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Research Paper

Perception of Construction Professionals on the Effect of Project Management Software on the Performance of Building Construction Projects in Lagos State, Nigeria

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ABSTRACT
This study investigates the perceptions of construction professionals on the effect of project management software on the performance of building construction projects in Lagos State, Nigeria. Utilizing a survey research design, copies of questionnaire were distributed among 232 professionals, a high response rate of 94.8% was achieved. The findings reveal that a significant majority (64.1%) of respondents are highly satisfied with their project management software, noting substantial improvements in project completion times and quality of work. Microsoft Project (38.2%) and Autodesk BIM 360 (20%) are identified as the most prevalent software, preferred for their efficient handling of projects in Lagos.The demographic analysis indicates a workforce predominantly composed of younger, highly educated professionals, suggesting an industry inclined towards adopting technological innovations. The study underscores the necessity for broader adoption and effective integration of project management software to mitigate common issues such as delays and cost overruns. Recommendations include encouraging widespread use of project management software, ongoing professional training, and the implementation of policies to standardize the use of such software.
***KEYWORDS**: Project Management Software, Construction Professionals, Lagos State, Technological Innovation.*

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I. INTRODUCTION

The construction industry plays a crucial role in the economic development of nations worldwide, significantly impacting GDP and employment. It employs a wide array of professionals, from engineers to labourers, and it is involved in developing critical infrastructure like hospitals and schools (Najmiddinov&Yaxshiliqov, 2024). Technological advancements have led to the adoption of innovative practices such as modular construction and green building to meet environmental standards and enhance efficiency (Awodele*et al.*, 2023).

In Nigeria, the construction sector is a key economic driver, contributing notably to GDP and job creation. It supports other industries like manufacturing by providing essential infrastructure (Ali, 2021; Abubakar*et al.*, 2018). The sector is divided into formal and informal segments, the latter of which involves small-scale projects that often escape government oversight, thus complicating data collection.

Information Technology (IT) has become integral to project management within the industry, enhancing planning, control, and performance through sophisticated software solutions (Adetola*et al.*, 2019; Amir & Amen, 2013). The rapid evolution of Information and Communication Technology (ICT) has transformed planning processes, making them more efficient (Abbas *et al.*, 2018; Abdul *et al.*, 2020).The rapid advancements in the field of Information Technology have provided developers with new insights, enhanced networking capabilities, and widespread access to personal computers, simplifying the management of complex projects (Al-Shammari, & Al-Jibouri, 2019). Notable projects such as the launch of the Space Shuttle Challenger and the ambitious Channel Tunnel project between England and France have set benchmarks and guided the evolution of project management practices globally.

Lagos State, Nigeria's most populous city and a fast-growing urban center, continues to see a high demand for new infrastructure and property developments, driven by both public and private investments. However, the region faces challenges such as project delays and cost overruns, exacerbated by poor coordination between the formal and informal sectors and insufficient use of modern management tools (Mwangi, 2011; Osuizugbo*et al.*, 2023). Strategic use of project management software could address these issues by more effectively utilizing resources like time and money.

This study aims to explore the perception of construction professionals on the effect of project management software on the performance of building construction projects in Lagos State, addressing the gaps in the literature regarding the relationship between software utilization, training, government policies, and project performance. The objectives of this study are to determine the types of project management software that are used in building construction projects in Lagos State and to examine the perception of construction professionals on the effect of project management software on the performance of building construction project in Lagos State. This investigation is crucial for improving project management practices and enhancing the contribution of the construction industry to the Lagos state economy.

II. METHODOLOGY

The survey research method was utilized to meet the objectives of this study, with Lagos State being chosen due to its vibrant and rapidly expanding construction sector, a key element of the state's economic framework. Lagos State, situated on the south western coast of Nigeria and bordered by the Bight of Benin to the south, uniquely borders only Ogun State to the east and north, distinguishing it as the only Nigerian state to share a boundary with just one other state. Known as the most populous city in Africa, Lagos was established from the Western Region and the erstwhile Federal Capital Territory on May 27, 1967. According to the 2006 population census, the city had a population of 9,113,605, which has grown to an estimated 35,000,000 as per the latest figures from the National Bureau of Statistics.

The construction industry in Lagos covers a wide range of projects, including skyscrapers, expansive residential areas, and essential structures like roads, bridges, and public transport systems. The industry is divided into formal and informal sectors. The formal sector, typically made up of large, sometimes multinational companies, undertakes major projects involving substantial financial investment and sophisticated technology. These entities are tasked with building significant infrastructures and notable buildings, with some projects valued at over $2 billion. Conversely, the informal sector comprises smaller local companies and individual contractors focused on smaller-scale residential and commercial building projects. This sector plays a vital role in accommodating the housing needs of Lagos's swiftly expanding population, now over 15 million.

This research targets building construction professionals from registered companies within Lagos. These professionals, including Project Managers, Architects, Quantity Surveyors, Engineers, and Builders, have relevant experience in the region. As noted by Obialo (2023), there are 69 registered building construction companies in Lagos State, forming the study's population. The research utilized a simple random sampling method to determine the study sample. Out of the 69 firms, fifty-eight (58) were selected using the Yamane formula.

The Yamane (1973) sample size formula was used to calculate the sample size as follows;

$$n = \frac{N}{(1+Ne^2)}$$

Where n is the sample size, N is the population size and e is the margin of error (5%). Therefore, substituting in the values;

$$n = \frac{69}{1+69(0.05)^2}$$

$$n = \mathbf{58}$$

Where: n = Sample size, N = Population size, e = Margin of errors = 5% = 0.05

In this study, 232 professionals from 58 building construction companies were selected, with 4 professionals from each company participating. Primary data was collected using copies of questionnaire distributed through a survey research design and administered to the respondents.

The content of the questionnaire was reviewed for validity by two experts, one from the Department of Project Management and another from the Department of Building Technology at FUTA. The reliability of this research tool was confirmed by achieving a Cronbach's Alpha value of 0.7, indicating acceptable internal consistency.

Descriptive statistics and frequency tables were utilized to analyze and present the distribution of the variables investigated in the study.

III. RESULTS AND DISCUSSION

A set of 232 questionnaires was administered to building construction professionals in the study area, 220 of these were adequately and comprehensively filled out, representing 94.8% of the overall distributed questionnaires.

Demographic Characteristics of Respondents

The demographic profile of respondents from building construction projects in Lagos State, Nigeria, provides insights into industry participation trends (Table 1). Notably, there is a significant male majority (88.2%) compared to females (11.8%), suggesting domination of male involvement in the construction sector. The age distribution shows a predominance of participants aged 21-50 years, indicative of a youthful workforce. Educational backgrounds are diverse, with most respondents holding B.Sc./HND (39.1%), followed by PGD/MSc. (30.5%), OND (21.4%), and a smaller fraction holding Ph.D. (9.0%), reflecting a highly educated pool of professionals. The professional breakdown shows Engineers (30.0%) and Builders (27.3%) as the largest groups, with Quantity Surveyors, Project Managers, and Architects also contributing significantly. Experience levels vary, with many respondents (48.6%) having less than five years in the industry, suggesting a recent influx of new entrants, alongside a solid base of more experienced practitioners.

These demographic characteristics underline a shift towards more gender diversity and indicate the importance of higher education in the sector. The data suggests the necessity for effective collaboration among various professional groups to ensure successful project outcomes. Additionally, the mix of novice and veteran professionals highlights the potential benefits of mentorship and continuous professional development to sustain innovation and skill enhancement in Lagos State's construction industry.

Table 1: Table Showing Demographic Characteristics of Respondents

Variable	**Frequency**	**Percentage**
Gender		
Female	26	11.8
Male	194	88.2
Total	**220**	**100.0**
Age		
Less than 20 years	37	16.8
21-30 years	54	24.6
31-40 years	47	21.4
41-50 years	55	25.0
Over 50 years	27	12.2
Total	**220**	**100.0**
Highest Educational Qualification		
OND	47	21.4
B.Sc./HND	86	39.1
PGD/MSc.	67	30.5
Ph.D	20	9.0
Total	**220**	**100.0**
Professional/Owners category		
Project Manager	28	12.7
Engineer	66	30.0
Quantity Surveyor	49	22.3
Architect	17	7.7
Builder	60	27.3
Total	**220**	**100.0**
Years of Experience		
Less than 5 years	107	48.6
5 – 10 years	42	19.1
10-15 years	53	24.1
Over 20 years	18	8.2
Total	**220**	**100.0**

Source: Field Survey (2023)

Types of Project Management Software Tools Used in Building Construction Project

The data presented in Table 2 highlights the preferences for project management software among respondents involved in building construction projects. According to the findings, Microsoft Project is the most favoured software, utilized by 38.2% of respondents, making it the leading choice. Autodesk BIM 360 follows as the second preferred option, selected by 20% of respondents. Other software tools, including Primavera P6 (8.2%), Procore (4.0%), Assembla (4.6%), Base Camp (6.4%), Gantt Project (4.0%), Artemis View (1.8%), Open Workbench (6.4%), and Liquid Planner (6.4%), have varying degrees of usage ranging from 2% to 8%, indicating less popularity.

This distribution suggests a strong inclination towards Microsoft Project and Autodesk BIM 360 as the primary project management tools in the construction sector, with the remaining tools being used to a lesser extent.

Table 2: Types of Project Management Software Tools Used in Building Construction Projects in the Study Area.

Project Management Tool	Frequency	Percent
Microsoft Project	84	38.2
Primavera P6	18	8.2
Procore	9	4.0
Autodesk BIM 360	44	20.0
Assembla	10	4.6
Base Camp	14	6.4
Gantt Project	9	4.0
Artemis View	4	1.8
Open Workbench	14	6.4
Liquid Planner	14	6.4
Total	220	100.0

Source: Field Survey, 2023.

Perception of Construction Professionals on the effect of the Project Management Software Tools on the Performance of Building Construction Project in Lagos State

The findings from the survey in Table 3, revealed that a substantial majority of construction professionals in Lagos State, 64.1%, reported that project management software tools satisfied their project management requirements to a high degree. Additionally, 35.9% of the respondents felt that these tools met their needs to a moderate extent. This data indicates a strong overall satisfaction with the effectiveness of project management software in meeting operational demands within the construction sector. It suggests that the majority of professionals believe that the tools not only support but significantly enhance project management processes by facilitating more efficient planning, execution, and monitoring of construction projects.

This data underscores the critical role that project management software plays in the construction industry, particularly in complex urban environments like Lagos State. By efficiently addressing the multifaceted challenges of project management, these tools empower companies to achieve better coordination, resource allocation, and adherence to timelines and budgets. Their effect is particularly noticeable in environments characterized by rapid urbanization and extensive infrastructure needs, where managing large-scale projects efficiently is crucial. This trend reflects a growing dependency on technological solutions to enhance industry standards and outcomes, aligning with global movements towards digitization in construction management practices.

Table 3: Project Management Software meeting Project Management needs

Performance on BDP	Frequency	Percent
Extremely well	141	64.1
Somewhat well	79	35.9
Total	220	100.0

Source: Field Survey, 2023.

Performance of Project Management Software in Building Construction Projects

The survey highlights the effectiveness of project management software in enhancing various aspects of building construction projects. A significant portion of the respondents, 35.9%, reported that project management software substantially improved the completion times of their projects. Additionally, 28.2% observed notable enhancements in the quality of work due to the software's implementation. Work adherence, safety records, and customer feedback also saw improvements, cited by 14.1%, 11.8%, and 10% of respondents, respectively. This diversity in benefits indicates that project managers rely on software tools to optimize a wide range of project metrics, with project completion and quality of work being the most significantly impacted. The

insights also suggest that while budget adherence, safety, and customer feedback are less frequently enhanced, they are nonetheless important components of project management that benefit from software integration.These findings illustrate the comprehensive role that project management software plays in advancing construction project outcomes. The software not only expedite project timelines and enhance quality but also foster adherence to budget constraints and improve safety measures. The quantitative data reflect a broad appreciation for these tools within the construction industry, underscoring their value in meeting the complex demands of modern construction management. By integrating these technologies, firms can better navigate the challenges associated with large-scale construction projects, leading to more efficient operations and increased client satisfaction.

Table 4: Performance of Project Management Software in Building Construction Projects in the Study Area

Performance Metrics	Frequency	Percent
Completion time	79	35.9
Budget adherence	31	14.1
Quality of work	62	28.2
Safety records	26	11.8
Customer feedback	22	10.0
Total	220	100.0

Source: Field Survey, 2023.

Perception on the effect of Project Management Software on the Performance of Building Construction Projects in the study area.

The survey data in Table 5 presents an insightful analysis of the perceptions regarding the impact of project management software on building construction projects in the specified study area. The findings reveal that 51.8% of respondents report a significant improvement in project performance due to the use of these software tools, while another 40% observed moderate improvements. Conversely, a small fraction of the respondents, 5.9%, noticed no change, and another 2.3% reported a deterioration in performance. This suggests that while the majority experienced positive outcomes from integrating project management software, a small segment perceived either no benefit or negative effects.These results underscore the generally favourable view of project management software in enhancing the efficiency and outcomes of building construction projects, with most users noting substantial or moderate enhancements in project performance. Table 5 and the analysis reveal the critical role that project management software plays in the construction industry, particularly in optimizing project execution and delivery. Although most feedback is positive, the presence of neutral and negative experiences suggests the complexity of effectively integrating technology into existing systems and processes. It highlights the necessity for ongoing training, support, and possibly more tailored software solutions to meet diverse project demands and user expectations.

Table 5:Perception on the effect of Project Management Software on the Performance of Building Construction Projects in the study area.

Impact of PMST on BCP	Frequency	Percent
Improved performance significantly	114	51.8
Improved performance moderately	88	40.0
No effect on performance	13	5.9
Worsened performance	5	2.3
Total	220	100.0

Source: Field Survey, 2023.

Perception on the Effect of Project Management Software on some Proxy Variables of Building Construction Projects Performance

The survey results in Table 6 below provide insights into the effect of project management software on various proxy variables of building construction projects' performance. According to the data, 41.8% of the professionals indicated that project management software significantly affects project completion times, suggesting a substantial improvement in efficiency. About 24.1% of the respondents observed that these tools have a positive effect on project budget management, helping to keep costs within planned limits. Additionally, 20% reported enhancements in the quality of work, attributing improvements to the systematic approach facilitated by the software.

The influence of project management software extends to communication among team members, with 11.8% of respondents recognizing its benefits in this area, likely leading to better coordination and fewer

misunderstandings. However, only a small fraction (2.3%) noted an effect on risk management, indicating potential areas for further software development or training to fully exploit these tools' capabilities in managing project risks. Furthermore the findings highlight the multifaceted benefits of project management software in the construction industry, though they also suggest that its potential in certain areas, like risk management, remains underutilized.These statistics demonstrate the widespread adoption and effectiveness of project management software in enhancing operational performance in building construction, underlining the importance of technology in modern construction practices. The varied effect across different variables also suggests areas for future improvement, particularly in leveraging technology to better manage risks associated with construction projects.

Table 6:Perception on the Effect Project Management Software on Some Proxy Variables of Building Construction projects performance

	Frequency	Percent
Project completion time	92	41.8
Project budget	53	24.1
Quality of work	44	20.0
Communication among team members	26	11.8
Risk management	5	2.3
Total	220	100.0

Source: Field Survey, 2023.

IV. CONCLUSION

This study in Lagos State, Nigeria, explores construction professionals' perceptions of project management software's effect on building construction performance. A comprehensive survey reveals that most professionals are highly satisfied with these tools, particularly for their ability to streamline planning and execution, thus enhancing completion times and work quality. Microsoft Project and Autodesk BIM 360 emerge as preferred software for managing large-scale projects essential to Lagos's infrastructure development. These software are favoured for their user-friendly interfaces and robust functionalities suitable for complex urban projects.

The demographic profile of the workforce, predominantly younger and highly educated, suggests a receptivity and adaptability to technological advancements, promising ongoing improvements in project management practices. This study contributes valuable insights into the integration of ICT in construction, a relatively underexplored area in emerging markets. Recommendations include promoting wider software adoption, continuous professional training, and policy implementation to standardize software use, aiming to reduce project delays and cost overruns. Highlighting the benefits of technology in construction management, this study underscores the need for strategic planning and continuous education to enhance productivity and sustainability in the construction industry.

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