Appraising the Adoption of Project Management Information System by Construction Firms in Kano State, Nigeria

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ABSTRACT

In recent years, the use of Project Management Information Systems (PMIS) has become increasingly popular among construction firms to facilitate project planning. The aim of this study is to investigate the critical success factors for the adoption of project management information system in construction firms with a view to enhancing the delivery of construction project. To achieve this aim, a questionnaire survey was used to collect data on PMIS adoption from professionals in construction firms in Kano State. Data relating to 92 completed questionnaires on the PMIS adoption in Kano State were provided by the construction firms. Descriptive and inferential statistics were used to analyse the data obtained from the questionnaire survey using SPSS 25.0 software. The study reveals that, "Willing to recommend PMIS to others" and "Willing to donate for PMIS adoption." were the factors with highest means scores. This suggests a strong endorsement of PMIS by construction firms in Kano State. In addition, project stakeholder collaboration emphasizes the importance of collaboration between all parties (clients, contractors, architects, etc.) for successful PMIS implementation. The study also reported that, effective information sharing and communication facilitated by PMIS can significantly benefit project outcomes. The R-squared value of 0.305 indicates that, 30.5% of the variance in the level of PMIS adoption can be explained by the independent variables representing the challenges to adoption. The highly significant p-value (less than 0.001) further emphasizes the strong statistical relationship between these challenges and the level of PMIS adoption. This finding suggests that, the challenges identified in the study are indeed significant barriers hindering the widespread adoption of PMIS in Kano construction firms. The study recommends awareness campaigns to educate construction firms about the practical benefits and success stories of PMIS implementation is important. This can bridge the knowledge gap and motivate them to move beyond positive intentions. Industry bodies or government agencies can work towards standardizing PMIS practices and data formats. This can streamline implementation and facilitate collaboration between firms.

Keywords: PMIS, Construction, Construction Firms, Project Management, IT Adoption.

INTRODUCTION

The construction industry is a complex and dynamic sector that involves the management of various resources, such as time, cost, and quality, to achieve project objectives (Akintoye & Fitzgerald, 2000). In recent years, the use of Project Management Information Systems (PMIS) has become increasingly important in the construction industry to enhance the management of these resources and improve project performance (Kassem *et al.*, 2020). Project Management Information Systems (PMIS) are essential tools that enable construction firms to manage and control their projects efficiently. According to Ibrahim *et al.*, (2019), PMIS provides a comprehensive platform for tracking and managing various project-related data, including cost, schedule, scope, and quality. This ensures that
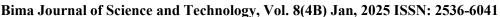
construction firms have better control of their projects, leading to improved project outcomes. Similarly, Alzahrani *et al*., (2019) argue that, PMIS enables construction firms to share information and communicate with various stakeholders in real-time, enhancing collaboration among project teams. This leads to improved decision-making and problem-solving, ultimately leading to project success.

In a study by Kumar & Agarwal, (2018) the authors stressed that PMIS enables construction firms to automate project-related processes, reducing the time and cost required to manage projects. Furthermore, Othman *et al*., (2021) observes that, PMIS enhances decision-making by providing project teams with access to accurate and up-to-date project data. PMIS according to Barata *et al*., (2021) is essential for construction firms to manage their projects efficiently, improve project outcomes, and increase profitability. PMIS enhances various aspects of project management, including collaboration, communication, quality management, risk management, decision-making, resource management, and stakeholder engagement. In addition, PMIS provides a framework for standardising project processes, improving project documentation, and monitoring project progress in real-time, ultimately leading to improved project performance (Barata *et al*., 2021). A recent study conducted by Zou *et al*., (2019), found that, the use of PMIS in Australia is high with 87% of construction companies adopting it. Similarly, a study conducted in 2017 reported that 77% of construction firms in the USA use PMIS. A study published in the Journal of Construction Engineering and Management in 2019 found that the use of PMIS in China is increasing rapidly, with a growth rate of over 10% per year. Several studies have been conducted to identify the CSFs suitable for adopting PMIS in construction firms. These studies have identified various CSFs, such as top management support, user involvement, system usability, data accuracy, and compatibility with existing systems (Kassem *et al*., 2020; Lu & Thomas, 2019). Understanding these CSFs can help construction firms to effectively plan and implement PMIS to enhance project performance and achieve their business objectives

It is obvious that the developed countries have reached a significant level of adoption compared to the developing countries. Therefore, identifying the critical success factors (CSFs) for the adoption of PMIS in construction firms is essential to ensure the successful implementation and use of the system. CSFs refer to the key factors that must be present for a project to be successful. In the context of PMIS adoption, CSFs can be related to technology, people, processes, and organisational factors (Kassem *et al*., 2020). In recent years, the use of Project Management Information Systems (PMIS) has become increasingly popular among construction firms to facilitate project planning (Shrestha &Tamrakar, 2019) scheduling (Shen *et al*., 2017), monitoring (Lee & Kang, 2017), and control (Lu & Thomas, 2019). Previous studies (Kassem, 2020; Akinpelu *et al*., 2019; Zou *et al*., 2019) have highlighted different aspects that influence the uptake and utilisation of PMIS in construction firms. However, despite the benefits of PMIS, there is a lack of comprehensive research on the factors that influence the effective use of PMIS in construction firms and according to Kassem, (2020) there is a lack of consensus on the factors that influence the adoption of PMIS by the construction companies.

As no attempt to determine the factors influencing PMIS adoption by construction firms in Kano State exist in literature, a gap thus exists regarding the influence of these

factors on PMIS adoption by construction firms in Kano. Consequently, the major objectives of this study are to determine the level of adoption of PMIS by construction firms, to identify the major factors influencing the adoption of PMIS by construction firms and to assess the challenges for the adoption of PMIS by construction firms in the study area.

Overview of Project Management Information System

A project management information system, or PMIS, is a tool that aids in tracking, managing, and organizing all of the data related to a project. It could be a set of tools, a piece of software, or possibly both at once. According to Hayford, (2021) a PMIS serves as the focal point for all information about a project, combining tasks, papers, schedules, plans, and communication channels into a single, readily navigable platform. Thanks to this one source of truth, all team members will always have access to the most recent information, which promotes cooperation and lowers the possibility of misunderstandings or miscommunication (Boateng, 2021).

By giving team members a centralised platform to share information, updates, and feedback easily, PMIS greatly improves collaboration (Lesebo *et al*., 2023). Communication barriers vanish, and teamwork becomes more effective when all project data is kept in one easily accessible area (Mollaoglu, 2018). A culture of openness and cooperation is fostered by team members' ease of idea sharing, feedback, and task coordination (Kumar *et al*., 2022). In addition to expediting decision-making (Khan *et al*., 2021), this expedited cooperation process fosters a more cohesive and productive work environment, which in turn drives project success (Belmont *et al*., 2023).

PMIS gives project managers instant access to vital information on their work status, how

resources are being used, and any dangers (Wu *et al*., 2020). This information helps managers make decisions that are well-informed throughout the project lifecycle. Project managers can evaluate performance in relation to milestones, spot new problems, and modify plans of action as necessary to minimise risks and maximise resource utilisation by using the PMIS's extensive and current information (Sarker *et al*., 2018). The manager's capacity to foresee obstacles, seize opportunities, and ultimately guide the project toward successful outcomes while maintaining alignment with organisational objectives is improved by this data-driven approach to decision-making (Ahn *et al*., 2022).

By automating different project management processes like scheduling, task dependencies, and progress monitoring, a PMIS is crucial in improving project teams' efficiency (Lee *et al*., 2021). Project managers and team members can more efficiently dedicate their time and resources to high-priority tasks and strategic goals by streamlining regular operations with PMIS capabilities (Ivezić *et al*., 2019). Project managers can concentrate on monitoring project progress, addressing problems, and maximising project outcomes when repetitive duties are automated, freeing up team members to concentrate on producing value-added work (Turner & Harder, 2018). This improved efficiency helps teams accomplish their goals more successfully by accelerating project delivery and increasing overall production (Liu *et al*., 2020).

Benefits of Using PMIS in Construction Firms

Fortmueller, (2019) states that, PMIS is especially useful for handling larger-scale projects. They advise selecting a PMIS programme that provides friendliness, calendars, schedules, budgets, reports, graphics, networks, charts, migration, and

consolidation features. Project managers and other team members can obtain relevant information about resource scheduling, budget management, supplier management, time management, task assignment, quality control, documentation, and collaborative tools through PMIS, which "allows individuals or teams to track projects from their conception to their execution (Frosolini *et al*., 2022). According to Frolini *et al*., (2022), a current trend in PMIS development and utilisation moves away from single-project management and towards integrated multi-project planning that utilises shared sources.

Effective systems are essential for supporting all project managers, since managing a complicated entity like a project is impossible without planning, budgeting, analysis, and control systems in place to help the manager do his job. Without this backup, his budgeting and planning would be too sluggish, and they would not be utilised to assist him in managing and organising his workload. Project manager won't be able to effectively oversee his project without an effective information system since he won't know what is actually going on until it's too late. He will also have to devote a significant amount of his most valuable and limited resource his time to simple supervision and information gathering, and whatever information he does obtain will unavoidably be outdated (Hayford, 2021).

When utilising software tools, it's important to remember that they are only auxiliary tools. Defining their scope and application in the execution of projects should be grounded in the overall principles of the project management procedures within the specific organisation. PMIS is beneficial to an organisation when tackling projects, provided all of the deployed software application's capabilities are utilised (Boateng, 2021). PMIS provides multiple options for solutions in the form of specific software applications. Simple

freeware apps, cloud solutions, more sophisticated apps created by smaller local software companies, sophisticated apps available internationally, and advanced solutions that support portfolio management with a broad range of features and the ability to be tailored to user needs are all available. Simple freeware tools such as Open Project (formerly known as Project Libre; Marion & Fixson, 2021), Gantt Project (Brčić & Mlinarić, 2018), dot Project (Stickler *et al*., 2020), or Open Workbench (Chikh Mhamed & Zhao, 2022) are available for use in project management among the current offerings on the market.

Additionally, online apps in the cloud mode exist, such as iProject (Ash-Shaiku, 2019) and Admi Project (Cui *et al*., 2018). These programmes offer a range of functionalities and the benefit of infinite data availability with guaranteed internet connectivity. The British software company Concerto Project Management Software has developed its product using the web application concept (Fatima *et al*., 2018). According to Brčić & Mlinarić, (2018). The use of Project Management Information Systems (PMIS) can lead to a 75% increase in project success. Accordingly, PMIS quality and usage are crucial (Brčić & Mlinarić, 2018).

Critical Success Factors for PMIS Adoption in Construction Firms

Implementing a new PMIS requires a well-defined change management plan. This includes resolving reluctance to change, providing user training, and being transparent about the system's advantages. A seamless transition and user buy-in are ensured by effective change management (Whang *et al*., 2019, Including important stakeholders in the PMIS selection and customisation process is essential, such as project managers, engineers, and field workers. A more user-friendly

system that meets their unique demands is the result of comprehending user needs and taking their comments into account (Hayford, 2021). It can be difficult to integrate the PMIS with other construction software, such as accounting or CAD systems, and to migrate current project data. Workflows are streamlined and interruptions are prevented with a carefully thought-out data migration strategy and flawless system integration (Risath, 2018).

Obi *et al*., (2021) state that, strong senior management support is essential for the deployment of PMIS to be successful. The PMIS must be promoted by leadership, who must provide the required resources and ensure that teams are held responsible for using the system efficiently. The field of PMIS is always changing. A continual improvement process should be in place for construction companies, and it should involve user feedback sessions, frequent system updates, and the investigation of new features that could improve project management even more. Modifying current workflows could occasionally be necessary to fully utilise the PMIS (Whang *et al*., 2019).

Construction PMIS, according to Kikwasi, (2018) is a new approach to business and construction management in which, in order to communicate quickly and accurately, the client, supervisor, contractor, and subcontractors combine and share a variety of information (such as documents, drawings, photos, and job records). Short building times and lower construction costs are two examples of how this strategy promotes efficient work and effective management. PMIS facilitates three essential roles for effective work performance amongst the parties involved in the project (client, contractor, and architect).

Communication

PMIS offers a common forum for information sharing, which dismantles communication silos. Team members have instant access to discussions, project papers, and real-time updates to keep everyone in the loop. This leads to easier workflows and increased productivity by eliminating the need for many email threads and information chasing. Consider a construction project in which the PMIS enables instantaneous plan and update sharing between architects, engineers, and subcontractors. By doing this, miscommunication-related delays are eliminated, and everyone is guaranteed to be working with the most recent information (Shayan *et al*., 2022).

Collaboration

According to Kumar *et al*., (2023) encourages active collaboration and straightforward communication. Project managers may allocate jobs efficiently and monitor progress in real-time with the help of features like task management and assignment tools. Team members can work on papers, exchange ideas in forums, and talk about problems and solutions using built-in communication channels. This promotes a more cooperative atmosphere where team members are encouraged to participate and work together to achieve a common objective. Imagine a design team exchanging comments and revisions online using a PMIS. This facilitates quicker decision-making by streamlining the review procedure (Mashali *et al*., 2023).

Community

Information exchange facilitates the collection of relevant data and information (Parks, 2005). Future project teams will be able to access this invaluable information base. This helps new team members learn from previous experiences and lessens the need to start from scratch for every project (Wang *et al*., 2023).

Potential Barriers to PMIS Adoption in Construction Firms

Construction companies may face several obstacles while using Project Management Information Systems (PMIS) that prevent successful adoption. The expense of purchasing and putting in place a PMIS is one major obstacle (Abed, 2018). Small and medium-sized construction companies frequently find it difficult to make the initial financial investment needed for software licenses, customisation, maintenance, and training. Due to financial constraints, these businesses might stick with conventional project management techniques, which may be less effective, or choose less expensive but less effective options (Hayford, 2021).

Another barrier to adoption is the complexity of PMIS solutions. To meet construction companies' unique requirements and workflows, these systems frequently need to be heavily customised. Users used to old ways may become overwhelmed by this intricacy and become resistant to change. The steep learning curve may cause employees to feel overburdened or frustrated, hindering the PMIS's efficient deployment and use (Choi & Ha, 2022).

In industries like construction, where specialists may have been effectively employing established methods for years, resistance to change is a common problem. This resistance may result from things like dislike of new technologies, a fear of losing one's job, or a sense of control. Effective change management techniques, a clear explanation of the PMIS's advantages, and employee participation in decision-making and implementation are necessary to overcome this obstacle (Gebeyehu, 2020).

Issues with data integration and quality further complicate PMIS implementation in construction companies. Numerous parties are involved in construction projects, and a lot of data from different sources is used. It can be difficult to guarantee the quality and smooth integration of this data into the PMIS, which raises questions regarding the data's consistency, correctness, and dependability. Strong data management procedures, standardised procedures, and potentially the integration of data from many sources are needed to address these issues (Sidney, 2019).

Employee skill and training shortages are yet another barrier to implementing PMIS effectively. It's possible that many employees don't have the abilities and knowledge needed to operate the PMIS properly, which could lead to underuse or abuse of the system. To close these skill gaps and guarantee that staff members can fully utilise the PMIS, sufficient training programmes designed to meet the unique requirements of construction professionals are important (Almuntaser *et al*., 2019).

Silva *et al*., (2023) state that, adding another level of complexity to the PMIS is the integration with current systems, like accounting or scheduling software. The complexity of this integration procedure may call for additional resources and technological know-how. There could be problems with compatibility between the PMIS and current systems, which would make the deployment process even more difficult and perhaps result in inefficiencies or inconsistent data (Silva *et al*., 2023; Almuntaser *et al*., 2019). Another major factor influencing PMIS adoption in construction companies is security concerns. Sensitive information, such as financial data, plans, and client information, is frequently included in construction projects. This information needs to be protected against unauthorised access and data breaches (Almuntaser *et al*., 2019). PMIS adoption programmes may not succeed if senior management does not provide significant

support and commitment. Insufficient resources, authority, and momentum to propel effective adoption initiatives might be caused by a lack of support from the leadership. In order to overcome resistance and ensure the effective deployment and utilisation of the system, senior management must advocate for the adoption of PMIS, provide sufficient resources, and actively participate in the process (Salih, 2020).

Organization Barriers to PMIS Adoption

Construction companies face major change management issues when they switch to a Project Management Information System (PMIS) from existing software or old paper-based approaches. Adoption may be hampered by staff resistance brought on by unfamiliarity or worries about the learning curve. According to Hayford, (2021) a PMIS that does not address the unique requirements of construction workers may result from excluding important stakeholders from the selection and customisation process. Including engineers, project managers, and field staff early on creates a sense of ownership and guarantees that the system is easy to use and meets their needs.

A PMIS cannot function properly without adequate IT support, yet many construction companies may not have this. Users may experience difficulties as a result of inadequate IT support, which may aggravate them and make them resist the new system (Hamood *et al*., 2023).

The adoption of PMIS is likely to face challenges in the absence of significant senior management support, (Lesebo *et al*., 2023). Support from management is essential for giving instructions, assigning tasks, and holding teams responsible for using the PMIS efficiently. The intricacy of construction projects further complicates the use of PMIS. Although PMIS has many functions, not every

function may be needed for every project (Lesebo *et al*., 2023; Hamood *et al*., 2023). It is based on this that construction companies usually assess their project objectives and ensure the selected PMIS meets the project objectives without additional cost.

Technological Barriers to PMIS Adoption

Transferring current project data from multiple sources into a Project Management Information System (PMIS) can be challenging for construction companies. Because this procedure is lengthy and complex, it must be carefully planned to guarantee data consistency and correctness throughout the system. According to Ayier, (2022) integrating construction software with other programmes, such as accounting or CAD systems, adds complexity that frequently calls for technical know-how and possible customisation to guarantee smooth compatibility. In order to reduce disruptions and guarantee a seamless transition to the PMIS, overcoming these obstacles calls for a careful approach to data migration and integration, emphasizing comprehensive testing, validation, and quality assurance procedures (Metcalf, 2019).

Inadequate user training is another major obstacle to PMIS implementation in construction organisations, according to Dequanter *et al*., (2022). Users could find it difficult to comprehend the system's capabilities or use its features without thorough training on its functionality. To empower users and promote adoption, training programmes that are specifically designed to meet the needs of varying user skill levels and cover PMIS applications unique to the construction industry are imperative (Ullah *et al*., 2021).

Construction companies have serious security concerns regarding the PMIS because project data is so critical. Adoption attempts may be hampered by users' unwillingness to entrust

the system with sensitive information due to the possibility of security breaches. To alleviate these worries and increase user confidence in the PMIS, strong security mechanisms such data encryption, access limits, and frequent backups must be implemented (Chen *et al*., 2021).PMIS implementation may face major obstacles from a construction company's lack of IT assistance. Insufficient assistance in resolving technical problems and answering user inquiries could provide challenges for users, impeding their inclination to embrace the system. To guarantee that, customers receive timely support and continue to have a pleasant experience with the system, having a committed IT team or dependable support from the PMIS vendor is essential (Ayier, 2022).

Adoption may be hampered by some PMIS's complexity, especially for smaller projects with less demanding requirements or construction companies with less technical know-how. Complicated systems can be intimidating and challenging to operate, which can cause user resistance and discontent. This barrier can be lessened by selecting a PMIS with an easy-to-use interface, simple workflows, and role-based access controls, which make the system more accessible to users of different skill levels.

Environmental Barriers to PMIS Adoption

One of the biggest obstacles to PMIS adoption in the construction industry is the absence of widely recognised standards for data interchange. According to Hayford, (2021) collaboration with project partners that use different PMIS might be hampered by laborious integration and lack of standards for data sharing between systems. Establishing and executing data exchange standards across the industry would substantially speed up data integration procedures, improve teamwork amongst project teams, and enable system interoperability. The PMIS market's fragmented vendor environment makes it more difficult for construction companies to choose a solution. Selecting the best system can be difficult and time-consuming because there are many manufacturers offering a wide range of features and functionalities (Ghansah *et al*., 2021).

The remote sites of construction projects often present a barrier to cloud-based PMIS solutions due to inadequate internet connectivity. These systems depend on dependable internet connections for real-time data access and collaboration, which might not be possible in rural locations. Dequanter *et al*., (2022) state that, other obstacles to PMIS adoption in the construction industry come from laws and regulations pertaining to data security, ownership and privacy. Compliance with applicable legislation is crucial to minimise hazards and legal issues, and compliance may differ based on the project's location.

The lack of individuals with the technical know-how necessary to efficiently use PMIS functions is another aspect of the skilled labour shortage in the construction sector (Lango, 2018). This gap can be filled, and system user proficiency can be ensured by funding training programmes to upskill current employees or luring people with PMIS expertise.

MATERIALS AND METHODS

The research design adopted for the study is quantitative since the research questions identify the study concepts and assess their relationships quantitatively. Based on the research questions and objectives and based on the objective of this research, building construction companies represent the context of this research, as observed by (Fellows and Liu, 2015) that, the context of a research

indicates the population of concern. The size of the population can vary depending on the research question and objectives. For this study, building construction companies registered with Corporate Affairs Commission (CAC) in the Kano State as of December 2024 was chosen as the population of the study. The study adopted simple random sampling techniques. This was applied by the use of the list of construction firms collected from the CAC kano State office.

The quantitative data gathered was analyzed using SPSS version 25 software. The analysis of the data involved both descriptive and inferential statistical operations available in the SPSS software. The 145 building professionals were asked to rank and rate on a scale of 1 to 5(Very low to Very high) the extent to which construction firms adopt PMIS, and to rate the impact of each factor influencing PMIS adoption as well as the challenges of PMIS adoption by construction firms. The responses results obtained were analysed with the use of IBM SPSS (version 25.0) software. The mean, standard error and standard deviation were computed. The computed means was used to rank the adoption level, influence of the factors as well as the challenges of PMIS adoption by construction firms using Microsoft excel$^{(R)}$.

Prior to undertake the detailed analysis, the reliability test for level of adoption of PMIS by construction firms in Kano State, Factors Influencing PMIS Adoption, Challenges to PMIS adoption and the combined reliability tests were conducted using Cronbach's coefficient Alpha. The result of the test revealed that the value is greater than 0.70, indicating the research constructs are considered reliable.

RESULTS AND DISCUSSION

A descriptive analysis was carried out to identify the bio-data of the respondents in the study area. The results are presented in Table 1.

Bio-data of the Respondents

Table 1: Bio-data of the respondents

Class of information		Number	Percentage
Gender/Sex			
Male		72	78.26
Female		20	21.74
	Total	92	100.00
Educational Background			
Secondary		33	35.90
Degree		23	25.00
Masters		23	25.00
PhD		13	14.10
	Total	92	100
Profession			
Architect		30	32.61
Builder		29	31.52
Civil Engineer		20	21.74
Quantity Surveyor		13	14.13
	Total	92	100.00
Economic Sector			
Public		30	32.61
Private		62	67.39
	Total	92	100.00

Source: Field work, (2024)

Table 1 above presents the responses based on gender differences. Out of the total respondents, 78% were male while 21% of the respondents are female. The Table also illustrates the respondents' educational background in which 64% of the respondents had at least master's degrees. Thus, the above revelation is a testimony that the responses were from a sample of qualified personnel with adequate knowledge about how their firm's construction projects were managed. In addition, the fair distribution of built environment professionals of 33%, 32%, 22% and 14% for Architect, Builder, Civil Engineer and Quantity Surveyor respectively indicates that, majority of the respondents had the requisite experience and knowledgeable in their various areas of specialization in their work, thus, making the assessment reliable.Lastly, the Table provides insights into the respondents' economic sectors and the result reveals that majority (67%) of the respondents are in the private sector.

Level of Adoption of PMIS by Construction Firms in Kano State

Descriptive statistics based on mean ranking were carried out to explore the Level of adoption of PMIS by construction firms in Kano state, Nigeria. The results are presented in Table 2.

Table 2: Level of Adoption of PMIS by Construction Firms in Kano State

S/N	Variables	Mean	Std. Deviation	Rank	Remarks
1	Willing to recommend the adoption of PMIS for other staff	4.2969	0.6651	1	Very high
2	Willing to donate for adoption of PMIS	4.0546	0.79624	2	High
3	Willing to vote for adoption of PMIS	3.9386	0.82945	3	High
4	Willing to attend public event on adoption of PMIS	3.9317	0.85735	4	High
5	Adopted the use of PMIS	3.4369	0.65187	5	High
	Level of adoption	3.9317	0.76		Good

Source: Field work, (2024)

Table 2 presents the Level of adoption of PMIS by construction firms in Kano state, where the Willing to recommend the adoption of PMIS for other staff (M=4.2969, SD=0.66510), Willing to donate for adoption of PMIS (M=4.0546, SD=0.79624) constitute the highest mean respectively. In contrast, the least means constitute the Willingness to attend public events on the adoption of PMIS (M=3.9317, SD=0.85735), Adopted the use of PMIS (M=3.4369, SD= 0.65187). The overall result for the Level of adoption of PMIS indicates a good result. It appears that construction firms in Kano are generally receptive to using PMIS. Willing to recommend the adoption of PMIS for other staff, Willing to donate for the adoption of PMIS. The high means indicate that construction firms are likely to recommend PMIS to others and are willing to support its adoption financially. Willing to attend a public event on adoption of PMIS, Adopted the use of PMIS. While the means for attending public events and current adoption are lower, are still positive. This suggests that there is some interest in PMIS, but there may be room for improvement in promoting awareness and education about its benefits.

The Various Factors Influencing the Adoption of PMIS in the Study Area

Descriptive statistics based on mean ranking were carried out to explore the various factors influencing the adoption of PMIS in

construction organizations in Kano state, Nigeria. The results are presented in Table 3.

Table 3: Factors Influencing PMIS Adoption

S/N	Factors Influencing PMIS Adoption	Mean	Std. Deviation	Rank	Remarks
1	Project Stakeholder Collaboration	4.3618	0.77559	1	Very high
2	Top Management Support	4.0922	0.7506	2	High
3	Perceived Benefits	4.058	0.73095	3	High
4	Organizational Culture	4.0444	0.73658	4	High
5	Competitive Pressure	3.9863	0.76289	5	High
6	Return on Investment	3.9317	0.80375	6	High
7	Government Incentives	3.7884	0.80427	7	High
8	IT Expertise	3.0922	0.7506	8	Moderate
9	Technological Infrastructure	3.0307	0.58732	9	Moderate
10	Regulatory Framework	3.0205	0.75824	10	Moderate
11	End-User Involvement	2.8259	0.77663	11	Moderate
12	Firm Size	2.041	0.55981	12	Low

Table 3 presents the various factors influencing the adoption of PMIS in construction organizations in Kano state, where the highest means constitute Project Stakeholder Collaboration (M=4.3618, SD=0.77559), Top Management Support (M=4.0922, SD=0.75060), Perceived Benefits (M=4.0580, SD=0.73095), Organizational Culture (M=4.0444, SD=0.73658), while Technological Infrastructure (M=3.0307, SD=0.58732), Regulatory Framework (M=3.0205, SD=0.75824), End-User Involvement (M=2.8259, SD=0.77663), Firm Size (M=2.0410, SD=0.55981) constitute the least mean. Project Stakeholder Collaboration indicates a strong emphasis on collaboration between all parties involved in a construction project, which is essential for implementing PMIS successfully. Strong support from top management is crucial for driving the adoption of any new system, including PMIS. Construction organizations in Kano seem to recognize the potential benefits of using PMIS, such as improved efficiency, cost control, and project visibility. A culture that is open to change and innovation is likely to be more receptive to adopting PMIS. The relatively low mean for technological infrastructure suggests that some construction firms in Kano may lack the necessary hardware and software to implement PMIS effectively. A clear and supportive regulatory framework can encourage the adoption of PMIS. The low mean in this area might indicate a need for more regulations or guidance on the use of PMIS in construction projects. Involving end-users in selecting and implementing PMIS can increase its acceptance and usage. The low mean suggests that there may be a need for more focus on end-user involvement. The lowest mean among all factors indicates that, firm size might be a significant barrier to PMIS adoption. Smaller firms may have fewer resources to invest in PMIS or may find it more difficult to implement due to their size.

The Challenges to PMIS Adoption in the Study Area

Descriptive statistics based on mean ranking were carried out to explore the Challenges to PMIS adoption in construction organizations in Kano state, Nigeria. The results are presented in Table 4.
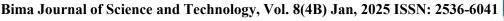
Table 4: Challenges to PMIS Adoption

S/N	Challenges to PMIS adoption	Mean	Std. Deviation	Rank	Remarks
1	Lack of Standardization	4.3311	0.67461	1	Very high
2	Long Implementation Timelines	4.157	0.8138	2	High
3	Inadequate IT Infrastructure	3.9215	0.92594	3	High
4	High Cost of PMIS Software	3.8874	0.81652	4	High
5	Data Security Concern	3.7952	0.7515	5	High
6	Resistance to Change	2.9147	0.87597	6	Moderate
7	Lack of Sufficient Organizational Resources	2.4369	0.81036	7	Low
8	Limited Awareness and Education	2.3788	0.75398	8	Low
9	Integration Challenges	2.3515	0.84505	9	Low
10	Market Trends	1.8635	0.74103	10	Low

Table4 presents the various factors influencing the Challenges to PMIS adoption in construction organizations in Kano state, where the Lack of Standardization (M=4.3311, SD=0.67461), Long Implementation Timelines (M=4.1570, SD=0.81380), Inadequate IT Infrastructure (M=3.9215, SD=0.92594), High Cost of PMIS Software (M=3.8874,SD=0.81652) constitute the highest mean respectively, while the least mean constitute of the Lack of Sufficient Organizational Resources (M=2.4369, SD=0.81036), Limited Awareness and Education (M=2.3788, SD=0.75398), Integration Challenges (M=2.3515, SD=0.84505), Market Trends (M=1.8635, SD=0.74103), respectively. The table shows that the most significant challenges are Lack of Standardization (M = 4.3311, SD = 0.67461) and Long Implementation Timelines (M = 4.1570, SD = 0.81380), followed by Inadequate IT Infrastructure (M = 3.9215, SD = 0.92594) and High Cost of PMIS Software (M = 3.8874, SD = 0.81652). On the other hand, the least challenging factors are Lack of Sufficient Organizational Resources (M = 2.4369, SD = 0.81036), Limited Awareness and Education (M = 2.3788, SD = 0.75398), Integration Challenges (M = 2.3515, SD = 0.84505), and Market Trends (M = 1.8635, SD = 0.74103).

CONCLUSION

The study reveals positive outlooks toward PMIS adoption in Kano's construction industry. This is evident from the High willingness to recommend PMIS (indicating endorsement by construction firms). Recognition of potential benefits (improved efficiency, cost control, project visibility). Lower means for attending PMIS events and current usage indicate a need for increased awareness and education about PMIS. The study identifies challenges that hinder wider PMIS adoption, including lack of standardization, long implementation timelines, inadequate IT infrastructure, and high software costs, which emerged as the most significant barriers. Limited awareness, integration challenges, and lack of resources also play a role, although to a lesser extent. The R-squared value of 0.305 signifies that 30.5% of the variance in PMIS adoption can be attributed to these identified challenges. This highlights their substantial impact. The study also paints a cautiously optimistic picture of PMIS adoption in Kano's construction sector. While there is a positive endorsement of PMIS, challenges hinder wider adoption. By addressing these challenges through targeted interventions, stakeholders can create a more favourable environment for PMIS implementation. This can significantly

improve project delivery efficiency and performance within the Kano construction industry.

Consequently, it is recommended that, there is need to develop targeted awareness campaigns to educate construction firms about the practical benefits and success stories of PMIS implementation. This can bridge the knowledge gap and motivate them to move beyond positive intentions. This study can be considered novel by providing a focused analysis within this region. Identifying specific challenges faced by Kano construction firms, such as "Lack of Standardization" or "Long Implementation Timelines," could be novel if they haven't been widely reported in other studies.

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