Impact of Project Management Information System on Project Completion of Selected Construction Company in Lagos State

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Abstract

This research delves into the transformative impact of project management information system on project completion in selected construction companies in Lagos State, exploring its impact on completion time, resource availability, and stakeholder satisfaction. A survey study plan was utilizing a standardized questionnaire distributed to project managers of 25 selected construction companies. The study empirically examines three hypotheses: the relationship between user skill and knowledge and completion time, the relationship between quality of information and availability of resources, and the substantial impact of system quality on stakeholder satisfaction. The research instrument reliability was test by applying Cronbach Alpha threshold. Employing rigorous statistical analyses, the findings reveal positive correlations in each hypothesis, underscoring the integral role of project management information system in shaping organizational dynamics. Employees' heightened awareness of information system emerges as a catalyst for improved project completion, while information quality proves instrumental in optimizing resource availability. Moreover, the study underscores the consequence of Project Management Information Systems (PMIS) in cultivating a culture of efficiency and continuous improvement within construction companies. These findings provide valuable empirical evidence to the disciplinary framework and propose realistic recommendations for construction firms aiming to harness PMIS for successful project completion and enhanced operational effectiveness.

Keywords

Project Management, Project Management Information System, Project Completion, Construction Company

1. Introduction

From the start of the twenty-one century, the homegrown and worldwide economies have greatly expanded and competition has become more competitive; companies are left with no choice but to learn to adapt to maintain their position in business [1]. Advances in technology and the world becoming more and more integrated have made it difficult for companies to take into account and apply at least some of the information or suffer losses in production. One of most crucial in today's corporate environment is information systems, including Project Management Information Systems (PMIS) which permit organization to be current and satisfy customer demands. According to [2], PMIS is more favourable since it provides precise and pertinent information that may be required for day-by-day managing of a project. Information serves as a source of intelligence for project management.

The [3] sees the Project Management Information System (PMIS) as "information system involving the tools and techniques deployed to gather, integrate, and disseminate the outputs of project management processes," which is comparable to the definition in the 6th Edition. PMIS may encompass both automated and manual systems and is used to support entire process of the project from start to finish. It contains a gathering of instruments, procedures, and approaches intended to support effective project planning, implementation, oversight, and management.

A PMIS is a comprehensive system that integrates hardware, software, and data communication components to gather, save, retrieve, and distribute project-related data and information. It supports various facets of project management, which may include planning, scheduling, apportionments of resource, cost regulation, risk management, as well as performance evaluation. A construction developer can benefit from a Project Management Information System (PMIS) in several departments, including sales, marketing, inventory management, revenue contracts, and project management. According to [4], businesses continue to invest in information systems in the anticipations of getting benefits later on. The information technology firm is therefore under pressure to devise solutions that are highly resourceful and user-friendly. Providing insight into each stage of project's work schedule and resource management, a PMIS can serve as an aid in project planning as at the start-up period of a project. It can also assist with collecting data on potential buyers or tenants for sales agents, tracking successful marketing campaigns, monitoring details on assets, inventory for single projects or across a portfolio of projects, managing data associated with revenue contracts for assets, and creating

reports on all development projects that the real estate developer might have [5]. Through wide-ranging of project evaluation, the visibility can be key into the work schedule and resource management of each project, PMIS can contribute valuable benefits to multi-project management. Ultimately, it helps ensure successful project management by monitoring information, collecting data, and storing information for use in multiple areas such as budgeting, scheduling, cost control, document control, risk analysis and management, quality assurance, communication plans and controls.

1.1 Statement of the Problem

In the present-day business setting, organizations encounter numerous challenges in managing projects efficiently and harnessing the full capabilities of project management information systems (PMIS). It is necessity to examine the relationship between project management information system and project completion in relation to construction projects. When construction projects are ended on schedule, efficient budget, with the suitable human resources, and in compliance with specifications to meet stakeholders' expectation, they are commonly regarded as successful [6]. When development initiatives are completed on schedule, within budget, in accordance with specifications, and to the satisfaction of stakeholders, they are typically regarded as successful [7]. Numerous project initiatives are overrun budget, are terminated prematurely, or fall short in terms of the functionality they supply. Even if choosing and creating projects takes extensive time and funding, it is still crucial for firms to manage their projects well in order to meet their performance goals [7]. In recent Ministry of Infrastructure reports from the Kigali Convention Center handover indicate that contractors provide subpar service through inadequate documentation, erroneous decision-making, and prolonged schedule deviation during project implementation, which causes projects to be delayed or fail completely [6]. Also, the ministry official claimed that although project documentation was available, there was no indication of a system in place to monitor the plans outlined in the project charter or even a database containing information about ongoing initiatives. The Nyabarongo hydro power plant, project which was scheduled to be finished in the month of February 2013 after the contract began in May 2009. However, the project saw two deadline extensions: one in April 2014 and another in October 2014, adding around 20 months to the original date. As known that construction projects involve vast amounts of data, including property information, financial data, and legal documents, With the introduction of computer programs that modernize decision-making, data irretrievability (for improved documentation), real time information, and overall project planning [8]. Using PMIS can support project manager to manage time and cost, enhance documentation, and enable improved decision-making based on reliable facts from the database [9,10].

In any organization Human error in the information system should be prevented since it could have led to a significant or little negative impact on the business. In the Project Management Information System Human error can occur for a number of reasons, but employee carelessness is a major contributing factor. The improper input will result in the incorrect output, regardless of how precise your computers and software are, and it will make the business to spent more money, time, and other resources. Complex projects require highly qualified workers that won't make such careless errors when using software project management tools [11]. This study aims to investigate the role of Project Management Information Systems (PMIS) in enhancing project completion, examining the relationships between system quality, information quality, and effective user skills and knowledge throughout the project lifecycle to ultimately improve project success rates.

1.2 Objectives of the Study

The main objective of this study was to investigate the impact of project management information system on project completion of Selected construction company in Lagos State, to inform strategies on how to successfully adopting information management system to achieve project completion and delivery in time

This study was guided by the following objectives

i. Examine the effect of Project Management Information System (PMIS) user skill and knowledge on completion time.
ii. Investigate effect of quality of information on availability of resources.
iii. Examine effect of System quality on Stakeholder satisfaction.

1.3 Research Questions

To accomplish the aforementioned goals, the following questions will be answered.

i. What is the effect of PMIS user skill and knowledge on completion time?
ii. To what extent is the effect of quality of information on availability of resources?
iii. To what extent is the effect of System quality on Stakeholder satisfaction?

1.4 Research Hypotheses

The following hypotheses were postulated in the course of the research; they are:

Ho_1: There is no significant effect of PMIS user skill and knowledge on completion time.

Ho_2: Quality of Information does not have any significant effect on availability of resources.

Ho_3: System quality does not have any significant effect on Stakeholder satisfaction.

1.5 Study Area

Lagos Sate was located in Southwest Nigeria, has a rich historical background and has undergone vital development over the years, it is one of the 36 States in Nigeria [12].

Date back to the pre-colonial era when it was originally habited by the Awori tribe of Yoruba which most engaged in fishing, farming and trading which are primarily settled on the Islan along the Atlantic Ocean.

In the 19th century Lagos became a British protectorate in 1861 and later annexed by the British in 1865 and became a colony of the Empire. It served as the capital of British colony of Nigeria till 1991 when Nigeria capital shift to Abuja. Under British regime, Lagos experienced significant development and modernization, infrastructure include roads, railway, bridges, school and hospital were built and it became a major commercial and administrative center.

In 1967, Lagos State was created as a separate administrative entity within Nigeria with Lagos as its capital. With the aimed to decentralize power and improve governance. At the period Lagos State also experienced significant development in several sectors of economy such as infrastructure, education, healthcare and commerce. The state has witnessed the construction of modern roads, bridges and other infrastructural project, it also becomes a major hub for trade, finance and industry in Nigeria.

Moreover, in term of infrastructure, Lagos State has experienced great development in recent years with construction of modern residential and commercial buildings, shopping malls and entertainments centers. The city is also known for its vibrant night life with numerous bars, clubs, and restaurants, offering variety of cuisine. Its population according to 2006 Nigerian census is put at 9,113,605, and annual potential population growth of 3.18%, if we estimate the population predicted for year 2022 which is roughly 16 years after the 2006 census. The population of Lagos will be estimated to be 13, 491.800 [13].

2. Literature

2.1 Concepts Project Management Information System (PMIS)

Businesses started implementing specialized software and digital technologies to enhance project management in the middle of the 21st century. Using sophisticated software programs, a project management information system collects, arranges, and utilizes project data. These programs assist project managers to organizing the information stream and plan, carry out, and close their projects. To improve project fulfillment, every aspect of project operations is planned, tracked, measured, scrutinized, and forecasted using a project management information system. Therefore, the main task to project success in terms of scope, cost, and time is the quality of the project management information system [14]. In this regard, having a strong PMIS and maintaining its quality has become essential to managing projects successfully and efficiently. It also aids project managers to make choices and to communicate the required information to both project team members and respective stakeholders [15].

Project management information system is one of the fundamental software applications and a logical process for storing, organizing, gathering project data. Utilizing these systems not only gives the companies a competitive advantage over their rivals, but it also improves the efficiency of projects at every stage of the project life cycle as well as all areas of the construction industry.

state that the employment of PMIS is predicated on the idea that the advantages it offers will outweigh its costs [9]. They also add that firms may now manage entire project portfolios successfully, in addition to individual projects thanks to the expansion of PMIS's reach.

PMIS plays a critical role in enhancing project efficiency, effectiveness and success by providing the tools and information needed to manage projects comprehensively. A construction project is a complex and comprehensive undertaking that involves various stages, from planning and design to construction, commissioning, and handover. Effective management of these stages is fundamental for the project to meet its main goal and requires a combination of skills and knowledge. [16] report that at the closing stage of project PMIS facilitate verification and validation of activities whether it is achievable and develop final project report. According to [17], the PMIS is used for making budget, organize schedules, and complete project management duties. However, every automation program finally takes time, training as well as monetary expenditure to at least attain satisfactory and progressive degrees of success through its lifespan in other to boost performance and competitive in the market [1]. Its adoption and proper utilization can lead to improved decision making, better communication and ultimately the successful delivery of construction projects.

2.2 PMIS User Skill and Knowledge

Understanding User skill refers to the proficiency and capability of individuals in utilizing PMIS tools and functionalities effectively. According to [18] Users with expertise in project management and PMIS can efficiently utilize the system's features. In gaining additional skill and knowledge users must be able to preparing an overall plan for the implementation of project, constantly measure its progress, assist the project manager in adequately managing project resources optimally, provide assistance for passing information to the different project stakeholders, producing reports that are essential for decision-making and provide historical project information and project audit [1]. This efficient use of features contributes to the PMIS's effectiveness by maximizing its benefits and minimizing potential

drawbacks. Project managers are maximally benefit from using PMIS because it increases productivity through prompt decision-making and the efficacy and efficiency of managerial tasks such as planning, scheduling, monitoring, and controlling.

2.3 Quality of Information

For sustainability of a firm, information is an indispensable resource. A firm's future depends on how well it uses and distributes information. When presented in the appropriate context at the appropriate time, high-quality information alerts us of opportunities and issues far in advance.

Information is a vital resource for the success of any organization [19]. Future of an organization lies in using and disseminating information wisely. Good quality information placed in right context in right time tells us about opportunities and problems well in advance [20]. Quality of information is a critical aspect of project management information systems (PMIS), it includes the instruments, procedures, and techniques used to gather, store, examine, and distribute project-related data.

System output is required quality of information. The information system's results should be pertinent to the projected usage, easy to grasp, precise or less prone to errors, concise, comprehensive, or encompass all necessary information, promptly available and real-time support information demands, and operational. According to [2], PMIS has favourable character to the firms that implement it because it offers precise and pertinent information that may be required by the firm for day-to-day project management. The vast majority of researchers point out that having high-quality information is crucial for project management success [21,20]. PMIS is useful since it offers accurate, pertinent and high-quality information that may be needed for a project's progress report of daily operations.

2.4 System Quality

System quality is the overall operation, reliability, and effectiveness of a system in meeting its intended objectives and satisfying user requirements. Also, System quality is the extent to which a project management information program meets the specified requirements, user expectations, and general standards for software systems [22]. It encompasses various components contribute to the design, functionality, usability, and maintenance of the software system.

Any system's non-functional requirements are referred to as its "system qualities," and when assessing a system's quality, the functioning components of the system in question are the main focus. Ease to use, uncomplicatedness, precision, dependability, rapidity, availability, stability, adaptability, and accessibility are among the attributes of a PMIS [23,24]. System quality is essential for ensuring that the system operates efficiently, delivers value to its users, and meets their expectations.

2.5 Stakeholders Satisfaction

According to the 7th version of the [25] Guide, a stakeholder is any person, team, or corporate entity that is concentrate on influencing or being influenced by the choices, actions, or results of a project, portfolio or program, Stakeholders are crucial to the project's success since their goals, strategies, techniques, and procedures have a direct significant impact on how well sustainable construction is carried out [26]. According to [27], effective stakeholder engagement, comprehension of their major areas of interest, and accurately forecasting of their influence are critical factors in project performance and success when seeking their support. There is a far higher chance of success for projects that consider the relevant of both main and minor stakeholder in its Planning [28].

Stakeholder participation in project initiation, planning, execution, monitoring and controlling potentially increases the likelihood of project success and is a suitable means of achieving a firm's objective, claim [29]. Establishing an appraisal index system with several important satisfaction elements is one method for measuring stakeholder satisfaction [30].

2.6 Project Completion

Every project must come to a conclusion, and project completion, is the final stage of the project life cycle. Delivering on the project manager's promises is the goal of the entire undertaking which is contain in the project charted. By fulfilling your promises, you ensure that all parties involved are on the same page and that all requirements for acceptance have been fulfilled. After that, your project can be said to completed. There is more to a successful project completion time than just delivering a project to the customer or company [29]. By giving a comprehensive process report of your efforts, you have the chance to improve your Goodwill and solidify your bond with each client [28]. Project completion refers to the successful conclusion of a project or task, where all the set goals, objectives, and deliverables have been achieved and met. It involves various stages, including planning, organizing, execution, monitoring, and evaluation (phases of a project).

2.7 Availability of Resources

Within the framework of project management information systems (PMIS), resource availability pertains to the ease of access and preparedness of different resources, including personnel, tools, and data, within the system to facilitate efficient project management. Effective communication, decision-making, and project success all depend on these

factors. Making sure that the resources-including people, money, materials, and equipment-are available and prepared to support project activities is known as resource availability (Project Management Institute) [31].

3. Methodology

3.1 Sample and Population

The Impact of project management information systems on project completion in the construction industry was investigated using a descriptive research approach. The population targeted in this study will be twenty-five construction companies in Lagos State. The samples from the companies include the Project managers, Project supervisors, IT officers, and Project Management Office (PMO) to participates in the study. These construction companies have a reputation for working on well-known projects and had extensive project management experience construction in Lagos State. [32,33] and the breakdown is illustrated in table 1 below.

Because the study needed to include people with more in-depth knowledge of the project, a Straightforward random selection process was used to choose the project managers, project supervisors, IT officers, and Project Management Office (PMO) from each of the twenty-five chosen construction companies in Lagos State.

Table 1. Number of respondent's base on returned from companies.

S/N	Construction Company	Number Questionnaire Distributed	Number Questionnaire Retuned
1	Dutum Group construction company	4	3
2	Oat Construction Nigeria Limited	4	2
3	Sujimoto Construction	4	4
4	BUA cement	4	2
5	Arbico Plc	4	3
6	Craneburg Construction	4	5
7	Makon Group	4	3
8	Flexip Group	4	2
9	Nigerite	4	4
10	Lafarge Africa	4	3
11	Dagonte Group	4	3
12	Julius Berger Service Nigeria	4	3
13	China Civil Eng constructio corp (CCECC)	4	5
14	Megastar Technical and constructioon comp ltd	4	3
15	ELALAN Construction Company	4	4
16	Arab Contractors Nigeria ltd	4	2
17	Cappa and D'Alberto Plc	4	2
18	ITB Nigeria Ltd	4	4
19	Costain West Africa Plc	4	2
20	The Building practice ltd	4	5
21	Adold engineering company ltd	4	2
22	Setraco Nigeria ltd	4	4
23	Reynolds Construction company (RCC) Nig	4	3
24	Bouygues construction Nigeria Ltd	4	3
25	Monier constrcution ltd	4	3
	Total	**100**	**79**

Source [32,33]

In order to assess the reliability of the variable utilized in the questionnaire, Cronbach's Alpha was employed; a score of 0.7 threshold or higher indicate that the questionnaire has a high degree of reliability shown in table 2 below.

Table 2. The Cronbach's Alpha test.

Reliability Statistics		
Cronbach's Alpha	**Cronbach's Alpha Based on Standardized Items**	**Number of Items**
.924	.936	30

3.2 Method of Data Collection and Analysis

Descriptive statistics in the form of frequency and percentage were used to assess and present the respondents' bio-data, also code and the regression analysis were employed to validate the degree of correlation between the variables

4. Data Presentation And Analysis

4.1 Relevant Hypotheses Test

4.1.1 Analysis of Research Hypothesis One

Ho: There is no significant effect of user skill and knowledge on completion time.

In the first hypothesis, User skill and knowledge (X_1).is the independent variable and completion time (Y_1) is the dependent variable,

$$Y_1 = C_1 + A_1X_1$$

Where A_1 represents the regression coefficients, while C_1 is constant. The regression coefficients were therefore calculated.

From table 3 It shows the model summary indicated a substantial positive relationship between User skill and knowledge and Completion time(R=0.471). This suggests that technology stands as a crucial element influencing the enhancement of work quality in the construction sector. Approximately 22% of the variability in quality improvement can be explained by user skill and knowledge (R^2=0.221). The number of predictors in the model is taken into consideration by the modified R^2. and stands at 0.278. while the standard error estimate (0.53204) provides a measure of the residuals' dispersion.

Table 3. Model summary- User skill and knowledge and Completion time.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.471[a]	.221	.211	.53204

a. Predictors: (Constant), User Skill and Knowledge

While table 4 show the unstandardized coefficient for user skill and knowledge (UK) was 0.561, and the standardized coefficient (β) was 0.471. The t-value (4.680) and the p-value (0.000) both indicated statistical significance, reinforcing the assertion of a meaningful relationship.

Table 4. Statistic test.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.544	.540		2.860	.005
	User skill and knowledge	.561	.120	.471	4.680	.000

a. Dependent Variable: Completion Time

The statistical results confirm that a high positive correlation between used skill and knowledge and completion time in the construction industry. Hence, they are strongly supporting the rejection of the null hypothesis

$$Y_1 = 1.544 + 0.561X_1$$

The results of the analysis align with existing works of literature on the role of user skill and knowledge in organizational performance and completion time of projects. The positive relationship between user skill and knowledge and completion time suggests that employees who are more informed and knowledgeable about their skills are better equipped to leverage technology on improving project completion time.

4.1.2 Analysis of Research Hypothesis Two

Ho: Quality of Information does not have any significant effect on availability of resources.

In this hypothesis, the independent variable, is the quality of information (X_1), and the dependent variable is availability of resources (Y_1).

$$Y_2 = C_2 + A_2X_2$$

Were,

A_2 represents the regression coefficients, while C_2 is constant. The regression coefficients were therefore calculated.

Table 5 model clarifies the connection between quality of information and availability of resources. The value of R (0.679) denotes substantial positive correlation indicating a noteworthy connection between the two variables. The R^2 coefficient of determinant (0.461) signifies that the 46.1% of variability in the availability of resources may be attributed to the quality of information. The adjusted R^2(0.453) considers the number of predictors in the model, and the standard error of the estimate (0.32263) provides a measure of the residual's dispersion.

Table 5. Model summary-quality of information and availability of resources.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.679[a]	.461	.453	.32263

a. Predictors: (Constant), Information Quality

From table 6 the unstandardized coefficient for quality of Information (QI) was 0.601, and the standardized coefficient β (0.679) both demonstrate the relationship's direction and strength. The t-value (8.107) and the p-value (0.000) affirm statistical significance, highlighting the meaningful impact of system quality implementation on availability of resources patterns.

Table 6. Statistic test.

Coefficients[a]					
Model	**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
	B	Std. Error	Beta		
1 (Constant)	1.693	.329		5.142	.000
Information quality	.601	.074	.679	8.107	.000

a. Dependent Variable: Availability of Resources

The model's statistical findings provide compelling evidence the null hypothesis. The p-value (0.000), which indicateds a substantial positive association, attests to the impact that quality of information has on resource availability in the construction industry.

$$Y_2 = 1.693 + 0.601 \, X_2$$

The findings of this analysis align with the broader literature emphasizing the transformative impact of information quality on resource availability patterns. In the context of construction industry, information quality is recognized as a driven force of project success, choice-making, collaboration and communication, innovation and improvement. By recognizing the importance of information quality, construction professionals can leverage it to drive business success, improve project outcomes and enhance industry competitiveness [34]. The positive relationship identified in this study implies that firms actively prioritize accurate data management and resource planning to enhance their project management processes.

4.1.3 Analysis of Research Hypothesis Three

Ho: System quality does not have any significant effect on Stakeholder satisfaction

In this hypothesis, the dependent variable is stakeholder satisfaction (Y_3) while the independent variable, which is system quality (X_3).

$$Y_3 = C_3 + A_3 X_3$$

Were,

A_3 represents the regression coefficients, while C_3 is constant. The regression coefficients were therefore calculated

Table 7. Model summary-user skill and knowledge and completion time.

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.720[a]	.518	.511	.35862

a. Predictors: (Constant), System Quality

Table 8. Statistic test.

Coefficients[a]					
Model	**Unstandardized Coefficients**		**Standardized Coefficients**	**T**	**Sig.**
	B	Std. Error	Beta		
1 (Constant)	1.034	.377		2.741	.008
System Quality	.767	.084	.720	9.092	.000

a. Dependent Variable: Stakeholder Satisfaction

Table 7 model summary serves as a lens through which to view the relationship between system quality and stakeholder satisfaction. R (0.720) suggest a somewhat positive correlation that indicates a clear relationship between the two variables. The coefficient of determinant R^2(0.518) conveys that 51.8% of the variability in stakeholder satisfaction may be attributed to system quality interest. The number of predictors in the model is taken into account by the adjusted R^2 (0.511), and the standard error of the estimate (0.35862) provides a measure of the residual's dispersion.

Table 8 shows the unstandardized coefficient for the system quality (0.767) and the standardized coefficient β (0.720) both illuminates on the relationship's direction and magnitude. The t-value (9.092) and the p-value (0.000) affirm statistical significance, underscoring the meaningful impact of system quality on stakeholder satisfaction.

Based on the statistical data obtained from the model, the null hypothesis is persuasively rejected. The p-value (0.000), implies a substantial positive association, attests to the important role that system quality plays in influencing stakeholder satisfaction in the construction companies.

$Y_3 = 1.034 + 0.767 X_3$

The results from the analysis underscore the importance of system quality as a driving force behind stakeholder satisfaction in the construction industry. The positive relationship suggests that employees or stakeholders within firms who demonstrate a keen interest in system quality contribute to the optimization of stakeholder satisfaction. This interest may manifest in a proactive approach. to exploring and implementing technological solutions to enhance efficiency, streamline workflows, and improve overall operational effectiveness.

System quality impact on stakeholder satisfaction corresponds with the larger body or research that highlight how stakeholder satisfaction is impacted by perceived system quality [35] perceived system quality has a positive impact on customer satisfaction, and that this relationship is meditated by trust and commitment.

5. Conclusion

The findings of the research underscore the transformative impact of PMIS across various facets of the construction industry. The analysis of user skill and knowledge and completion time revealed that employees well-versed with the system and had a good understanding of its features and functionality were able to complete tasks more quickly and efficiently. Moreover, the results demonstrated that effective quality of information is a key driver of resource accessibility strategies, enabling firms to optimize resource allocation and improve operational efficiency. construction companies.

The significant positive relationships identified in each hypothesis strongly support the rejection of the null hypotheses, affirming the essential role of project management information system in shaping project completion and outcomes.

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