

Enhancing Construction Project Delivery in Nigeria Through Building Information Modelling (BIM): Trends, Adoption and Industry Challenges

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Abstract- *This study examines the integration of Building Information Modelling (BIM) in Nigeria's construction industry, focusing on its potential to enhance project delivery. Through a qualitative approach involving 37 construction professionals, the study investigates current adoption trends, key challenges, and implications for industry stakeholders. Findings reveal high awareness of BIM (100%) among respondents; however, 67% possess knowledge but are not currently applying it. Challenges include lack of skilled personnel, high software costs, and resistance to change. The study highlights the need for training, policy support, and collaborative practices to unlock BIM's full potential for efficient, cost-effective, and high-quality project delivery.*

Keywords: *Building Information Modelling, BIM Adoption, Nigeria, Construction Project Delivery, Industry Challenges*

I. INTRODUCTION

The Nigerian construction industry continues to struggle with project delays, cost overruns, and poor coordination among stakeholders (Ogunsemi & Jagboro, 2006). As the demand for infrastructure increases, the need for efficient and technology-driven approaches has become more pressing. Building Information Modelling (BIM) provides a digital framework that enables professionals to plan, design, and manage projects collaboratively through shared and real-time information (Eastman et al., 2011). Research has shown that BIM improves project delivery by enhancing coordination, reducing waste, and supporting better cost control (Azhar, 2011; Eadie et al., 2013).

However, despite its proven benefits in many developed countries, BIM adoption in Nigeria remains low, largely due to limited technical capacity, high implementation costs, and organizational resistance (Oladapo, 2020). This study investigates the trends, adoption levels, and challenges of BIM in Nigeria, providing insights for policymakers,

construction firms, and educational institutions to improve project delivery efficiency.

II. LITERATURE REVIEW

Building Information Modelling (BIM)

Building Information Modelling (BIM) is defined as a digital representation of a facility's physical and functional characteristics, providing a shared knowledge platform that supports informed decision-making across the full lifecycle of a project (Eastman et al., 2011). The adoption of BIM yields multiple benefits, such as improved visualization, enhanced collaboration among stakeholders, cost reductions, and mitigation of project risks (Azhar, 2011).

More recently, empirical studies confirm that BIM significantly reduces project time and cost through improved coordination, error minimization, and resource optimization (Das et al., 2025). Moreover, BIM's advanced modelling and simulation capabilities bolster decision-making transparency and stakeholder alignment, thereby reducing uncertainty and risk exposure (Morin et al., 2024).

Project Delivery in the Nigerian Construction Industry

Project delivery refers to the methods and processes by which construction projects are planned, executed, and completed. Traditional methods in Nigeria are often fragmented, with limited coordination among clients, contractors, and consultants, leading to inefficiencies and delays (Ogunsemi & Jagboro, 2006).

BIM facilitates integrated project delivery, promoting timely communication, accurate design coordination, and informed decision-making. Recent studies support this: for example, the Influence of Digitalization Adoption Level on Construction Project Delivery in Nigeria (Okpo, Ikediashi &

Dania, 2023) found that higher levels of digitalization - of which BIM is a component - improve time, cost, and quality performance in Nigerian construction projects.

Another study on Building Information Modelling: Key to Solving Nigeria's Construction Crisis (Ajayi, 2025) reports that BIM permits early-stage collaboration, virtual simulations, and better handling of design changes, which lead to faster delivery, fewer errors, and lower cost overruns.

BIM Adoption in Nigeria

Recent empirical investigations in Nigeria confirm that awareness of BIM is growing, but practical implementation remains weak, particularly outside the design phase. For instance, Bello & Ayegba (2024) report that among professionals in post-construction management, lack of awareness, limited access to BIM software, and difficulties adapting to new technology are major barriers.

In Small and Medium Enterprises (SMEs), key impediments include inadequate awareness, clients' low demand, gaps in skills, and incompatibility and functionality issues of available BIM tools. A study of client bodies in northeastern Nigerian universities found that awareness levels (64%) are reasonably high, yet client leadership, enforcement (e.g. mandating BIM), incentives, and stakeholder readiness are critical success factors to move from awareness to adoption.

Drivers such as improved efficiency, performance, government intervention, and software availability are also emphasized. In educational settings (polytechnic built-environment programs), challenges such as insufficient hands-on training, inadequate infrastructure, and misalignment between training and industry needs limit students' readiness to apply BIM in professional settings.

Challenges to BIM Adoption

Barriers to the adoption of Building Information Modelling (BIM) in Nigeria include a shortage of

skilled personnel, high software and training costs, resistance to change, limited infrastructure, and inadequate government policies (Akinola et al., 2019). Olatunji (2018) further highlights that the lack of BIM-trained professionals and weak institutional support continue to hinder technological advancement in the construction sector.

Similarly, Adewuyi and Odesola (2021) emphasize that without consistent government intervention and effective collaboration among stakeholders, BIM implementation in Nigeria will remain fragmented. In addition, Toyin and Mewomo (2023) identify poor awareness of BIM's potential, habitual resistance to shifting from traditional construction practices, and limited technical competence as major impediments.

Supporting this view, Ikediashi et al. (2022) note that inadequate education and training, coupled with unreliable digital infrastructure, significantly constrain BIM adoption.

Addressing these challenges is therefore essential to unlocking the full potential of BIM in enhancing project delivery efficiency across Nigeria's construction industry.

III. METHODOLOGY

A qualitative research design was adopted. 37 respondents from various professional backgrounds in the Nigerian construction industry-including Architects, Engineers, Project Managers, Contractors, Builders, and Quantity Surveyors-were selected through purposive sampling.

Data collection involved semi-structured interviews and questionnaires assessing BIM awareness, usage, adoption trends, perceived benefits, and barriers. Data were analyzed thematically and quantitatively, with results presented in tables, charts, and descriptive discussion.

IV. RESULTS

Respondent Profile

Professional Role	No of Respondents	Percentage (%)
Architects	9	24
Engineers	8	22
Project Managers	7	19
Contractors	6	16

Builders	4	11
Quantity Surveyors	3	8
Total	37	100

Table 1: Showing Respondents distribution by role

Roles: Architects (33%), Engineers (22%), Project Managers (8%), Contractors (16%), Builders (19%), Quantity Surveyors (3%) (Figure 1).

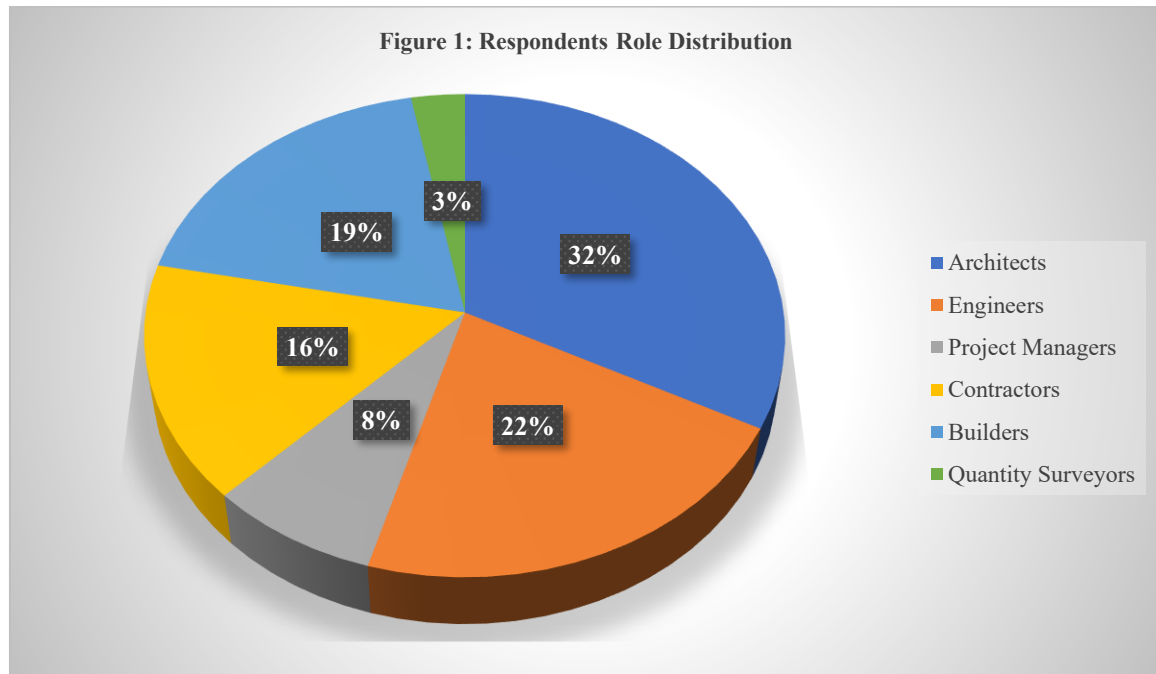


Figure 1: Respondent Role Distribution

Experience Distribution of Respondents

Experience (Years)	No of Respondents	Percentage (%)
Less than 5	6	16
5 – 10	12	32
11 - 15	10	27
Greater than 15	9	25

Table 2: Respondent distribution by role and years of experience

BIM Awareness and Knowledge

Knowledge /Usage Level	No of Respondents	Percentage (%)
Know BIM but not applying/ not conversant	25	67
Know and actively use BIM	12	33

Table 3: BIM Awareness and Knowledge

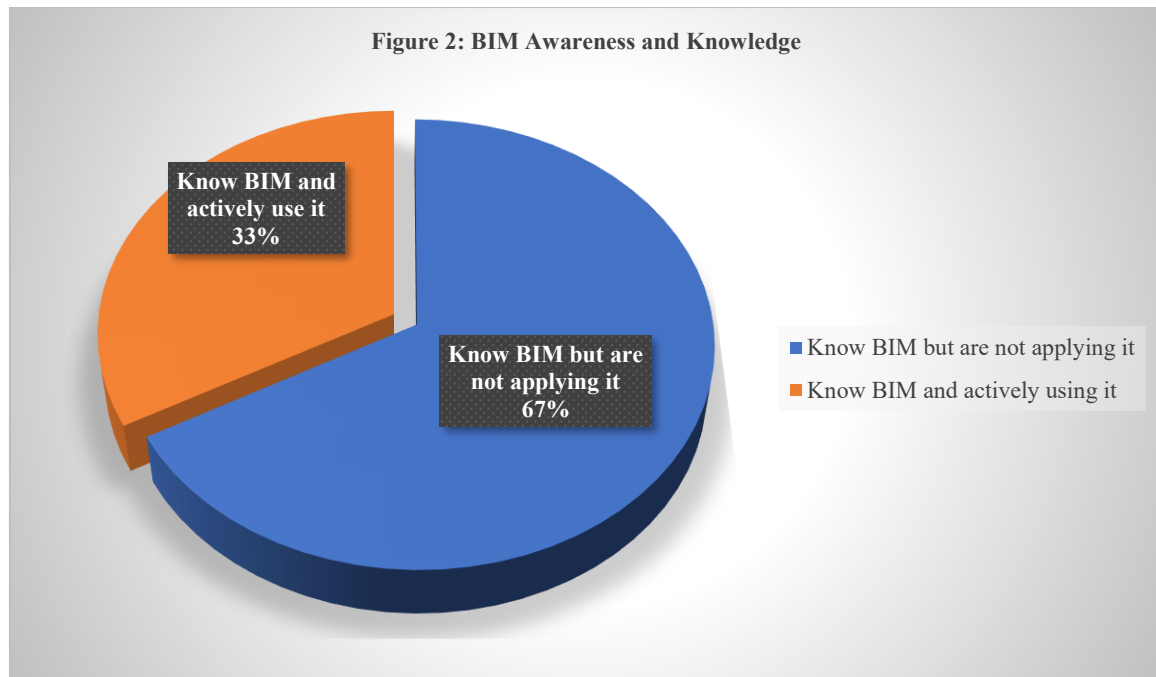


Figure 2: Showing the 67% Know BIM but are not applying it and 33% are actively using BIM

BIM Usage by Role (Active Users Only):

Professional Role	Active Users	Percentage (%) within Role
Architects	4	44
Engineers	3	38
Project Managers	2	29
Contractors	2	33
Builders	1	25
Quantity Surveyors	0	0

Table 4: Active BIM Usage by Professional Role

Likelihood of BIM adoption in the next 5 years: 27% likely, 14% very likely, 22% unlikely, 24% neutral.

Likelihood	No of Respondents	Percentage (%)
Very Unlikely	5	14
Unlikely	8	22
Neutral	9	24
Likely	10	27
Very likely	5	14

Table 5: Showing likelihood of BIM adoption

BIM Tools Used (Among Active Users)

Autodesk Revit was the most widely used software, followed by Navisworks and ArchiCAD.

BIM Tool	No of Respondents
Autodesk Revit	10
ArchiCAD	3
Navisworks	4
Tekia Structures	2
Others	1
None	25

Table 6: BIM Tools Used (Among Active Users)

Perceived Benefits of BIM (Multiple Selections Allowed)

Improved visualization (32 mentions), Enhanced collaboration (28 mentions), Reduced project cost (20 mentions) and Other benefits: time management, sustainability, risk reduction

Benefit	Count
Improved visualization	32
Enhanced Collaboration	28
Reduced Project Cost	20
Better Time Management	15
Improved Sustainability	12
Risk Reduction	10

Figure 7: Perceived Benefits of BIM

Challenges to BIM Adoption

Lack of skilled personnel (30 mentions), High software/training cost (25 mentions), Resistance to change (22 mentions), Inadequate infrastructure (20 mentions), Limited awareness among stakeholders (15 mentions) and Lack of government policies (14 mentions).

Barrier	Count of Respondents
Lack of skilled personnel	30
High software/training cost	25
Resistance to change	22
Inadequate infrastructure	20
Limited awareness among stakeholders	15
Lack of government policies	14

Table 8: Challenges to BIM Adoption

Willingness to Undergo BIM Training

68% willing or very willing to undergo training

Willingness	No of Respondents	Percentage (%)
Very unwilling	2	5
Unwilling	3	8
Neutral	7	19
Willing	15	41
Very willing	10	27

Table 9: Willingness to undertake BIM Training

Organizational Support for BIM Adoption

Organizational support is moderate, with 32% moderately supportive and 27% supportive.

Support Level	No of Respondents	Percentage (%)
Not supportive	4	11
Slightly supportive	5	14
Moderately supportive	12	32
Supportive	10	27
Very supportive	6	16

Table 10: Organizational support for BIM Adoption

V. FINDINGS

The results highlight high awareness but low practical application of BIM in Nigeria. While most respondents know BIM, only 33% actively use it, indicating a significant knowledge-to-practice gap.

1. High Awareness, Low Usage: 67% of respondents know about BIM but are not applying it.

2. Role Differences: Architects (33%) show the highest adoption within their role (42%), Builders and Quantity Surveyors lag behind, while Project Managers form only 8% of respondents.

3. Top Benefits: Improved visualization, collaboration, and cost reduction-align with previous literature (Azhar, 2011; Eastman et al., 2011). The main challenges-lack of skilled personnel, high costs, resistance to change-mirror findings in other emerging markets (Akinola et al., 2019; Oladapo, 2020).

4. Challenges: Lack of skilled personnel, high software costs, and resistance to change remain critical barriers.

5. Training Potential: Majority are willing to undergo BIM training; moderate organizational support exists, indicating room for wider adoption.

VI. SUMMARY OF FINDINGS

This study examined the state of Building Information Modelling (BIM) awareness and implementation within Nigeria's construction sector, using responses from 37 professionals drawn from diverse roles including architects (33%), engineers (22%), builders (19%), contractors (16%), project managers (8%), and quantity surveyors (3%). The findings provide a clear picture of the opportunities and limitations surrounding BIM adoption in the country.

A major insight from the study is that most professionals are aware of BIM, yet only a few actively apply it in their daily practice. About 67% of respondents reported having knowledge of BIM but not using it, while only 33% are active users. This shows that awareness does not necessarily translate into application, pointing to the existence of barriers beyond simple knowledge gaps.

Professionally, architects and engineers emerged as the most engaged groups, with 42% and 38% of their members respectively using BIM tools such as Revit and Navisworks. Their relatively higher adoption can be linked to their involvement in design coordination and visualization tasks, where BIM's benefits are most evident. On the other hand, builders and quantity surveyors recorded the lowest usage, suggesting that BIM is yet to be fully integrated into areas like cost management, site operations, and procurement.

Respondents strongly agreed that BIM improves project visualization (86%), enhances collaboration among professionals (76%), and helps in reducing project costs (54%). These perceptions align with international studies such as Azhar (2011) and

Eastman et al. (2011), which recognize BIM as a tool that brings efficiency, accuracy, and better communication into the project environment.

However, several barriers continue to limit widespread adoption. The leading challenges identified include lack of skilled personnel (81%), high cost of software and training (68%), resistance to change (59%), and inadequate digital infrastructure (54%). These findings reflect similar concerns raised by Akinola et al. (2019) and Ogunbiyi et al. (2018), who emphasized the structural and institutional shortcomings slowing technological advancement in Nigeria's construction sector.

Encouragingly, the study also revealed signs of readiness for progress. A large portion of the respondents - nearly 68% - expressed willingness or strong willingness to undergo BIM training. Furthermore, many organizations were found to be moderately supportive of BIM integration, suggesting that with the right policies and incentives, the industry could move towards a stronger digital transformation path.

In summary, the study highlights a sector that understands the potential of BIM but struggles to move from awareness to actual implementation.

Bridging this gap will require targeted investment in human capacity development, affordable access to BIM tools, and stronger institutional backing. Government intervention - through policy directives, public sector BIM mandates, and collaboration with professional bodies - could accelerate adoption. If these steps are taken, BIM could significantly improve project delivery outcomes in Nigeria by reducing delays, curbing cost overruns, and fostering collaboration among key stakeholders.

VII. RECOMMENDATIONS

Based on the findings of this study, several practical steps are proposed to strengthen the adoption and effective use of Building Information Modelling (BIM) in Nigeria's construction industry. These recommendations address policy, education, professional practice, and industry collaboration.

1. Strengthen Training and Capacity Development
There is a pressing need to equip construction professionals with practical BIM skills through

structured training programs. Universities, polytechnics, and professional institutes should integrate BIM into their curricula, ensuring that graduates enter the workforce with relevant digital competencies. Continuous professional development courses should also be encouraged for practitioners already in the field, with support from industry associations such as the Nigerian Institute of Architects (NIA), Nigerian Society of Engineers (NSE), and Nigerian Institute of Building (NIOB).

2. Promote Government Leadership and Policy Frameworks

The government should take an active role in driving BIM implementation by formulating clear policies, guidelines, and mandates for its use in public projects. Introducing BIM requirements into public procurement and tendering processes will not only enhance efficiency and accountability but also encourage private sector firms to follow suit. This aligns with international practices observed in countries such as the UK and Singapore, where government mandates significantly accelerated BIM adoption.

3. Enhance Infrastructure and Access to Technology

Reliable internet connectivity, access to digital tools, and affordable BIM software licenses are essential for successful implementation. Government and private stakeholders should collaborate with technology providers to create affordable access models - such as educational or enterprise licensing - tailored to the needs of small and medium-sized firms that dominate Nigeria's construction industry.

4. Encourage Industry Collaboration and Knowledge Sharing

The fragmented nature of the construction industry often leads to communication breakdowns and inefficiencies. Establishing BIM-focused networks, forums, and communities of practice would allow professionals from different disciplines - architects, engineers, builders, and quantity surveyors to share experiences, best practices, and local solutions to technical challenges. Professional bodies and academic institutions can jointly host such platforms.

5. Create Incentives for Early Adopters

Incentives such as recognition awards, tax rebates, or special funding opportunities could be introduced to encourage firms that pioneer BIM usage in Nigeria. This approach would stimulate healthy competition

and motivate more organizations to invest in digital technologies that improve project delivery outcomes.

6. Promote Research and Local Innovation in BIM

Further research is needed to explore how BIM can be adapted to local construction practices, procurement systems, and socio-economic realities. Collaboration between academia, government, and private organizations should focus on developing indigenous BIM standards and templates that reflect Nigeria's building regulations, materials, and cost structures.

7. Foster a Cultural Shift Toward Digital Transformation

Beyond tools and policies, a mindset change is necessary. Many industry players remain comfortable with traditional methods. Stakeholders should therefore promote awareness campaigns and demonstrate tangible project successes achieved through BIM. This can help build trust and reduce resistance to technological change across the industry.

VIII. CONCLUSION

BIM represents more than a digital tool; it is a strategic process that can transform how construction projects are conceived, delivered, and managed in Nigeria. When the current barriers are addressed through coordinated efforts in policy, training, infrastructure, and industry culture, the Nigerian construction sector can move closer to achieving efficiency, transparency, and sustainability in project delivery.

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