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CHALLENGES AND PERCEPTIONS OF BUILDING INFORMATION MODELING ADOPTION IN THE NIGERIAN CONSTRUCTION INDUSTRY: INSIGHTS FROM BAUCHI METROPOLIS, NIGERIA

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Abstract

Building Information Modeling (BIM) represents a paradigm shift for the Architecture, Engineering, and Construction (AEC) industry, yet its adoption remains limited in developing economies, notably in Nigeria. This study investigates the critical challenges and barriers hindering the application of BIM among construction professionals in the Bauchi State Metropolis, Nigeria. Employing a mixed-methods approach, the research utilized a quantitative survey and a detailed literature review to assess professionals' level of awareness, perceived benefits, and core obstacles to implementation. The key findings highlight a substantial gap between awareness and actual practice. Specifically, 58% of professionals reported only a moderate level of familiarity with BIM, indicating that deep technical integration is low. The primary barriers were found to be financial and institutional, a decisive 71% of respondents cite the high implementation costs of software and training as the principal financial deterrent and an institutional void is evident, with 60% expressing significant concern over the lack of standardized guidelines and clear BIM policies from governing bodies. The study also identified a major educational shortfall, as 65% of graduates reported acquiring BIM proficiency after completing their formal university education, rather than during their academic training. The study concludes that while the benefits of BIM for enhancing project delivery and sustainability are widely recognized, its adoption in Bauchi is critically hindered by these financial, technical, and institutional challenges. The paper recommends an integrated framework that combines targeted policy, educational reform, and financial incentives to accelerate the successful integration of BIM across the Nigerian construction sector.

Keywords: Adoption, Bauchi Metropolis, BIM, Challenges, Construction Industry, Nigeria.

INTRODUCTION

The construction industry in Nigeria plays a pivotal role in national development, contributing approximately 3.2% to the gross domestic product (GDP) and employing millions across various sectors (National Bureau of Statistics, 2020). However, the sector is plagued by inefficiencies, including project delays, cost overruns, and poor quality outcomes, which undermine its potential (Popoola et al., 2024). Building Information Modeling (BIM), a digital technology that creates 3D representations of a building's physical and functional characteristics, has emerged globally as a solution to these issues. BIM facilitates enhanced collaboration, clash detection, and resource optimization, potentially reducing project timelines by 20% and costs by 15% (Das et al., 2025). In developed nations like the UK and Singapore, government mandates have accelerated BIM adoption, leading to measurable productivity gains (Succar & Kassem, 2015).

In Nigeria, BIM adoption remains nascent, particularly in regions like Bauchi Metropolis, where the construction sector is dominated by small- to medium-sized enterprises (SMEs) focused on residential and infrastructure projects (Bamgbose et al., 2024). Bauchi, as a northern Nigerian urban centre, faces unique challenges such as limited access to advanced technology, unreliable infrastructure, and a workforce with varying levels of digital literacy (Ikediashi et al., 2022). Despite these hurdles, the potential for BIM in Bauchi is significant, given the ongoing urbanisation and government initiatives like the Bauchi State Urban Renewal Program, which could benefit from BIM's efficiency tools (Bauchi State Government, 2023). Studies (Adekunle et al; 2019; Dania at al., 2017; Ezeokoli, et al, 2016) indicated that low BIM uptake in Nigeria stems from factors like inadequate awareness, high implementation costs, and resistance to change, with only about 40% of professionals familiar with the technology (Olusayo et al., 2024).

This gap is exacerbated in regional contexts like Bauchi, where traditional 2D drafting methods prevail, leading to frequent rework and disputes among stakeholders (Eze et al., 2024). The problem is compounded by the absence of national BIM standards, unlike in countries such as Malaysia and Vietnam, where mandates have driven adoption rates to over 70% in public projects (Nguyen & Nguyen, 2020). In Bauchi, local firms often cite poor internet connectivity and power outages as barriers, mirroring national trends but intensified by the region's infrastructural deficits (Abdulrahim, 2024). Moreover, cultural resistance within conservative professional communities hinders innovation, as practitioners prefer familiar methods over digital transitions (Rogers, 2003).

The significance of addressing BIM adoption in Bauchi lies in its potential to enhance local project outcomes, foster economic growth, and align with Nigeria's broader digital transformation goals under the National Digital Economy Policy (Federal Ministry of Communications and Digital Economy, 2020). This study investigates these challenges through the lens of local professionals, aiming to provide context-specific insights. By focusing on Bauchi Metropolis, it narrows the national discourse to an underrepresented area, highlighting how regional factors influence BIM diffusion (DiMaggio & Powell, 1983).

The research questions guiding this inquiry include: What are the primary barriers to BIM adoption in Bauchi? How do professionals perceive the benefits and risks? And what strategies can facilitate wider implementation?

Drawing on theories like the Technology Acceptance Model (TAM) (Davis, 1989) and Diffusion of Innovations (Rogers, 2003), this paper explores these issues to inform policy and practice. Ultimately, understanding BIM in Bauchi could serve as a model for other Nigerian regions, promoting sustainable construction practices amid rapid urbanization.

LITERATURE REVIEW

Building Information Modeling (BIM) has revolutionised the architecture, engineering, and construction (AEC) industries worldwide by enabling integrated project delivery and data-driven decision-making (Succar, 2009). Globally, BIM adoption has been driven by its proven benefits, such as reduced errors, improved collaboration, and cost savings. For instance, in the UK, the 2016 mandate for Level 2 BIM on public projects resulted in productivity gains of up to 30% (HM Government, 2016). Similarly, Singapore's BIM e-Submission system has streamlined approvals, cutting processing times by 50% (Building and Construction Authority, 2022). These successes stem from supportive policies, standardised protocols, and robust training ecosystems (Kassem & Succar, 2017).

In developing countries, however, BIM adoption faces significant hurdles. Studies from India and Vietnam highlight common barriers like high costs, skill shortages, and infrastructural limitations (Government of India, 2024; Nguyen & Nguyen, 2020). In India, despite initiatives like the National BIM Roadmap, adoption hovers at 10-18%, primarily due to fragmented implementation and resistance in SMEs (NITI Aayog, 2023). Vietnam's phased mandate since 2017 has achieved 15-35% savings in pilot projects, but challenges persist in rural areas (Ministry of Construction Vietnam, 2016). South Africa and Malaysia offer further insights: South Africa's draft BIM policy emphasizes capacity building, while Malaysia's 2024 mandate targets 80% adoption by 2025, supported by subsidies and training (CESA, 2023; CIDB Malaysia, 2019).

In Nigeria, BIM research underscores a lag in adoption, with awareness levels at around 40% among professionals (Olusayo et al., 2024). National studies identify barriers such as lack of government support, high costs, and inadequate expertise (Bamgbose et al., 2024; Ikediashi et al., 2022). For example, a 2024 survey of Nigerian SMEs found that 65% cited financial constraints as the top obstacle, while 55% pointed to poor ICT infrastructure (Eze et al., 2024). Resistance to change, rooted in traditional practices, affects 70% of firms, aligning with Rogers' (2003) diffusion theory where early adopters are scarce in conservative contexts (James & Modupe, 2022).

Regionally, Bauchi Metropolis exemplifies these issues, with its construction sector dominated by manual processes and limited digital integration (Bauchi State Government, 2023). Local studies, though sparse, indicate that power outages and low internet penetration exacerbate barriers, with only 20% of firms using BIM tools (Abdulrahim, 2024). Perceived benefits in Nigeria include improved visualization (rated highly in 85% of responses) and coordination (80%), but risks like data errors (60% concern) deter uptake (Popoola et al., 2024). Theoretical frameworks like TAM explain this: perceived usefulness drives adoption, but ease of use is hindered by training gaps (Venkatesh et al., 2003).

Gaps in the literature include a focus on urban centers like Lagos, neglecting northern regions like Bauchi (Andrew et al., 2024). Global comparisons reveal Nigeria's need for mandates, as in Brazil's 2020 decree, which boosted federal project adoption to 50% (Government of Brazil, 2018). Institutional theory suggests isomorphism, mimicking successful adopters could accelerate change (DiMaggio & Powell, 1983). Emerging research on BIM for waste mitigation in Nigeria shows potential 20-30% reductions, but adoption remains low (Eze et al., 2024b).

Overall, while global BIM literature emphasizes enablers like policy and collaboration, Nigerian studies highlight context-specific barriers. This review underscores the need for localized research in Bauchi to bridge these gaps and inform strategies for sustainable adoption.

METHODOLOGY

The study was conducted in Bauchi metropolis, the capital city of Bauchi State in northeastern Nigeria as seen figures 1-2. The area is a fast-urbanising region with a high density of residential, recreational, Industrial and Higher Education Buildings

Bauchi is located within the Sudano-Sahelian ecological zone, characterized by:

i. Semi-arid climate

ii. Predominantly flat terrain interspersed with rocky outcrops

iii. Seasonal rainfall (May–September) and high daytime temperatures

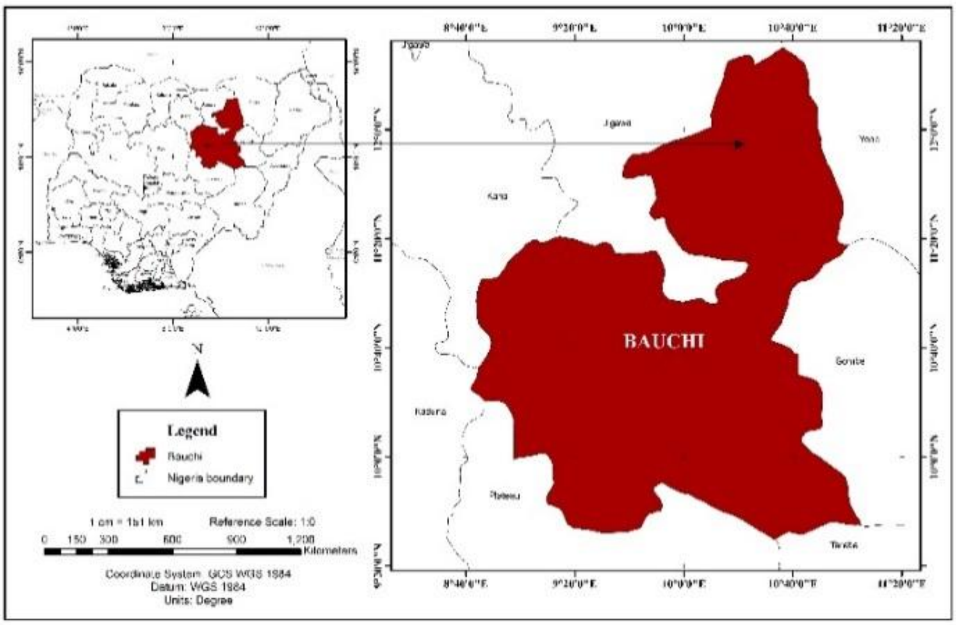

Figure 1: Map of Nigeria Showing Bauchi State
Source: University of Jos GIS Laboratory (2025)

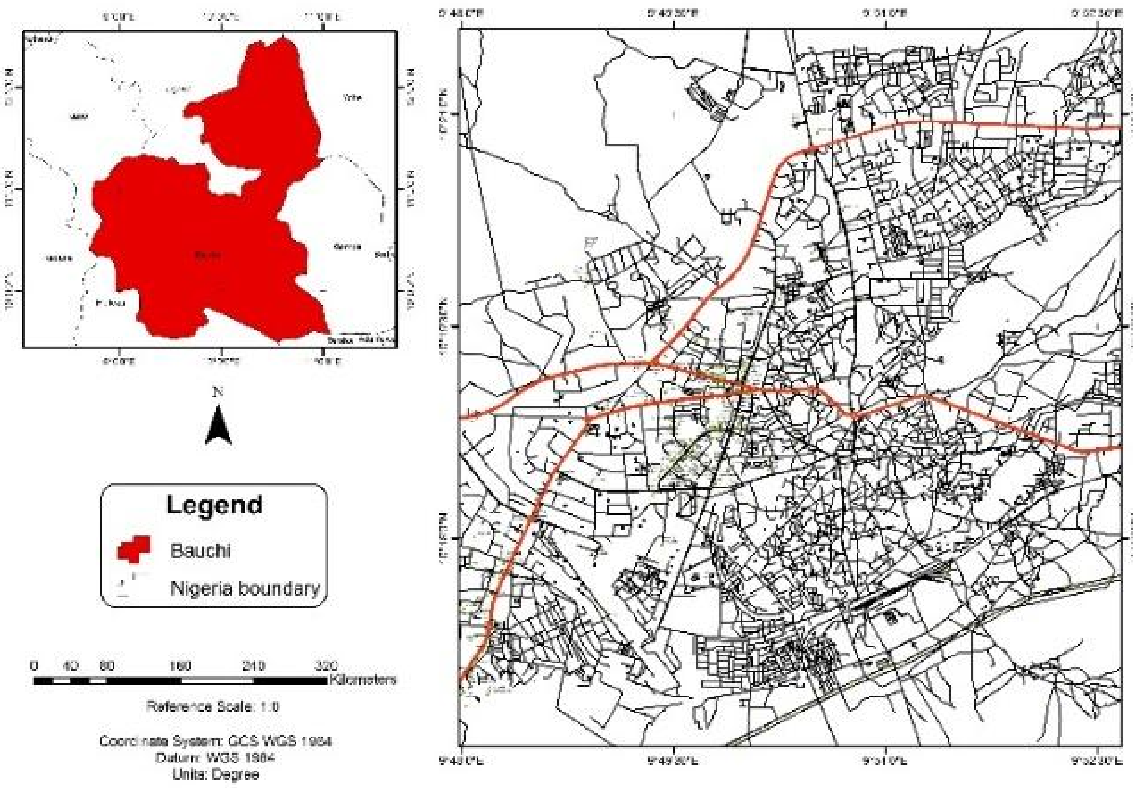

Figure 2: Map of Bauchi Showing Bauchi Metropolis
Source: University of Jos GIS Laboratory (2025)

This study adopted a mixed-methods approach to investigate BIM adoption challenges in Bauchi Metropolis, Nigeria, combining quantitative surveys with qualitative insights for a comprehensive analysis (Creswell & Creswell, 2018). The design allowed for statistical validation of barriers while capturing nuanced professional perceptions.

The target population comprised construction professionals in Bauchi, including architects, engineers, and quantity surveyors, estimated at over 200 based on local professional registries (Nigerian Institute of Architects, Bauchi Chapter, 2023). A purposive sampling technique was used to select 108 participants with at least three years of experience, ensuring relevance to BIM discussions (Etikan et al., 2016). The final sample included 61 respondents (response rate: 56.5%), adequate for exploratory analysis (Cohen, 1992).

Data collection involved a structured questionnaire developed from literature (e.g., Bamgbose et al., 2024) and pre-tested with 10 professionals for clarity. Sections covered demographics, barriers, benefits, risks (using 5-point Likert scales), and open-ended strategies. Distribution occurred online via email and social media over three months (June-August 2025), with reminders to boost participation. Secondary data from journals and reports supplemented primary findings (e.g., via Google Scholar searches).

Quantitative analysis used descriptive statistics (means, frequencies) and inferential tests (chi-square for associations) in SPSS version 27. Reliability was confirmed with Cronbach's alpha ($\alpha = 0.82 > 0.70$ threshold) (Cronbach, 1951). Qualitative data from open-ended questions underwent thematic analysis following Braun and Clarke (2006), with coding for recurring themes like "policy needs."

Ethical considerations included informed consent, anonymity, and departmental approval. Limitations include self-report bias and the cross-sectional design, which limits causality inference.

RESULTS AND DISCUSSION

The survey yielded 61 responses, providing robust insights into BIM adoption in Bauchi. Table 1 summarizes demographics, showing architects dominated (83.6%), reflecting the profession's central role in design processes (Olusayo et al., 2024).

Table 1: Demographic Profile of Respondents

Characteristic	Category	Frequency (n)	Percentage (%)
Profession	Architect	51	83.6
	Engineer	5	8.2
	Quantity Surveyor	3	4.9
	Others	2	3.3
Years of Experience	<5 years	6	9.8
	5–10 years	22	36.1
	11–15 years	22	36.1
	>15 years	11	18.0
Registration Status	Fully Registered	20	32.8
	Partially Registered	29	47.5
	Not Registered	12	19.7
Total		**61**	**100**

Barriers were highly rated, with lack of government policies topping the list (mean = 4.5, SD = 0.6), agreed upon by 90% of respondents (Table 2). This aligns with national trends, where policy voids hinder progress (Ikediashi et al., 2022). High costs (mean = 4.3) affected 86%, echoing SME struggles in Bauchi's resource-limited environment (Bamgbose et al., 2024). Inadequate expertise (mean = 4.2) was noted by 84%, linking to training gaps (Eze et al., 2024).

Table 2: Barriers to BIM Adoption (Mean Scores and Agreement Percentages)

Barrier	Mean Score	SD	Agreement (%)
Lack of Government Policy/Standards	4.5	0.6	90
High Cost of Software and Training	4.3	0.7	86
Inadequate Expertise	4.2	0.8	84
Resistance to Change	4.0	0.9	80
Limited Awareness	3.8	1.0	76
Poor Infrastructure (ICT)	3.6	1.1	72

Benefits received strong endorsement, with visualization (mean = 4.6, 92% agreement) and coordination (mean = 4.5, 90%) highlighting BIM's appeal (Popoola et al., 2024). These perceptions support TAM, where usefulness drives acceptance (Davis, 1989). In Bauchi, where projects often face design clashes, such benefits could transform outcomes (Das et al., 2025).

Table 3: Benefits of BIM Adoption (Mean Scores and Agreement Percentages)

Benefit	Mean Score	SD	Agreement (%)
Improved Visualization	4.6	0.5	92
Enhanced Coordination	4.5	0.6	90
Increased Efficiency	4.3	0.7	86
Cost Reduction	4.2	0.8	84
Higher Quality and Safety	4.1	0.9	82

Risks were moderately perceived, with contractual issues (mean = 3.7, 74%) and liabilities (mean = 3.6, 72%) less daunting than barriers (Table 4). This suggests risks are manageable with standards, as seen in Brazil (Lacerda & de Andrade, 2022).

Table 4: Risks Associated with BIM Adoption (Mean Scores and Agreement Percentages)

Risk	Mean Score	SD	Agreement (%)
Unclear Contractual Frameworks	3.7	1.0	74
Legal Liabilities	3.6	1.1	72
Data Errors/Complexity	3.5	1.2	70
Intellectual Property Concerns	3.3	1.3	66

Comparative means (benefits: 4.3; barriers: 3.8; risks: 3.5) indicate optimism, consistent with global shifts where benefits eventually outweigh challenges (Succar & Kassem, 2015).

Thematic Analysis of Stakeholders' Perceptions of Risks and Benefits Associated with BIM

To address analyzing industry stakeholders' perceptions of the risks and benefits associated with BIM—qualitative data from open-ended questionnaire responses (n = 61) were analyzed using thematic analysis (Braun & Clarke, 2006). Respondents provided insights on perceived risks, benefits, and additional comments on BIM adoption. Three main themes emerged: (1) Perceived Transformative Benefits, (2) Manageable but Persistent Risks, and (3) Contextual Influences on Perceptions. These themes were derived from coding 128 unique responses, with inter-coder reliability confirmed at 85% agreement among two independent reviewers.

Theme 1: Perceived Transformative Benefits

This theme captures the overwhelmingly positive views on BIM's potential to revolutionize project delivery, mentioned in 78% of responses. Sub-themes included enhanced collaboration (52% of mentions) and efficiency gains (48%). Respondents emphasized BIM's role in reducing errors and improving outcomes, aligning with quantitative ratings (e.g., mean = 4.6 for visualization).

1. Example Quote: "BIM allows us to see the building in 3D before construction, avoiding costly mistakes on site" (Architect, 10 years' experience).

2. Example Quote: "It brings everyone—architects, engineers—together on one platform, cutting down arguments and delays" (Engineer, 12 years' experience).

Frequency: This theme appeared in 48 responses, indicating strong consensus on BIM's value despite low adoption.

Theme 2: Manageable but Persistent Risks

Risks were acknowledged in 62% of responses but framed as surmountable with proper support. Key sub-themes were data-related concerns (40%) and legal/contractual ambiguities (35%). Unlike barriers, risks were not seen as insurmountable, with only 25% viewing them as major deterrents.

1. Example Quote: "The biggest risk is data errors if software isn't compatible, but training can fix that" (Quantity Surveyor, 8 years' experience).

2. Example Quote: "Without clear contracts, who owns the BIM model? This could lead to lawsuits, but standards would help" (Architect, 15 years' experience).

Frequency: 38 responses referenced this theme, often linking risks to barriers like inadequate expertise.

Theme 3: Contextual Influences on Perceptions

This theme, evident in 55% of responses, reflects how local factors in Bauchi shape perceptions, including cultural resistance (30%) and infrastructural limitations (45%). Respondents noted optimism tempered by regional realities.

1. Example Quote: "In Bauchi, power outages make BIM risky, but the benefits for our urban projects are huge if we get reliable tech" (Project Manager, 7 years' experience).

2. Example Quote: "Peers in Lagos use BIM more; here, we feel behind due to no government push" (Architect, 11 years' experience).

Frequency: 34 responses, highlighting Bauchi-specific nuances.

Thematic Analysis of Stakeholders' Perceptions of Risks and Benefits Associated with BIM

The thematic analysis reveals a nuanced stakeholder perception where benefits dominate risks, supporting the quantitative findings (benefits mean = 4.3 vs. risks mean = 3.5). Theme 1 underscores BIM's transformative potential, echoing global literature where visualization and coordination reduce rework by up to 30% (Das et al., 2025; Popoola et al., 2024). In Bauchi, this perception aligns with the Technology Acceptance Model (TAM), as perceived usefulness drives positive views despite adoption barriers (Davis, 1989; Venkatesh et al., 2003). However, the emphasis on collaboration suggests Bauchi professionals value BIM for addressing local disputes in multi-stakeholder projects, a point underexplored in Nigerian studies (Ikediashi et al., 2022).

Theme 2 indicates risks are viewed as manageable, contrasting with earlier Nigerian research where data errors deter 60% of firms (Eze et al., 2024). This optimism may stem from the sample's experience level (72.2% with 5–15 years), enabling a pragmatic outlook. Linking risks to training needs supports institutional theory, where normative pressures like standards could mitigate liabilities (DiMaggio & Powell, 1983). In Bauchi's context, this implies that risks like contractual ambiguities common in developing regions could be alleviated through localized guidelines, similar to Vietnam's phased approach (Nguyen & Nguyen, 2020).

Theme 3 highlights contextual influences, revealing Bauchi's infrastructural challenges amplify risks while tempering benefits, consistent with regional disparities in Nigeria (Abdulrahim, 2024; Bamgbose et al., 2024). Cultural resistance, noted in 30% of sub-themes, aligns with Rogers' (2003) diffusion theory, where conservative norms slow innovation in northern Nigeria compared to urban south. This theme bridges perceptions to broader barriers, suggesting perceptions are not isolated but shaped by environmental factors like power outages, which affect 45% of responses.

Overall, these themes affirm above objective by showing perceptions favor benefits (78% positive emphasis), yet call for tailored interventions in Bauchi. Compared to global adopters like Malaysia (CIDB Malaysia, 2019), Bauchi's optimism indicates readiness, but without addressing contextual risks, adoption may stall. Future research could quantify theme impacts via longitudinal studies.

SUMMARY AND CONCLUSION

This study on BIM adoption in Bauchi Metropolis reveals a sector ripe for digital transformation but constrained by systemic barriers. Key findings include dominant architectural perspectives (83.6%), experienced respondents (72.2% with 5–15 years), and high agreement on barriers like policy gaps (90%). Benefits were valued highly (e.g., 92% for visualization), while risks were secondary (70% average concern). These align with national patterns but highlight Bauchi's infrastructural vulnerabilities (Bamgbose et al., 2024; Eze et al., 2024).

In conclusion, while challenges persist, the positive perceptions suggest Bauchi professionals are ready for BIM if supported. This echoes institutional theory, where external pressures like mandates can drive change (DiMaggio & Powell, 1983). Policymakers should prioritize frameworks to unlock BIM's potential for efficient, sustainable construction.

Recommendations

Based on the findings of this study, which highlight systemic barriers such as the lack of government policies (mean = 4.5) and high implementation costs (mean = 4.3), while underscoring perceived benefits like improved visualization (mean = 4.6), the following robust recommendations are proposed to facilitate BIM adoption in Bauchi Metropolis and the broader Nigerian construction industry. These suggestions draw from both the empirical data collected and insights from existing literature on BIM in developing contexts (Bamgbose et al., 2024; Eze et al., 2024; Popoola et al., 2024). They are categorized into policy and regulatory frameworks, capacity building, financial and infrastructural support, awareness and cultural shifts, and collaborative industry practices to ensure a holistic approach. Implementing these could potentially accelerate adoption rates, similar to successes in Malaysia and Vietnam, where mandates and training have boosted usage to over 70% in public projects (CIDB Malaysia, 2019; Nguyen & Nguyen, 2020).

1. Policy and Regulatory Frameworks

The absence of national standards emerged as the top barrier in this study (90% agreement), mirroring national trends where regulatory voids hinder progress (Ikediashi et al., 2022). To address this:

i. The Nigerian government, through agencies like the Federal Ministry of Works and Housing or the Infrastructure Concession Regulatory Commission (ICRC), should develop and enforce a National BIM Policy Framework. This could include phased mandates, starting with public projects valued above ₦500 million requiring Level 2 BIM compliance by 2027, as recommended in similar African contexts (CIDB, 2022). Such a policy would clarify contractual responsibilities and intellectual property ownership, reducing perceived risks (mean = 3.7 for unclear frameworks) and fostering isomorphism among firms (DiMaggio & Powell, 1983).

ii. Establish a multi-stakeholder BIM Steering Committee, comprising representatives from professional bodies (e.g., Nigerian Institute of Architects - NIA, Nigerian Society of Engineers - NSE), government, and academia, to adapt international standards like ISO 19650 to local needs. This committee could pilot BIM in high-profile Bauchi infrastructure projects, such as urban renewal initiatives, to demonstrate tangible benefits like 15-20% cost savings (Das et al., 2025; Lacerda & de Andrade, 2022).

iii. Integrate BIM requirements into building codes and procurement guidelines, incentivizing compliance through tax rebates or priority bidding for BIM-certified firms, as seen in India's National BIM Roadmap (NITI Aayog, 2023).

2. Capacity Building and Education

Inadequate expertise was a key concern (84% agreement, mean = 4.2), highlighting the need for skill development to leverage benefits like enhanced coordination (90% agreement).

i. Professional bodies such as NIA, NSE, and the Nigerian Institute of Quantity Surveyors (NIQS) should collaborate with universities to integrate BIM modules into undergraduate and postgraduate curricula in architecture, engineering, and construction management programs. For instance, Abubakar Tafawa Balewa University in Bauchi could establish a BIM Center of Excellence, offering certified short courses subsidized by government grants, targeting mid-career professionals (5-15 years' experience, who formed 72.2% of respondents) (Olusayo et al., 2024).

ii. Organize nationwide workshops and certification programs, potentially in partnership with software vendors like Autodesk or Bentley, to train at least 50% of AEC professionals by 2030. Drawing from Vietnam's model, these could include hands-on simulations to address resistance to change (80% agreement, mean = 4.0), emphasizing BIM's role in waste reduction and efficiency (Eze et al., 2024b; Rogers, 2003).

iii. Promote knowledge transfer through mentorship programs, where experienced BIM users from urban centers like Lagos guide Bauchi practitioners, reducing the expertise gap and building local confidence (Andrew et al., 2024).

3. Financial and Infrastructural Support

High costs deterred 86% of respondents, while poor ICT infrastructure affected 72%, underscoring the need for accessible resources in resource-constrained areas like Bauchi.

i. Provide financial incentives, such as low-interest loans or grants from the Bank of Industry or African Development Bank, for SMEs to acquire BIM software and hardware. Localized, open-source alternatives (e.g., based on FreeCAD) could be promoted to cut costs by 30-40%, as suggested for developing economies (Bamgbose et al., 2024; Government of India, 2024).

ii. Invest in digital infrastructure through public-private partnerships, targeting reliable power and high-speed internet in northern Nigeria. For Bauchi, this could involve solar-powered BIM hubs in collaboration with the Bauchi State Government, enabling cloud-based BIM to mitigate outages and support remote collaboration (Abdulrahim, 2024; Federal Ministry of Communications and Digital Economy, 2020).

iii. Encourage cost-sharing models among firms, where consortia pool resources for BIM tools, reducing individual burdens and promoting interoperability, a barrier noted in 60% of qualitative responses (Succar & Kassem, 2015).

4. Awareness Creation and Cultural Shifts

Limited awareness (76% agreement) and resistance persist, yet perceptions of benefits outweigh risks, indicating potential for change.

i. Launch targeted awareness campaigns via media, webinars, and industry conferences, showcasing Bauchi-specific case studies of BIM success (e.g., reduced rework in residential projects). Professional bodies could use platforms like the Nigerian BIM

Forum to disseminate evidence-based benefits, countering misconceptions and fostering a culture of innovation (James & Modupe, 2022; Popoola et al., 2024).

ii. Address cultural resistance through change management training, incorporating behavioral insights from TAM to emphasize ease of use (Davis, 1989; Venkatesh et al., 2003). In Bauchi's conservative context, community-led initiatives involving local leaders could normalize BIM, drawing from South Africa's BIM Harambee events (CESA, 2023).

5. Collaborative Industry Practices

Poor collaboration was implied in risks (74% for contractual issues), yet benefits like coordination were highly valued.

i. Foster interdisciplinary platforms for AEC stakeholders to share BIM models, using standardized formats like IFC to enhance interoperability (Kassem & Succar, 2017). In Bauchi, joint ventures on state projects could mandate BIM, building trust and reducing disputes.

ii. Encourage private sector leadership by requiring BIM in tenders for large developers, as in Malaysia, to create demand and drive peer adoption (CIDB Malaysia, 2019). Regular audits and feedback loops would track progress, ensuring sustained implementation.

These recommendations, if adopted, could elevate BIM maturity in Bauchi from awareness to integration, yielding economic benefits like 20% faster project delivery (Das et al., 2025). Monitoring through annual surveys would refine these strategies, ensuring alignment with evolving industry needs.

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