig. (2-tailed)	.000		
	N	84	84	
Data Integration	Pearson Correlation	.793**	.487**	1
	Sig. (2-tailed)	.000	.000	
	N	84	84	84

There was a significant positive correlation between cost management and project performance (r = 0.762, p = 0.000), suggesting that strong cost management practices, such as accurate budgeting, cost monitoring, and prompt addressing of overruns, contribute to better project outcomes. These results align with Mir and Pinnington (2019), who demonstrated that projects with robust cost-tracking systems are more likely to stay within budget and deliver successful results. The findings also support Wambugu (2020), who emphasized the importance of cost management in large-scale infrastructure projects, noting that regular financial audits and the use of tracking systems enhance budget compliance.

Data integration showed the strongest positive correlation with project performance (r = 0.793, p = 0.000), indicating that seamless data sharing, real-time access to project information, and centralized data systems significantly enhance project outcomes. This finding underscores the critical role of data integration in improving project coordination, decision-making, and stakeholder communication. Schwalbe (2020) also emphasized the importance of real-time data integration, noting that it improves decision-making efficiency in IT projects. Similarly, Patel and Walker (2020) found that integrated data systems contribute to a 32% improvement in project completion rates, reinforcing the value of data integration in complex infrastructure projects.

Regression Analysis

Multiple regression analysis was conducted to determine the extent to which the independent variables predict the performance of World Bank-funded projects. This analysis provides insights into the individual contribution of each independent variable to the dependent variable. The beta coefficients table provides insights into the individual contributions of each independent variable to the dependent variable, reflecting how much a one-unit change in the independent variable impacts project performance.

Table 5: Beta Coefficients of the Study Variables

Variable	Unstandardized Coefficients (B)	Standardized Coefficients (Beta)	t	p-value
(Constant)	0.845		7.554	0.000
Cost Management	0.348	0.302	3.783	0.003
Data Integration	0.395	0.367	4.438	0.000

From the coefficients table, the following regression equation was fitted;

$$Y= 0.845 + 0.348X_1 + 0.395X_2$$

Where: Y = Performance of World Bank-funded projects; X_1 = Cost Management; X_2 = Data Integration;

Cost management has a positive and significant impact on project performance (B = 0.348, p = 0.003), suggesting that improving cost management practices leads to better project outcomes. Projects that employ accurate budgeting, regular cost reviews, and financial tracking systems are more likely to stay on budget and meet performance expectations. These findings align with Patel and Walker (2020), who demonstrated that cost management is essential in preventing budget overruns and ensuring project success.

Data integration has the largest impact on project performance (B = 0.395, p = 0.000), indicating that seamless integration of data systems, real-time access, and centralized records management significantly enhance project outcomes. This finding highlights the importance of data-driven decision-making in ensuring project success, consistent with Schwalbe (2020), who found that real-time data integration improves decision-making efficiency and project coordination.

Conclusions

Strong cost management practices, such as adherence to budgets, regular financial reviews, and prompt addressing of cost overruns, are crucial for maintaining project financial health. Projects that incorporate accurate cost estimates and financial tracking systems are more likely to remain within budget and meet performance targets.

The integration of data systems significantly enhances project performance by improving coordination, real-time decision-making, and communication among stakeholders. Data integration enables the seamless sharing of information, ensuring that all project participants have access to up-to-date data, which improves the overall effectiveness of project management.

Recommendations

Cost Management

To address cost management issues more effectively, project managers should prioritize real-time cost monitoring systems to track expenses and prevent budget overruns. The study highlighted the importance of adhering to financial targets, so the adoption of digital financial tracking systems is recommended to provide project teams with real-time visibility into their financial status. This will also allow for prompt adjustments in cases where financial deviations are detected. Regular cost reviews should be institutionalized, where periodic financial audits are conducted at every project phase to assess compliance with the approved budget. This practice will help prevent cost escalations and allow early detection of financial mismanagement. Moreover, projects should ensure that contingency budgets are adequately allocated and clearly defined within the financial plans, with provisions to accommodate unexpected cost fluctuations, especially in large-scale infrastructure projects. Lastly, training sessions on cost management and financial accountability could be held for project team members to ensure they understand the importance of strict budget adherence and the consequences of financial mismanagement.

Data Integration

Data integration emerged as the most significant factor influencing project performance in this study. To leverage this, it is recommended that World Bank-funded projects implement comprehensive data integration platforms that centralize all project data, ensuring seamless access for all stakeholders. A centralized platform will improve coordination and decision-making by providing real-time updates on project progress, financial status, resource use, and risk management. Project managers should also focus on enhancing the security and reliability of data systems to safeguard sensitive project information, especially considering the scale and importance of the projects involved. Training programs should be organized for project team members to ensure they are fully proficient in using these data systems, particularly in entering, accessing, and interpreting data. Moreover, stakeholder reporting mechanisms should be integrated into these platforms, ensuring that timely and accurate data is shared with all key stakeholders, thus fostering transparency and enhancing accountability. The use of mobile-accessible data systems could also be explored, given the field-based nature of many project activities, enabling real-time data input and retrieval even from remote locations.

Areas for further research

Further studies could explore the impact of external factors, such as political, environmental, and regulatory influences, on the performance of World Bank-funded projects. Additionally, future research could focus on the role of organizational culture and leadership styles in shaping the outcomes of international development projects.

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