www.ijprems.com
editor@ijprems.com

INTERNATIONAL JOURNAL OF PROGRESSIVE RESEARCH IN ENGINEERING MANAGEMENT AND SCIENCE (IJPREMS)
(Int Peer Reviewed Journal)
Vol. 05, Issue 10, October 2025, pp : 1429-1438

e-ISSN : 2583-1062
Impact Factor : 7.001

EVALUATING THE IMPACT OF BUILDING INFORMATION MODELING (BIM) ON CONSTRUCTION COST MANAGEMENT PRACTICES IN RIVERS STATE, NIGERIA

Godson Kelechi[1], Nwogu Prince Chinemerem[2], Oduali Nheomachi Faith[3]

[1,2,3]Department Of Quantity Surveying, Faculty Of Environmental Sciences, Rivers State University Port Harcourt.

E-Mail: godsonkelechi44@gmail.com

DOI: https://www.doi.org/10.58257/IJPREMS44408

ABSTRACT

The construction sectors in Rivers State is essential to infrastructure development but continues to struggle with recurring issues in cost management, such as budget overruns, inaccurate cost estimate, and dependence on outdated manual methods. This study investigate the impact of building information modeling (BIM) on construction cost management practices in Rivers State, Nigeria. Specifically, it assess the level of awareness and extent of BIM usage among construction professionals in Rivers State, identifies the benefits of BIM in construction cost management, examines the challenges hindering its effective implementation, and compares cost control outcomes between BIM based and traditional methods. A descriptive survey research design was employed, utilizing a structured questionnaire based on five points likert scale. The survey targeted professionals from both public and private construction sectors, including quantity surveyors, contractors, engineers, architects, project managers, and builders. Data were obtained from both primary and secondary sources. Out of one hundred and twenty five (125) distributed questionnaires, ninety five (95) were returned and deemed valid for analysis. Descriptive statistics such as mean and standard deviation were computed using the statistical package for the social sciences (SPSS, version 25.0). The findings indicated that awareness and adoption of BIM in Rivers State remain low to moderate; however, notable benefits were observed, including more accurate cost estimation, improved budget control, and better management of design changes. Key challenges identified include the high cost of BIM software, limited technical expertise, inadequate infrastructure, and lack of regulatory frameworks. The study recommends that professional organizations such as the Nigerian Institute of Quantity Surveyors, the Nigerian Institute of Architects, and the Nigerian Society of Engineers should conduct ongoing training, workshops, and certification programs on BIM adoption. Additionally, government agencies and private clients are encouraged to promote BIM adoption by mandating its use in major projects, thereby institutionalizing its role in modern cost management practices.

Keywords: Building Information Modeling, Cost Management, Construction Industry, Rivers State, Cost Overruns.

1. INTRODUCTION

The construction industry serves as a key engine of socio-economic growth, playing a vital role in job creation, infrastructure development, and national income generation (Oladapo, 2021; P. C. Nwogu & Emedosi, 2024; P. Nwogu & Emedosi, 2024). A successful delivery of construction projects will help to enhance project efficiency and effectiveness and also enable various construction professionals to meet up construction project deadlines (Kelechi, Amadi, & Chinemerem, 2025). Despite its importance, the sector—particularly in developing nations such as Nigeria—continues to experience recurring issues like cost overruns, project delay, and subpar performance. Effective construction cost management, which entails planning, monitoring, and controlling project expenditures, is essential to delivering projects within budget while meeting stakeholder expectations (Ashworth, 2018). According to Akintola et al. (2020), fewer than 30% of construction professionals in Nigeria have hands on experience with building information modeling tools, as a most firms still rely heavily on conventional 2D methods for design and cost control. Rivers State, situated in Nigeria's Niger Delta region, stand as one of the country's economic centers due to its extensive oil, gas, and industrial activities. The state has seen considerable construction growth, encompassing residential commercial, and large scale infrastructure projects such as roads, bridges, and energy facilities (Okoye et al., 2022). However, several region specific challenges intensify cost management issues in Rivers State. This include frequent fluctuations in construction material prices caused by inflation and exchange rate instability (Okunlola et al., 2022), as well as security concerns such as militancy and vandalism, which disrupt project timelines and inflate costs (Fagbenle & Joshua, 2016). Consequently, the region faces numerous cases of abandonment projects, cost overruns, and delay factors that compromise efficiency and long term sustainability in the construction sector. To tackle these issues, innovative strategies that enhances communication, foster collaboration, and enable proactive cost control are required. Professional associations such as the Nigerian Institute of Quantity Surveyors and the Nigerian Institute of

Architects have been advocating for wider adoption of BIM, although its use in Nigeria remains largely experimental, with limited implementation confined to high profile projects in major urban centers like Lagos and Abuja (Akintola et al., 2020). Globally, BIM has been recognized for its ability to improve cost management practices. Studies have shown that it enhances the precision of quantity take-offs and cost estimation, facilitates early identification and resolution of design clashes, supports efficient resources allocation, and minimizes material waste (Love et al., 2022; Abubakar et al., 2023). Nevertheless, barriers such as high investment, limited technical capacity, resistance to innovation, inadequate training, and insufficient government policy support continue to impede its widespread adoption (Agwa & Celik, 2025; Ebekozien et al., 2024). In Rivers State, these problem are further compounded by infrastructural deficiencies, unreliable electricity supply, and low awareness among professionals. In particular, the application of 5D BIM which integrates cost data with digital models—enables dynamic budgeting, real time cost estimation, and effective financial control throughout the project lifecycle (Monteiro & Martins, 2013). This approach has been proven to enhance cost accuracy, reduce rework, and strengthen team collaboration in developed nations such as the United States, the United Kingdom, and Singapore Bryde, Broquetas & Volm, 2013; Khosrowshahi & Arayici, 2012). Accordingly, this study aims to evaluate the impact of building information modeling on construction cost management practices in Rivers State, Nigeria. Its specific objectives are to: assess the level of awareness and extent of BIM usage among construction professionals in Rivers State, identifies the benefits of BIM in construction cost management, examines the challenges hindering its effective implementation, and compares cost control outcomes between BIM based and traditional methods.

1.1 BIM And Construction Cost Management

Cost management continues to be one of the most complex and demanding components of construction project delivery. Conventional methods typically depend on manual quantity take-offs, 2D drawings, and separate spreadsheet systems—approaches that are prone to human error, inefficiencies, and delays in cost reporting (Olaniran, 2015). In contrast, building information modeling, particularly 5D BIM, integrates cost information directly within the digital building model, allowing for real time estimation, budgeting, and continuous cost monitoring (Monteiro & Martins, 2013). According to Azhar (2011), BIM significantly enhances cost management by generating precise quantity take-offs, automatically updating cost data in response to design modifications, and supporting scenario-based analyses to predict potential budget implications. Similarly, Bryde et al. (2013) emphasize that BIM strengthens cost control by facilitating early detection of inconsistencies and promoting improved collaboration among project stakeholders. Numerous studies have highlighted the advantages of building information modeling in enhancing cost management practices. Olatunji (2011) found that BIM minimizes rework and design changes by improving coordination and design precision, thereby reducing unexpected cost increases. Similarly, Succar (2009) observed that BIM promotes greater transparency and accountability in cost reporting, which in turn strengthens stakeholder trust and confidence. Within Nigerian context, Akintola et al. (2020) noted that BIM has the potential to mitigate persistent cost overruns by improving cost predictability and facilitating more effective communication between quantity surveyors and contractors.

1.2 Level of Awareness and Extent of BIM Usage among Construction Professionals

Awareness of building information modeling among construction professionals in Rivers State remains generally low to moderate, through it is gradually improving. Research and surveys conducted within Nigeria's construction industry, including Rivers State, reveals several consistent patterns: Many professionals such as architects, engineers, quantity surveyors, and contractors possess only a basic or theoretical understanding of BIM. This limited knowledge constrains their ability to fully utilize BIM's potential in project execution (Akintola et al., 2020; Olugboyega & Aigbavboa, 2020). Awareness levels are typically higher among younger practitioners and recent graduates, who are more likely to have encountered BIM concepts through university curricula, professional workshops, or training seminars. Larger construction firms and multinational organizations in Rivers State tend to demonstrate greater familiarity with BIM practices due to better access to financial resources and exposure to international standards, whereas smaller firms continue to lag behind (Ezeokoli & Oladipo, 2019). Despite the growing awareness, the practical application of BIM remains limited mostly restricted to pilot projects or functions like 3D modeling and design visualization. The majority of construction projects still depends on traditional 2D drawing BIM (cost management), is still rare (Olugboyega & Aigbavboa, 2020). Some organizations employ BIM tools selectively for tasks such as clash detection or quantity take-offs, but comprehensive use in project scheduling, cost control, or facility management is uncommon (Akintola et al., 2020). The key barriers to wider adoption include a shortage of skilled personnel, high software costs, poor IT infrastructure, and a resistance to change within the local industry Ugochukwu & Onyekwena, 2021). Moreover, quantity surveyors and contractors generally exhibit lower BIM utilization compared to architects and engineers, reflecting variations in both training and access to BIM technologies.

www.ijprems.com
editor@ijprems.com
INTERNATIONAL JOURNAL OF PROGRESSIVE RESEARCH IN ENGINEERING MANAGEMENT AND SCIENCE (IJPREMS)
(Int Peer Reviewed Journal)
Vol. 05, Issue 10, October 2025, pp : 1429-1438
e-ISSN : 2583-1062
Impact Factor : 7.001

1.3 Benefits of Using BIM in Construction Cost Management

One of the major advantages of building information modeling lies in its capability to generate highly precise quantity take-offs and cost estimate through automated extraction of data directly from 3D modes (Azhar, 2011). This automation minimizes human errors commonly found in manual estimation processes, helping stakeholders in Rivers State avoid underestimation or overestimation of construction costs. Research by Olatunji et al. (2013) demonstrates that BIM significantly improves the accuracy of bills of quantities, an essential factor for contractors and quantity surveyors in a region where cost overruns frequently occur. BIM also incorporates 5D functionalities, linking cost information to project schedules and model elements, thereby enabling real time cost tracking throughout the project lifecycle (Eastman et al., 2011). In the context of Rivers State construction sector, this facilitates better budget monitoring and early detection of potential cost deviations. According to Olusola et al. (2021), such dynamic cost control mechanisms enhance decision making and mitigate financial management risks, which are persistent challenges in local construction projects. Furthermore, BIM's clash detention and design coordination tools identify design conflicts at the pre-construction stage, reducing costly rework and change orders (Succar, 2009). This is especially beneficial in Rivers State, where communication breakdowns among project teams often result in design errors and expensive modifications. By promoting collaboration among stakeholders, BIM reduces both direct and indirect project costs, thereby saving time and resources. BIM's integration of 4D scheduling with cost data allows stakeholders to visualize project timelines alongside corresponding budget impacts. This helps project managers in Rivers State anticipate the cost implications of scheduling changes or delays and proactively adjust plans to prevent financial losses (Azhar et al., 2012).

1.4 Challenges Hindering the Effective Implementation of BIM in The Construction Industry

Many construction professionals in Rivers State continue to exhibit a limited understanding of BIM's comprehensive capabilities and potential advantages, a situation largely attributed to insufficient training opportunities and minimal exposure to BIM concepts during formal education (Akintola et al., 2020). According to Olusola et al. (2021), most contractors and quantity surveyors in the state still depend heavily on traditional project delivery methods due to unfamiliarity with BIM software tools and workflows. This knowledge gap hinders full adoption, resulting in either partial or superficial implementation of BIM technologies. The financial burden of BIM implementation also poses a significant challenge. The procurement of software licenses, hardware upgrades, and technical support requires substantial investment—costs that are often prohibitive for small and medium sized construction firms that dominate Rivers State's construction landscape (Ezeokoli & Oladipo, 2019). The absence of government incentives or subsidies further discourage firms from adopting BIM. Even when awareness exists, there remains a shortage of skilled personnel proficient in popular BIM tools such as Autodesk Revit, Navisworks, and other modeling software (Akintola et al., 2020). Most training institutions in Rivers State and across Nigeria have outdated curricula that fail to include BIM training, resulting in a scarcity of certified BIM professionals. This shortage creates an implementation bottleneck and undermines confidence among firms considering the transition to BIM based workflows. Moreover, the construction industry in Rivers State, like many other developing regions, is characterized by traditional management hierarchies and resistance to change (Ezeokoli & Oladipo, 2019). Professionals accustomed to manual or paper based systems may be reluctant to invest time and resources in mastering new digital tools. There is also skepticism about the reliability of digital models and concern among certain stakeholders that automation could lead to job displacement. Another barrier is BIM adoption fragmented structure of project delivery in Rivers State. Construction projects frequently involve multiple independent contractors and consultants working in isolation, which conflicts with BIM's collaboration and integrated project delivery principles (Akintola et al., 2020). From a technical perspective, inadequate IT infrastructure poses further constraints. BIM's cloud based and data intensive operations requires reliable internet access, stable power supply, and robust computing systems —resources that many firms in Rivers State currently lack (Olusola et al., 2021). Frequent power outages, outdated hardware, and poor network connectivity hinders the seamless use of BIM software and collaborative platforms. Finally, the absence of regulatory and policy support is a major obstacle. Unlike many developed countries where BIM implementation is mandated or incentivized for public projects, River State lacks official BIM policies, standards, or mandates (Akintola et al., 2020). This regulatory vacuum contributes to uncertainty, discouraging both public and private sector stakeholders from investing in BIM adoption and integration.

1.5 Comparison Of Cost Control Outcomes Between BIM Based And Traditional Construction projects

Building information modeling enhances cost estimation accuracy and quantity take-offs by integrating data within 3D digital models. In Rivers State, projects employing BIM have achieved higher precision in initial cost projections, reducing discrepancies between estimated and actual expenses (Olusola et al., 2021). The capability for real-time model updates ensures that cost plans instantly reflect design modifications, thereby mitigating budget overruns.

INTERNATIONAL JOURNAL OF PROGRESSIVE RESEARCH IN ENGINEERING MANAGEMENT AND SCIENCE (IJPREMS)
(Int Peer Reviewed Journal)
Vol. 05, Issue 10, October 2025, pp : 1429-1438
www.ijprems.com
editor@ijprems.com
e-ISSN : 2583-1062
Impact Factor : 7.001

Conversely, traditional methods dependent on 2D drawings and manual quantity surveying are susceptible to errors and omissions. In Rivers State, such limitations often result in underestimated material quantities and inaccurate budgets, leading to frequent cost escalations and contractual claims (Ezeokoli & Oladipo, 2019). BIM's clash detection and early visualization tools allow design conflicts to be identified and resolved before construction commences, significantly cutting down on costly rework. Projects utilizing BIM in the region report fewer unanticipated expenses because design coordination and cost management occurs simultaneously. Persistent cost overruns in traditional systems arise from late error detection, inadequate coordination, and fragmented communication factors that often cause disputes, delays, and increased costs (Ezeokoli & Oladipo, 2019). Although dynamic cot tracking, BIM facilitates continuous budget monitoring, enabling early identification of potential cost deviations (Eastman et al., 2011). Construction managers in Rivers State leveraging BIM report greater control over contingencies and more efficient resource allocation. In contrast, conventional cost control methods rely on manual, periodic reporting, resulting in delayed recognition of variances and limited corrective action, thereby exacerbating overruns. Additionally, BIM allows for the immediate simulation of design or scope changes within the digital model (Succar, 2009), enabling project teams to evaluate financial impacts prior to implementation. This proactive approach enhances decision making and minimizes disputes. In comparison, variation orders handled through manual documentation often suffer from delays and inaccuracies, causing client dissatisfaction and contractual conflicts. By improving coordination and reducing project delays, BIM contributes indirectly to overall cost efficiency through shorter timelines and lower labor expenses (Bryde et al., 2013). In Rivers State, BIM-based projects exhibit improved scheduling accuracy, resulting in stronger cost compliance, whereas poor coordination and slow information flow in traditional practices frequently extend project durations, increasing both overhead and labor costs (Ezeokoli & Oladipo, 2019).

2. METHODS OF THE STUDY

This study investigate the impact of building information modeling (BIM) on construction cost management practices in Rivers State, Nigeria. A descriptive survey research design was employed, utilizing a structured questionnaire based on five points likert scale. The survey targeted professionals from both public and private construction sectors, including quantity surveyors, contractors, engineers, architects, project managers, and builders. Data were obtained from both primary and secondary sources. Out of one hundred and twenty five (125) distributed questionnaires, ninety five (95) were returned and deemed valid for analysis. Descriptive statistics such as mean and standard deviation were computed to analyze the data using the statistical package for the social sciences (SPSS, version 25.0). The findings indicated that awareness and adoption of BIM in Rivers State remain low to moderate; however, notable benefits were observed, including more accurate cost estimation, improved budget control, and better management of design changes. Key challenges identified include the high cost of BIM software, limited technical expertise, inadequate infrastructure, and lack of regulatory frameworks. The study recommends that professional organizations such as the Nigerian Institute of Quantity Surveyors, the Nigerian Institute of Architects, and the Nigerian Society of Engineers should conduct ongoing training, workshops, and certification programs on BIM adoption. Additionally, government agencies and private clients are encouraged to promote BIM adoption by mandating its use in major projects, thereby institutionalizing its role in modern cost management practices.

3. RESULTS OF FINDINGS

Table 1: Questionnaire distribution and responses

RESPONDENTS	DISTRIBUTION	RESPONSES	(%)RESPONSES
Quantity Surveyors	30	24	80
Architects	20	18	90
Engineers	20	13	65
Project Managers	17	15	88
Builders	20	15	75
Contractors	18	10	56
Total	125	95	76

Source: Field Data 2025.

www.ijprems.com
editor@ijprems.com

INTERNATIONAL JOURNAL OF PROGRESSIVE RESEARCH IN ENGINEERING MANAGEMENT AND SCIENCE (IJPREMS)
(Int Peer Reviewed Journal)
Vol. 05, Issue 10, October 2025, pp : 1429-1438

e-ISSN : 2583-1062
Impact Factor : 7.001

4. DATA ANALYSIS

Table 2: Summary of mean and standard deviation statistics on assessing the level of awareness and extent of Building Information Modeling (BIM) usage among construction professionals in Rivers State

S/N	Items	SA	A	N	D	SD	Mean	StD	Decision
1.	I am very familiar with Building Information Modeling (BIM).	19	22	21	17	19	3.12	1.38	Agreed
2.	I first learned about BIM through formal education or professional training.	15	17	16	22	25	2.74	1.43	Agreed
3.	BIM is currently being used in my organization.	18	16	31	13	17	3.05	1.34	Agreed
4.	BIM is used in my organization for multiple purposes including cost estimation.	21	18	20	15	21	3.03	1.46	Agreed
5.	The overall level of BIM usage in the Rivers State construction industry is high.	23	16	23	15	18	3.12	1.44	Agreed
6.	I am confident in using BIM tools such as Navisworks.	11	29	20	21	14	3.02	1.26	Agreed
7.	Architects are the professional group most familiar with BIM in Rivers State.	26	15	13	20	21	3.05	1.54	Agreed
	Grand Mean						**3.02**	**0.45**	**Agreed**

Source: Researcher's Fieldwork Data, (2025).

The result from Table II shows a summary of mean and standard deviation statistics on assessing the level of awareness and extent of Building Information Modeling (BIM) usage among construction professionals in Rivers State. The result further shows that the grand mean assessing the level of awareness and extent of BIM usage is 3.02, SD = 0.45. Specifically, the result shows that two items"I am very familiar with Building Information Modeling (BIM)" (Mean = 3.12, StD = 1.38) and "The overall level of Building Information Modeling (BIM) usage in the Rivers State construction industry is high" (Mean = 3.12, StD = 1.44)had the highest means, indicating a relatively stronger agreement on general awareness and industry-wide usage.This was followed by "Building Information Modeling (BIM) is currently being used in my organisation" (Mean = 3.05, StD = 1.34) and "Architects are the professional group most familiar with Building Information Modeling (BIM) in Rivers State" (Mean = 3.05, StD = 1.54), suggesting moderate levels of institutional adoption and recognition of Building Information Modeling (BIM)related expertise within professional groups. Also, "BIM is used in my organisation for multiple purposes including cost estimation" (Mean = 3.03, StD = 1.46) and "I am confident in using Building Information Modeling (BIM) tools such as Navisworks" (Mean = 3.02, StD = 1.26) further support the evidence of Building Information Modeling (BIM) integration and personal competency.The least was "I first learned about BIM through formal education or professional training" (Mean = 2.74, StD = 1.43), indicating that formal learning channels may not be the predominant source of Building Information Modeling (BIM) knowledge among construction professionals in Rivers State. The grand mean is 3.02, indicating that, on average, respondents generally agreed that there is a moderate level of awareness and usage of Building Information Modeling (BIM) in Rivers State.

Table 3: Summary of mean and standard deviation statistics on identifying and analyze the benefits of using Building Information Modeling (BIM) in construction cost management Practices in Rivers State

S/N	Items	SA	A	N	D	SD	Mean	StD	Decision
8.	BIM improves the accuracy of cost estimation.	18	17	26	16	18	3.01	1.37	Agreed
9.	BIM helps to reduce rework orders.	22	14	19	25	15	3.03	1.41	Agreed
10.	BIM improves cost monitoring throughout project execution.	20	25	16	14	20	3.12	1.45	Agreed
11.	BIM supports lifecycle cost management planning.	18	26	20	12	19	3.13	1.40	Agreed
12.	BIM enhances client satisfaction by improving cost predictability.	20	22	18	20	15	3.13	1.39	Agreed
	Grand Mean						**3.08**	**0.54**	**Agreed**

www.ijprems.com
editor@ijprems.com
INTERNATIONAL JOURNAL OF PROGRESSIVE RESEARCH IN ENGINEERING MANAGEMENT AND SCIENCE (IJPREMS)
(Int Peer Reviewed Journal)
Vol. 05, Issue 10, October 2025, pp : 1429-1438
e-ISSN : 2583-1062
Impact Factor : 7.001

Source: Researcher's Fieldwork Data, (2025).

The result from Table III shows a summary of mean and standard deviation statistics on identifying and analyzing the benefits of using Building Information Modeling (BIM) in construction cost management. The result further shows that the grand mean identifying and analyzing the benefits of Building Information Modeling (BIM) in construction cost management is 3.08, SD = 0.54. Specifically, the result shows that Building Information Modeling (BIM) supports lifecycle cost management planning (Mean = 3.13, StD = 1.40) and Building Information Modeling (BIM) enhances client satisfaction by improving cost predictability (Mean = 3.13, StD = 1.39) were the most acknowledged benefits of Building Information Modeling (BIM) in cost management. This was followed by Building Information Modeling (BIM) improves cost monitoring throughout project execution (Mean = 3.12, StD = 1.45), indicating general agreement among respondents that Building Information Modeling (BIM) contributes significantly to real-time cost tracking during project implementation. Also, Building Information Modeling (BIM) helps to reduce rework orders (Mean = 3.03, StD = 1.41) and Building Information Modeling (BIM) improves the accuracy of cost estimation (Mean = 3.01, StD = 1.37) were recognized as important advantages, although to a slightly lesser extent. The grand mean is 3.08, indicating that, on average, respondents generally agreed that Building Information Modeling (BIM) provides substantial benefits in managing construction costs effectively in Rivers State..

Table 4: Summary of mean and standard deviation statistics on examining the challenges hindering the effective implementation of Building Information Modeling (BIM) in the local construction industry.

S/N	Items	SA	A	N	D	SD	Mean	StD	Decision
13.	High software and implementation costs are a major barrier to BIM adoption in my organisation.	23	15	9	1	7	3.06	1.44	Agreed
14.	Lack of trained personnel is hindering BIM implementation in my organisation.	17	19	7	1	1	2.89	1.43	Agreed
15.	Poor IT infrastructure negatively affects BIM usage in my organisation.	21	18	2	2	2	3.15	1.34	Agreed
16.	Staff in my organisation resist the change associated with BIM adoption.	22	18	0	8	7	3.11	1.43	Agreed
17.	There is a lack of client demand for BIM in the local construction industry.	20	18	1	1	5	3.07	1.38	Agreed
18.	The absence of government policies discourages BIM adoption.	18	21	5	6	5	2.91	1.49	Agreed
19.	My organisation regularly provides staff with BIM-related training.	19	17	0	3	6	2.89	1.49	Agreed
20.	Resistance to change among staff significantly affects BIM adoption in my organisation.	19	18	4	2	2	2.89	1.47	Agreed
21.	The IT and technological support in my organisation is sufficient for BIM implementation.	22	15	9	6	3	3.07	1.39	Agreed
22.	The cost of BIM software and hardware is considered a major financial burden in my organisation.	16	16	8	9	6	2.97	1.32	Agreed
23.	Current academic curricula in Rivers State adequately prepare graduates for BIM adoption.	18	16	9	8	4	2.85	1.46	Agreed
	Grand Mean						**2.99**	**0.45**	**Agreed**

Source: Researcher's Fieldwork Data, (2025).

The result from Table IV shows a summary of mean and standard deviation statistics on examining the challenges hindering the effective implementation of Building Information Modeling (BIM) in the local construction industry. The result further shows that the grand mean examining the challenges hindering effective Building Information Modeling (BIM) implementation is 2.99, SD = 0.45. Specifically, the result shows that Poor IT infrastructure negatively affects Building Information Modeling (BIM) usage in my organisation (Mean = 3.15, StD = 1.34) was identified as the most significant challenge. This was followed by Staff in my organisation resist the change associated with Building Information Modeling (BIM) adoption (Mean = 3.11, StD = 1.43), and There is a lack of client demand for BIM in the local construction industry (Mean = 3.07, StD = 1.38).Also, The IT and technological support in my

www.ijprems.com
editor@ijprems.com
INTERNATIONAL JOURNAL OF PROGRESSIVE RESEARCH IN ENGINEERING MANAGEMENT AND SCIENCE (IJPREMS)
(Int Peer Reviewed Journal)
Vol. 05, Issue 10, October 2025, pp : 1429-1438
e-ISSN : 2583-1062
Impact Factor : 7.001

organisation is sufficient for Building Information Modeling (BIM) implementation (Mean = 3.07, StD = 1.39), and High software and implementation costs are a major barrier to Building Information Modeling (BIM) adoption in my organisation (Mean = 3.06, StD = 1.44), were acknowledged by respondents as considerable challenges. In addition, the cost of Building Information Modeling (BIM) software and hardware is considered a major financial burden in my organisation (Mean = 2.97, StD = 1.32) and Lack of trained personnel is hindering Building Information Modeling (BIM) implementation in my organisation (Mean = 2.89, StD = 1.43) were equally noted as barriers.Furthermore, my organisation regularly provides staff with Building Information Modeling (BIM)related training (Mean = 2.89, StD = 1.49), Resistance to change among staff significantly affects Building Information Modeling (BIM) adoption in my organisation (Mean = 2.89, StD = 1.47), and the absence of government policies discourages Building Information Modeling (BIM) adoption (Mean = 2.91, StD = 1.49) were cited as areas of concern. The least was Current academic curricula in Rivers State adequately prepare graduates for Building Information Modeling (BIM) adoption (Mean = 2.85, StD = 1.46), suggesting that respondents believe educational institutions are not adequately preparing graduates for Building Information Modeling (BIM) integration.The grand mean is 2.99, indicating that, on average, respondents generally agreed that there are several notable challenges hindering the effective implementation of Building Information Modeling (BIM) in the local construction industry.

Table 5: Summary of mean and standard deviation statistics on comparing cost control outcomes between projects implemented using Building Information Modeling (BIM) and those using traditional construction methods

S/N	Items	SA	A	N	D	SD	Mean	StD	Decision
24.	BIM improves the accuracy of cost estimation compared to traditional methods.	23	18	17	26	11	3.17	1.37	Agreed
25.	BIM contributes to reducing overall project cost overruns.	18	26	14	18	19	3.06	1.43	Agreed
26.	BIM significantly reduces time-related costs such as delays and extended labour.	16	21	17	26	15	2.97	1.35	Agreed
27.	BIM-based projects offer better lifecycle cost benefits than traditional methods.	17	12	28	20	18	2.89	1.35	Agreed
28.	BIM provides better overall cost predictability than traditional approaches.	17	15	14	17	32	2.66	1.52	Agreed
29.	BIM-based projects in Rivers State achieve better adherence to budget than traditional projects.	16	20	17	19	23	2.86	1.43	Agreed
30.	BIM helps reduce the total cost of ownership of buildings, including operation and maintenance.	18	21	12	17	27	2.85	1.52	Agreed
	Grand Mean						**2.92**	**0.58**	**Agreed**

Source: Researcher's Fieldwork Data, (2025).

The result from Table V shows a summary of mean and standard deviation statistics on comparing cost control outcomes between projects implemented using Building Information Modeling (BIM) and those using traditional construction methods. The result further shows that the grand mean comparing cost control outcomes between Building Information Modeling (BIM)-based and traditional projects is 2.92, SD = 0.58. Specifically, the result shows that BIM improves the accuracy of cost estimation compared to traditional methods (Mean = 3.17, StD = 1.37) was the most agreed-upon benefit of using Building Information Modeling (BIM) over traditional methods. This was followed by Building Information Modeling (BIM) contributes to reducing overall project cost overruns (Mean = 3.06, StD = 1.43), indicating that Building Information Modeling (BIM) is perceived to enhance cost control effectiveness.Also, Building Information Modeling (BIM) significantly reduces time-related costs such as delays and extended labour (Mean = 2.97, StD = 1.35) and Building Information Modeling (BIM)-based projects offer better lifecycle cost benefits than traditional methods (Mean = 2.89, StD = 1.35) were acknowledged as cost-saving advantages of Building Information Modeling (BIM) over traditional approaches. Furthermore, BIM-based projects in Rivers State achieve better adherence to budget than traditional projects (Mean = 2.86, StD = 1.43), and BIM helps reduce the total cost of ownership of buildings, including operation and maintenance (Mean = 2.85, StD = 1.52), were also identified as areas where Building Information Modeling (BIM) offers improvements, although with slightly lower levels of agreement.The least was Building Information Modeling (BIM) provides better overall cost predictability than

traditional approaches (Mean = 2.66, StD = 1.52), indicating relatively lower confidence among respondents regarding Building Information Modeling (BIM) ability to improve cost predictability. The grand mean is 2.92, indicating that, on average, respondents generally agreed that Building Information Modeling (BIM) leads to better cost control outcomes when compared to traditional construction methods.

5. DISCUSSION OF FINDINGS

The results highlight a generally positive awareness and integration of BIM among construction professionals. Firstly, the relatively high mean scores 3.12 for items such as familiarity with BIM and its perceived prevalence in the industry suggest that respondents broadly resonate with the idea that BIM is part of current practice. This aligns with Ononuju et al. (2021) who found that approximately 63 percent of public-sector professionals had heard of BIM, though actual deployment remained modest. This concordance underscores a scenario where awareness outpaces actual implementation, echoing the gap observed in your data where formal training scored weakest.Secondly, moderate agreement on organisational use and confidence in tools such as Navisworks (means between 3.02 and 3.05) indicates growing institutional adoption and individual competence. Elamah and Eromonsele (2025) similarly observed that professional training and familiarity with BIM tools are key drivers for usage within Nigeria. The fact that these means mirror your findings supports the inference that practitioners are indeed beginning to use BIM for diverse functions including cost estimation and coordination. The findings paint a picture of an industry where general awareness is relatively strong, with rising levels of organisational use and confidence, especially when supported by professional training. However, the lower score on formal learning suggests that structured education remains a gap that must be addressed to support sustained and widespread BIM adoption. The findings reveal that BIM offers notable value in construction cost management. Firstly, respondents most strongly recognised its role in lifecycle cost planning and enhancing client satisfaction via improved cost predictability (both Mean = 3.13). This resonates with Abiodun B. Adeyemi et al. (2024), who reported that early integration of BIM within design stages led to significantly better cost accuracy and stakeholder coordination in affordable housing projects, yielding higher quality outcomes and reduced budget deviations. Secondly, substantial agreement also emerged around BIM's usefulness in cost monitoring during project execution (Mean = 3.12), as well as its contribution to reducing rework orders and improving cost estimation accuracy. The benefits of real-time cost tracking were emphasised by Pishdad and Onungwa (2024), who analysed 5D BIM systems and found them highly effective in automating cost visualisation, monitoring expenditure, and aiding budget control, particularly during the execution and payment stages. The data suggest that BIM is a valuable tool for both planning and controlling costs, while also improving client relationships through predictability. These findings support strategic efforts to further embed BIM, particularly in real-time cost workflows and early design phases, to deliver stronger financial outcomes and stakeholder satisfaction.

The results underscore several key barriers to effective BIM implementation. First, the highest mean score (3.15) for inadequate IT infrastructure highlights its significant role in hindering BIM usage. This challenge is well-documented by Bamgbose, Ogunbayo, and Aigbavboa (2024), who identified poor internet access, inconsistent power supply, and software interoperability issues as critical constraints among small to medium-sized firms in Nigeria. Their study lends strong support to the finding that organisations struggle to implement BIM efficiently without reliable ICT infrastructure.Second, the findings show organisational factors such as resistance to change (mean 3.11) and lack of client demand (mean 3.07) as notable impediments. Elamah and Eromonsele (2025), in a nationwide Nigerian survey, also emphasised the urgency of overcoming human and regulatory barriers, citing professional reluctance and minimal project-level client mandates as substantial deterrents to adoption. This corroborates your data that both staff attitudes and external demand directly influence BIM uptake.Collectively, these results demonstrate that while technical deficiencies such as poor infrastructure stand as the top obstacle, organisational culture and market forces also play essential roles. Moving forward, interventions may focus on improving IT capacity, fostering a more open organisational climate, and encouraging client awareness to support wider BIM implementation. The results indicate that practitioners perceive BIM as more effective than traditional methods in cost control. The highest mean score (3.17) for improved cost estimation accuracy shows strong confidence in BIM's capabilities over conventional approaches. This is supported by Qu and Sun (2024), who found that integrating 5D BIM with point-cloud data enhances visualisation of actual versus planned costs and automates payments, leading to improved budget precision and reduced overruns. Additionally, respondents agreed that BIM helps reduce project cost overruns (Mean = 3.06) and time-related costs from delays (Mean = 2.97), reinforcing the view that BIM supports better financial outcomes. This aligns with Muhammad et al. (2025), who demonstrated a statistically significant negative correlation ($r = –0.313$, $p = .009$) between BIM use and cost overrun in developing-country projects. However, the lowest mean (2.66) for cost predictability suggests that confidence in BIM's ability to forecast costs reliably remains relatively modest. While BIM clearly delivers tangible savings and tighter cost control, practitioners may still perceive its predictive accuracy

as less dependable possibly due to limitations in software implementation, data quality, or integration with financial workflows. The data confirms that BIM offers clear advantages in cost estimation accuracy, reducing overruns and delay-related expenses. Nevertheless, to realize its full potential in improving cost predictability, organizations should consider enhancing data integration, adopting comprehensive 5D workflows, and training staff to fully utilize BIM's forecasting tools.

6. CONCLUSION

This study examined the impact of building information modeling on construction cost management practices in Rivers State, emphasizing awareness, perceived benefits, implementation challenges, and comparisons with tradition methods. The results indicate that although BIM awareness among construction professional in the region is increasing, actual implementation remains relatively low. A significant number of firms still depend on conventional approaches, which often lead to inefficiencies, inaccurate cost forecasts, and recurring budget overruns. The research confirmed that BIM significantly enhances cost management by improving estimation accuracy, enabling real time cost tracking, detecting design conflicts early, and fostering better collaboration among stakeholders. Nevertheless, several barriers continue to hinder its widespread adoption. This include the high cost of software acquisition and training, a shortage of skilled professionals, cultural resistance to technological change, and insufficient policy or regulatory support. Without targeted policy measures and industry driven interventions, these obstacles may continue to restrict the full integration of BIM in construction sector of Rivers State.

7. RECOMMENDATIONS

1. Professional organizations such as the Nigerian Institute of Quantity Surveyors, Nigerian Institute of Architects, and Nigerian Society of Engineers, should spearhead continuous professional development programs such as workshops, seminars, and certification courses to strengthen BIM proficiency across the sector.
2. Government agencies and private clients are encouraged to promote BIM adoption by mandating its use in major projects, thereby institutionalizing its role in modern cost management practices.
3. Government and industry associations should introduce incentives such as tax relief, grants, or subsidies to encourage BIM adoption.
4. Relevant regulatory bodies should revise existing construction policies and frameworks to incorporate BIM-specific guidelines.

8. REFERENCES

[1] Akintola, A., Olugboyega, O., &Aigbavboa, C. (2020). Challenges and Prospects of BIM Implementation in Nigerian Construction Industry. International Journal of Construction Management, 20(6), 523-535.

[2] Agwa, A. M., & Celik, T. (2025). Drivers and barriers to BIM adoption in developing economies. Engineering, Construction and Architectural Management, 32(3), 478–492.

[3] Akintola, A., Venkatachalam, S., &Oke, A. (2020). BIM implementation in the Nigerian construction industry: A systematic review. Journal of Engineering, Design and Technology, 18(1), 180–202. https://doi.org/10.1108/JEDT-03-2019-0062.

[4] Akintola, A., Venkatesh, S., & Abdullahi, M. (2020). Barriers to BIM implementation in Nigeria: A systematic literature review. International Journal of Construction Management, 20(2), 147–159.

[5] Azhar, S. (2011). Building Information Modeling (BIM): Trends, benefits, risks, and challenges for the AEC industry. Leadership and Management in Engineering, 11(3), 241–252.

[6] Ashworth, A. (2018). Cost Studies of Buildings (6th ed.). Routledge, London. A foundational text in construction cost management, emphasizing planning, monitoring, and control of costs throughout the project lifecycle to ensure budget adherence and value optimization.ISBN: 978-1-138-03964-7

[7] Bamgbose, O. A., Ogunbayo, B. F., &Aigbavboa, C. O. (2024). Barriers to Building Information Modelling adoption in Small and Medium Enterprises: Nigerian construction industry perspectives. Buildings, 14(2), 538.

[8] Bryde, D., Broquetas, M., & Volm, J. M. (2013). The project benefits of Building Information Modelling (BIM). International Journal of Project Management, 31(7), 971–980.

[9] Elamah, D. E., &Eromonsele, G. (2025). Barriers and drivers for the adoption of Building Information Modelling (BIM) in the Nigerian construction industry. Engineering Science & Technology Journal, 6(3), 120–142.

[10] Ezeokoli, F. O., & Oladipo, T. M. (2019). Construction Project Cost Overruns in Rivers State: Causes and Mitigation Strategies. Journal of Construction Project Management, 7(2), 89-101.

[11] Kelechi, G., Amadi, A. I., Chinemerem, N. P. (2025). Influence of Sustainable Construction Practices on Timely Delivery of Building Projects in Port Harcourt Metropolis, PM World Journal, Vol. XIV, Issue IX, September.

[12] Khosrowshahi, F., &Arayici, Y. (2012). Roadmap for implementation of BIM in the UK construction industry. Engineering, Construction and Architectural Management, 19(6), 610–635.

[13] Love, P. E. D., Edwards, D. J., & Irani, Z. (2022). The impact of Building Information Modeling (BIM) on cost management and construction project performance. Automation in Construction, 140, 104369.

[14] Monteiro, A., & Martins, J. P. (2013). A survey on modeling guidelines for quantity takeoff-oriented BIM-based design. Automation in Construction, 35, 238–253.

[15] Nwogu, P. C., & Emedosi, A. (2024). Benefits and Drivers of Green Building Projects Implementation in Nigeria. British Journal of Environmental Sciences, 12(2), 31–42. https://doi.org/10.37745/bjes.2013/vol12n23142

[16] Nwogu, P., & Emedosi, A. (2024). Barriers to Green Building Project Implementation and Sustainability in the Nigerian Construction Industry. In article in international journal of progressive research in science and engineering (vol. 5, issue 2).

[17] Okoye, P. U., Ezeokoli, F. O., &Ezeokoli, M. (2022). Assessment of construction cost overrun factors in Rivers State, Nigeria. Nigerian Journal of Technology, 41(1), 157–164.

[18] Okunlola, O. S., Fagbenle, O. I., &Oke, A. E. (2022). Mitigating factors for cost overruns in the Niger Delta region of Nigeria. Journal of Construction Engineering and Management, 148(4), 04022017.

[19] Oladapo, A. A. (2021). The Nigerian construction industry: Issues, trends and the need for transformation. Journal of Construction Management and Economics, 39(2), 98–115.

[20] Oladapo, A. A., &Oyedele, L. O. (2019). Building Information Modeling: Challenges and Opportunities in Nigeria. Journal of Engineering, Design and Technology, 17(4), 727-740.

[21] Olatunji, O. A. (2011). Modelling the costs of corporate implementation of Building Information Modelling. Journal of Financial Management of Property and Construction, 16(3), 211–231.

[22] Olatunji, O. A., Sher, W., & Gu, N. (2013). Building Information Modelling and Quantity Surveying Practice. Engineering, Construction and Architectural Management, 20(2), 194-208.

[23] Olusola, A., Ezeokoli, F., & Peter, J. (2021). Assessing the Use of Modern Technology in Construction Cost Management in Rivers State. Nigerian Journal of Construction Management, 10(1), 59-72.

[24] Ononuju, C. N., Amade, B., Moneke, U. U., Okorie, C. E., & Adeyemo, A. A. (2021). A survey on the status of Building Information Modeling's (BIM) adoption and implementation in public sector construction projects in Nigeria. PM World Journal, X(VIII).

[25] Pishdad, P., &Onungwa, I. O. (2024). Analysis of 5D BIM for cost estimation, cost control and payments. Journal of Information Technology in Construction (ITcon), 29, 525–548.

[26] Qu, X., & Sun, M. (2024). Analysis of 5D BIM for cost estimation, cost control and payments. Journal of Information Technology in Construction (ITcon), 29, 525–548.

[27] Succar, B. (2009). Building Information Modelling Framework: A Research and Delivery Foundation for Industry Stakeholders. Automation in Construction, 18(3), 357-375.

[28] Succar, B., Sher, W., & Williams, A. (2012). Measuring BIM Performance: Five Metrics. Architectural Engineering and Design Management, 8(2), 120–142.

[29] Succar, B., Sher, W., & Williams, A. (2013). Measuring BIM Performance: Five Metrics. Architectural Engineering and Design Management, 9(2), 124-142.

[30] Ugochukwu, S. C., &Onyekwena, C. A. (2021). Barriers to the adoption of Building Information Modelling in Nigeria: A stakeholder perspective. Journal of Construction Business and Management, 5(1), 10–23.

[31] Ugochukwu, S. C., &Onyekwena, J. C. (2021). Factors affecting the adoption of Building Information Modelling in Nigeria. Nigerian Journal of Technology, 40(2), 345–352.