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Green Building Awareness-Implementation Gap Among Built Environment Professionals in Lagos, Nigeria

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Abstract

Green building, a strategic response to continuous environmental degradation, energy inefficiency, and climate vulnerability associated with rapid urban sprawl, particularly in Lagos, Nigeria. While prior studies have established that built environment professionals in Lagos demonstrate moderate to high awareness of green building principles, empirical evidence consistently shows that this awareness has not translated into widespread adoption to full implementation in building projects. This study investigates the underlying reasons for this persistent awareness–implementation gap by adopting a sequential explanatory mixed methods approach that integrates quantitative and qualitative evidence drawn directly from professional practice. Quantitative data surveyed 196 built environment professionals practicing in Lagos based on minimum professional experience (≥5 years), direct involvement in building design or delivery, and demonstrable awareness of green building principles. The quantitative analysis employed descriptive statistics, Relative Importance Index, chi-square tests, and exploratory factor analysis to examine relationships between awareness, firm characteristics, perceived barriers, and levels of green building implementation. Reliability testing confirmed strong internal consistency across all measurement constructs, with Cronbach's alpha values exceeding accepted thresholds. The quantitative findings revealed relatively high awareness of green building strategies such as energy efficiency, passive design, and water conservation, however, actual implementation remains low and inconsistent. While firm size, years of establishment, and project typology were found to significantly mediate the translation of professional knowledge into practice, rregulatory enforcement weakness, cost driven client resistance, poorly coordinated project delivery structures, limited professional decision-making authority, and technical capacity constraints emerged as the most critical components of implementation. In triangulation, the qualitative analysis of 10 in-depth expert interviews revealed five themes: awareness without authority, short-term economic rationality, weak regulatory and institutional frameworks, poor interdisciplinary integration during project delivery, and an underdeveloped maintenance culture. The study establishes that green building challenges in Lagos are fundamentally implementation capacity problems rather than awareness deficits. The findings recommend a shift in policy and practice from awareness focused interventions toward enforceable regulatory frameworks, client oriented economic incentives, strengthened professional authority, and integrated project delivery models.

Keywords: Awareness, Built Environment Professionals, Green building, Implementation gap, Lagos, Sustainability

1.0 Introduction

Rapid urbanization has exacerbated the environmental footprint of the construction sector globally, with buildings responsible for approximately 39% of energy related carbon emissions and over one-third of total energy consumption worldwide [1],[2]. In developing countries, these impacts are magnified by weak regulatory systems, infrastructure deficits, and accelerated population growth, making sustainable construction not only desirable but essential for urban resilience [3],[4]. Nigeria exemplifies this challenge, with Lagos its commercial and economic hub experiencing unprecedented urban expansion that places intense pressure on energy systems, housing supply, and environmental quality [5]. Green building practices have been widely promoted as a strategic response to these

pressures, offering pathways to reduce operational energy demand, improve indoor environmental quality, and minimize lifecycle environmental impacts [6],[7]. Green building encompasses a range of integrated strategies, including passive design, energy efficient systems, water conservation, sustainable material selection, and waste management across the building lifecycle [8],[1]. In theory, these strategies are particularly well suited to tropical contexts such as Lagos, where climatic conditions favour passive cooling, daylight optimization, and natural ventilation when appropriately applied [9],[10].

Despite these advantages of green building, the adoption of green building practices in Nigeria remains limited and uneven, particularly within mainstream commercial and high-rise developments in Lagos [11],[12],[10]. While isolated landmark projects such as LEED-certified commercial buildings and high-end developments demonstrate technical feasibility, they remain exceptions rather than the norm within the broader urban fabric [13],[14]. This disconnects between demonstrated potential and regular practice raises critical questions about the factors limiting green building implementation in Lagos. Built environment professionals (BEPs) which includes architects, engineers, builders, and quantity surveyors occupy a central position in shaping building outcomes, particularly during the early design and planning stages where sustainability decisions exert the greatest long-term influence [15],[16]. Prior studies in Lagos report that BEPs possess moderate to high awareness of green building concepts, especially in relation to energy efficiency, passive design strategies, and basic sustainability principles [9],[17]. However, this growing awareness has not translated into consistent implementation at project level, suggesting that knowledge alone is insufficient to drive sustainable practice in the Nigerian construction context [3],[18],[10].

This awareness-implementation gap has become recurrent in green building research within developing economies, where institutional weakness, client-driven cost priorities, poorly coordinated project delivery systems, and limited professional authority often undermine sustainability intentions during construction [19],[4]. In Lagos, these challenges are compounded by weak enforcement of building regulations, absence of a nationally enforceable green building code, and limited economic incentives for sustainable investment, all of which reduce the perceived risk of non-adoption [13],[12]. Furthermore, other Nigerian studies have successfully identified barriers to green building adoption, most have focused on awareness levels, perceived challenges, or intention to adopt, with limited empirical attention given to explaining why implementation fails even when awareness exists [20],[17]. Consequently, there remains an insufficient understanding of how firm characteristics, institutional conditions, and professional power dynamics interact to prevent green building strategies from moving beyond design rhetoric into constructed reality. This study reframes green building adoption in Lagos as an implementation capacity problem rather than a knowledge deficit. By employing a mixed methods approach that integrates statistically grounded survey evidence with rich qualitative insights from professional practice, the study seeks to explain the mechanisms through which awareness is constrained during project delivery. In doing so, it responds directly to calls for more implementation focused research in green building research [3],[21].

1.1 Aim and Objectives of the Study

The aim of this study is to examine why awareness of green building principles among built environment professionals (BEPs) in Lagos has not translated into consistent implementation within building projects. To achieve this aim, the study pursues the following objectives:

1. assess the level of green building awareness and implementation among BEPs in Lagos;
2. identify the key barriers to GB implementation in the study area;
3. examine how firm features and professional roles mediate the translation of awareness into practice; and
4. explain quantitative patterns of implementation failure through qualitative insights drawn from expert professional experiences.

1.2 Contribution to Knowledge

Green building adoption as an institutional and organisational challenge, this study contributes a more grounded and practice responsive pathway for advancing sustainable construction in Lagos and similar developing urban contexts.

2.0 Literature Review

2.1 Green Building Practice in Developing Urban Contexts

Green building practice has emerged globally as a critical response to the environmental impacts of rapid urbanization, climate change, and escalating energy demand associated with the construction sector [1],[2]. In developing urban contexts, the relevance of green building is worsened by limited infrastructure facilities, informal building development patterns, and limited institutional capacity to regulate construction activities effectively [3],[4]. Lagos exemplifies these challenges, where population growth, land scarcity, and market-driven development pressures have intensified the environmental footprint of buildings [5]. Empirical studies across Sub-Saharan Africa consistently report low adoption of green building practices despite their benefits [6],[11]. While green buildings have been shown to reduce operational energy use, enhance occupant comfort, and improve long-term economic performance, their adoption remains constrained by weak policy enforcement, limited technical capacity, and cost-sensitive development cultures [15],[13]. These structural conditions shape how sustainability is interpreted and prioritized within professional practice.

2.2 Awareness and Knowledge of Green Building among Built Environment Professionals

Awareness and professional knowledge are widely recognized as foundational drivers of green building adoption, particularly during the design phase where sustainability decisions exert the greatest influence on building performance [8],[16]. Studies conducted in Nigeria and comparable developing contexts indicate that architects and allied professionals possess moderate awareness of green building concepts, especially in relation to energy efficiency, passive cooling, and material selection [9],[17]. However, awareness does not equate to applied competence. Studies shows that professional knowledge in many developing countries is often poorly coordinated, theoretical, or disconnected from construction realities, limiting its translation into effective practice [22],[18]. In Lagos, survey-based evidence reveals that while professionals may be familiar with sustainability terminology, fewer have adequate experience with lifecycle analysis, performance simulation, or post-occupancy evaluation, which are critical for implementing green strategies [12].

2.3 The Awareness–Implementation Gap in Green Building Practice

The persistence of an awareness–implementation gap has been widely documented in green building research, particularly within developing economies [19],[13]. This gap refers to situations where professionals demonstrate positive attitudes and intentions toward sustainability but fail to implement green strategies consistently in completed projects. Researchers argue that this disconnect reflects deeper organisational and institutional constraints rather than individual reluctance [23],[21]. In Nigeria, several studies report that green building strategies proposed during design stages are frequently removed or diluted during construction due to cost-cutting, contractor resistance, or client-driven value engineering [20],[24]. The absence of enforceable sustainability requirements further reinforces conventional practices, as non-adoption carries minimal regulatory or financial consequence [3],[19].

2.4 Institutional, Organisational, and Project Level Constraints

Institutional factors play a decisive role in shaping green building implementation. Regulatory frameworks, enforcement mechanisms, and incentive structures determine whether sustainability is treated as optional or mandatory within professional practice [25],[3]. In Nigeria, the lack of a nationally enforced green building code and inconsistent application of existing building regulations have been identified as major impediments to adoption [26],[12]. At the organizational level, firm size, years of establishment, and internal management support influence the capacity of professionals to advocate for and implement green strategies [27],[24]. Smaller firms, which dominate the Nigerian construction industry, often operate under tight financial constraints and limited bargaining power, reducing their ability to resist client pressure or invest in sustainability-oriented training and technologies. [24],[27] Project level dynamics further complicate implementation. Poorly coordinated project delivery systems, poor interdisciplinary coordination, and misalignment between design brief and construction execution have been shown to undermine sustainability objectives across building lifecycles [5],[18]. These challenges are particularly pronounced in Lagos, where fast track construction and speculative development prioritize speed and cost over long-term performance.

2.5 Theoretical Framework: Theory of Planned Behaviour and Implementation Capacity

The Theory of Planned Behaviour (TPB) provides a widely used framework for explaining environmentally responsible professional behaviour by linking attitudes, subjective norms, and perceived behavioural control to behavioural intention [23]. In green building research, TPB has been employed to explain professionals' willingness to adopt sustainable practices, with empirical studies confirming significant relationships between knowledge, attitudes, and intention [6],[21],[23]. However, critics argue that TPB is limited in contexts where behaviour is constrained by external factors beyond individual control [21]. In such settings, intention does not reliably predict action, as professionals operate within institutional, organisational, and economic systems that restrict their decision-making authority. This limitation is particularly relevant in Lagos, where architects often function as advisors rather than final decision makers, and where there is weak regulatory enforcement. To address this limitation, recent studies advocate extending TPB with implementation focused constructions that focused on conceptualizing capacity, institutional enforcement, and project delivery structures [21],[4]. This study adopts this extended perspective by conceptualizing green building adoption as a two stage processes: awareness and intention formation, followed by implementation mediated by firm level and institutional conditions.

2.6 Research Gap and Conceptual Positioning of the Study

The reviewed literature reveals three critical gaps. First, most Nigerian studies emphasized awareness and perceived barriers without empirically explaining why implementation fails when awareness exists. Second, limited attention has been given to how firm characteristics and professional power dynamics mediate green building implementation. Third, few studies integrate quantitative approach with qualitative explanations grounded in professional experience. By addressing these gaps through a mixed methods approach, this study positions itself as an implementation focused contribution to green building scholarship. It advances the argument that sustainable construction challenges in Lagos stem less from insufficient knowledge and more from constrained implementation capacity shaped by institutional, organizational, and project level realities.

3. Research Methodology

3.1 Research Design

This study adopted a sequential explanatory mixed methods research design, integrating quantitative and qualitative approaches to comprehensively investigate green building practice among built environment professionals (BEPs) in Lagos, Nigeria. Furthermore, this method was selected to enable statistical identification of patterns and relationships, followed by qualitative explanation of the contextual and institutional factors underlying those patterns [31]. This approach is particularly appropriate for sustainability research in developing contexts, where complex social, organizational, and regulatory dynamics often mediate professional behaviour [3]. The quantitative phase established the extent of green building awareness and implementation, as well as the relative importance of perceived barriers and firm characteristics. The qualitative phase subsequently provided interpretive depth, drawing on expert narratives to explain why awareness fails to translate into implementation within real project environments in Lagos [30],[4].

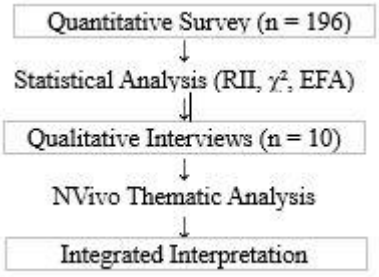

Fig. 1: Research Design: Author's fieldwork (2025)

3.2 Study Area: Lagos, Nigeria

Lagos State is Nigeria's economic and commercial center and one of the fastest growing megacities globally, with rapid urban expansion placing significant pressure on infrastructure, housing, energy supply, and environmental quality [5],[33]. The Lagos built environment is prioritized by intensive commercial development, high-rise office buildings, and mixed-use projects, making it a critical context for examining green building practice and implementation challenges [11]. Lagos was selected as the study area due to concentration of built environment professionals, high construction activity, and emerging exposure to sustainability discourse through landmark green projects and professional initiatives [13], [12]. These characteristics position Lagos as a testing ground and a pathfinder for green building adoption in Nigeria.

3.3 Quantitative Phase

3.3.1 Population and Sampling Strategy

The target population comprised built environment professionals including architects, engineers, builders, and quantity surveyors' firms actively involved in building design, construction, or project delivery in Lagos. 196 respondents were extracted from the dataset based on three criteria: (1) a minimum of five years professional experience, (2) direct involvement in design or project delivery within Lagos, and (3) demonstrated awareness of green building principles at or above the Likert scale midpoint.

Table 1: Summary of Quantitative and Qualitative Sample Characteristics

Research Component	Sample Size	Justification
Quantitative survey	196	Statistical rigor and analytical saturation
Qualitative interviews	10	Thematic saturation (NVivo based)

Source: Field Survey, 2025

3.3.2 Research Instrument and Data Collection

Quantitative data were collected using a structured questionnaire adapted from validated green building adoption instruments used in previous studies [6]. The questionnaire comprised five sections:

Section A: Respondent and firm characteristics
Section B: Awareness of green building principles
Section C: Sources of sustainability knowledge and influence
Section D: Perceived implementation barriers
Section E: Level of green building implementation and drivers' factors

Responses in Sections B–E were measured using a five-point Likert scale ranging from 1 (strongly disagree/not important) to 5 (strongly agree/very important), a scale shown to be reliable for behavioural and perception-based construction studies [35].

3.3.3 Validity and Reliability

Internal consistency reliability was assessed using Cronbach's alpha coefficients with reported values: awareness ($\alpha = 0.84$), and adoption factors ($\alpha = 0.86$).

3.3.4 Data Analysis Techniques

Quantitative data analysis was conducted using SPSS. The following statistical techniques were employed:

1. Descriptive statistics to summarized respondent and firm characteristics

2. Relative Importance Index (RII) to rank perceived barriers and drivers' factors
3. Chi-square tests to examine associations between awareness and implementation
4. Exploratory Factor Analysis to identify latent constructs influencing implementation

These techniques are widely adopted in green building and construction management research for identifying priority factors and underlying dimensions of complex behavioural phenomena [35],[20].

3.4 Qualitative Phase

3.4.1 Interview Sampling and Data Collection

This involved 10 in-depth semi structured interviews with experienced built environment professionals, selected purposively to achieve thematic saturation [37]. Interviews were conducted with informed consent, recorded for accuracy, and transcribed verbatim.

3.4.2 Qualitative Data Analysis

Qualitative data were analyzed using reflexive thematic analysis, following the six-step procedure outlined by [39]. This process involved familiarization with the data, generation of initial codes, theme development, theme review, and interpretive synthesis. The qualitative analysis focused on explaining quantitative findings, particularly the mechanisms through which regulatory weakness, client driven decision making, organisational constraints, and project delivery poor coordination inhibit green building implementation in Lagos [3],[4].

3.5 Integration of Quantitative and Qualitative Findings

Integration occurred at the interpretation stage, where qualitative themes were used to explain, contextualize, and enrich quantitative results. This approach strengthens inference quality by linking statistical trends to lived professional experiences, thereby enhancing the explanatory power of the study [31].

3.6 Ethical Considerations

Ethical approval was obtained prior to data collection. Participation was voluntary, informed consent was secured from all respondents, and confidentiality was maintained by anonymizing survey and interview data.

4.0 Results and Discussion

4.1 Profile of Respondents and Firms

This section presents the quantitative findings derived from the analyzed sample of 196 built environment professionals. The respondents represent architects, engineers, builders, and quantity surveyors actively involved in building design and project delivery in Lagos. This composition reflects the multidisciplinary nature of the construction industry and aligns with prior green building studies conducted in Nigeria and similar developing contexts [12],[3]. The dominance of architects within the sample is consistent with their central role in early-stage design decision-making, where sustainability considerations exert the greatest influence on long-term building performance [15],[16]

Table 2: Professional Distribution of Respondents (n = 196)

Profession	Frequency	Percentage (%)
Architects	123	62.8
Engineers	36	18.4
Builders	21	10.7
Quantity Surveyors	16	8.1
Total	196	100

Source: Field Survey, 2025

The experience profile of respondents indicates a strong representation of mid to senior level professionals, suggesting that the findings reflect informed professional judgement grounded in real project exposure rather than theoretical familiarity [35].

Table 3: Years of Professional Experience of Respondents

Years of Experience	Frequency	Percentage (%)
5–10 years	82	41.8
11–20 years	71	36.2
Above 20 years	43	22.0
Total	196	100

Source: Field Survey, 2025

4.2 Level of Awareness and Implementation of Green Building Practices

Descriptive analysis reveals that respondents generally reported moderate to high awareness of green building principles, particularly in relation to energy efficiency, passive design strategies, and water conservation measures. This finding reinforces earlier

studies that suggest growing sustainability awareness among built environment professionals in Lagos [9],[17] However, when respondents were asked to indicate the extent to which these principles are implemented in actual projects, reported implementation levels were significantly lower, indicating a pronounced awareness–implementation gap.

Table 4: Mean Scores for Awareness and Implementation Levels

Variable	Mean	Std. Deviation	Interpretation
Awareness of GB principles	3.92	0.61	High
Implementation of GB practices	2.64	0.73	Low–Moderate

Scale: 1 = Very Low, 5 = Very High

Source: Field Survey, 2025

This discrepancy suggests that awareness alone does not guarantee adoption, reinforcing arguments that structural and institutional constraints play a decisive role in shaping professional behaviour [21].

4.3 Relative Importance Index (RII) of Implementation Barriers

To identify and prioritize factors inhibiting green building implementation, the Relative Importance Index (RII) was computed for key perceived barriers. RII is widely used in construction research to rank factors based on respondents' level of agreement and perceived significance [20],[35].

Table 5: Ranking of Green Building Implementation Barriers Based on RII

Barrier	RII	Rank
Weak regulatory enforcement	0.84	1
High initial cost	0.81	2
Client resistance	0.79	3
Poorly coordinated project delivery	0.78	4
Limited technical expertise	0.75	5
Lack of green material availability	0.73	6
Insufficient management support	0.70	7

Source: Field Survey, 2025

The dominance of regulatory and client related barriers highlights the limited influence of individual professionals in enforcing sustainability decisions within Lagos based projects, reinforcing findings from prior Nigerian and African studies [13], [3].

4.4 Association Between Awareness and Implementation

A chi square test was conducted to examine the relationship between respondents' level of awareness and their reported implementation of green building practices. The analysis revealed a statistically significant association between awareness and implementation (χ^2, $p < 0.05$), indicating that awareness contributes positively to adoption likelihood. However, the strength of this association was moderate, suggesting that awareness alone explains only part of the variation in implementation behaviour. This finding supports critiques of purely awareness driven sustainability interventions in contexts characterized by institutional weakness [3], [10].

4.5 Exploratory Factor Analysis

Exploratory Factor Analysis was conducted to identify latent dimensions underlying the observed implementation barriers. The Kaiser–Meyer–Olkin (KMO) measure confirmed sampling adequacy (KMO > 0.70), and Bartlett's Test of Sphericity was significant ($p < 0.001$), validating the suitability of the data for factor analysis [35]. The Exploratory Factor Analysis yielded three dominant factor groups:

1. Institutional and Regulatory Constraints (regulatory enforcement, policy absence)
2. Economic and Client Driven Constraints (cost, client resistance)
3. Organisational and Technical Constraints (firm capacity, expertise, project poor coordination)

These factors collectively explain a substantial proportion of variance in green building implementation outcomes, reinforcing the argument that implementation failure is multi-dimensional and structurally embedded rather than purely knowledge based [21],[4].

4.6 Summary of Quantitative Findings

The quantitative analysis demonstrates that while built environment professionals in Lagos exhibit relatively high awareness of green building principles, implementation remains constrained by regulatory, economic, and organisational barriers. The findings confirm that awareness is a necessary but insufficient condition for sustainable practice, underscoring the need for institutional reform, client-oriented incentives, and integrated project delivery frameworks to enable meaningful green building implementation. [3],[21].

4.7 Qualitative Results: Thematic Analysis of Professional Perspectives

This section presents findings from the qualitative phase, drawing on 10 in-depth interviews with senior built environment professionals in Lagos. The interviews were analyzed thematically to explain and contextualize the quantitative results, particularly the observed gap between green building awareness and actual implementation. The qualitative findings are simplified into five interrelated

themes, each reflecting recurrent patterns across participant narratives and consistent with saturation principles in qualitative research [37],[39].

Table 6: NVivo Thematic Analysis of Expert Interviews (n = 10)

Theme	Sub-Themes	Description
Awareness without authority	Advisory role; limited decision power	Professionals understand green building but lack authority to enforce decisions
Client driven economic rationality	Cost sensitivity; short-term focus	Clients prioritize initial cost over lifecycle benefits
Weak regulatory framework	Lack of enforcement; voluntary compliance	Absence of mandatory green building regulations
Poorly coordinated project delivery	Poor coordination; design–construction gap	Sustainability intent is lost during construction
Organisational capacity constraints	Small firm size; limited resources	Firms lack leverage to insist on green implementation
Technical skill gaps	Limited hands-on experience	Theory outweighs practical implementation skills
Maintenance culture concerns	Fear of system failure	Weak maintenance discourages adoption
Supply chain constraints	Limited local materials	Dependence on imported green materials
Risk aversion	Fear of innovation	Professionals avoid experimentation
Positive sustainability orientation	Ethical motivation	Willingness to adopt if conditions permit

Source: Field Survey, 2025

4.7.1 Theme 1: Awareness Without Decision Making Authority

A dominant theme emerging from the interviews is the disconnection between professional awareness and decision-making power. While most participants demonstrated clear understanding of green building principles and expressed willingness to apply them, they consistently reported limited authority to enforce these strategies during project execution. Architects, in particular, described their role as advisory rather than decisive, with final decisions often resting with clients, financiers, or contractors. Several interviewees noted that sustainability recommendations are frequently overridden during value engineering, especially when clients prioritize initial capital cost over long-term performance. This finding aligns with earlier studies that highlight professional power imbalance as a critical barrier to sustainable construction in developing contexts [3]. The lack of contractual or regulatory backing weakens the capacity of professionals to insist on green alternatives, even when awareness and technical justification exist.

4.7.2 Theme 2: Short Term Economic Rationality and Client Resistance

Economic considerations emerged as a central determinant of implementation outcomes. Interviewees consistently emphasized those clients evaluate projects through a short-term financial lens, often viewing green building strategies as cost burdens rather than long-term investments. This perception leads to resistance against features perceived as nonessential, such as enhanced façades, renewable energy systems, or advanced water management solutions. Participants observed that although lifecycle cost benefits are frequently explained, clients often remain unconvinced due to uncertainty about payback periods and concerns over maintenance. These narratives corroborate quantitative findings that ranked high initial cost and client resistance among the most significant implementation barriers. Similar patterns have been documented in Nigerian and other Global South contexts, where market driven development cultures discourage long-term sustainability investments [9], [18].

4.7.3 Theme 3: Weak Regulatory Frameworks and Enforcement Gaps

The absence of enforceable green building regulations was repeatedly cited as a major impediment to implementation. Participants acknowledged the existence of general building codes but stated that sustainability provisions are either absent or poorly enforced. As a result, compliance with green building principles is largely voluntary and dependent on individual client interest or project prestige. Several interviewees argued that without regulatory mandates or incentives, professionals lack leverage to justify additional costs associated with green strategies. This regulatory vacuum reinforces conventional construction practices and reduces the perceived risk of non-adoption. These insights reinforce empirical evidence that institutional weakness undermines sustainable building transitions in developing economies [13], [3].

4.7.4 Theme 4: Poorly coordinated project Delivery and Interdisciplinary Disconnect

Another recurrent theme concerns poor coordination within the project delivery process. Interviewees described poor coordination between architects, engineers, contractors, and suppliers, leading to misalignment between design brief and construction execution. Sustainability strategies proposed during early design stages are often compromised due to lack of integration across disciplines. Participants highlighted that limited collaboration during construction frequently results in improper installation, substitution of specified materials, or complete omission of green features. This poor coordination reflects systemic challenges within the Nigerian construction industry, where project teams operate in silos rather than as integrated units [4],[18]. The findings underscore the need for integrated delivery frameworks to support effective implementation.

4.7.5 Theme 5: Technical Capacity and Maintenance Culture Constraints

Interviewees also pointed to limited technical capacity and weak maintenance culture as barriers to sustained green building implementation. Concerns were raised about the availability of skilled personnel to install and maintain green technologies, as well as the reliability of supply chains for sustainable materials. Participants noted that fear of system failure and poor maintenance discourages both professionals and clients from adopting advanced green solutions. This hesitation is exacerbated by Nigeria's infrastructural challenges, including unreliable power supply and limited access to technical support services. These findings are consistent with earlier studies linking maintenance culture and technical capacity deficits to low sustainability adoption in developing urban contexts [21],[28].

4.8 Synthesis of Qualitative Findings

The qualitative results demonstrate that the failure of green building implementation in Lagos is not rooted in professional ignorance or lack of awareness. Instead, it reflects a complex interaction of institutional, economic, organisational, and technical constraints that systematically limit professional agency. These themes provide critical explanatory depth to the quantitative results, confirming that awareness alone cannot overcome entrenched structural barriers. By foregrounding professional experiences, the qualitative findings reinforce the argument that advancing green building practice in Lagos requires systemic reforms that extend beyond training and awareness campaigns to include regulatory enforcement, client incentives, interdisciplinary integration, and long-term operational planning.

4.9. Discussion: Integrating Quantitative and Qualitative Findings

The quantitative and qualitative findings to provide a coherent explanation of why green building awareness among built environment professionals in Lagos has not translated into consistent implementation. By triangulating statistical patterns with professional narratives, the discussion advances an implementation focused interpretation that moves beyond awareness-centric explanations, responding to calls for context sensitive sustainability research in developing urban environments [3],[21].

Table 7: NVivo Thematic Analysis Alignment with Quantitative

NVivo Theme	Supporting Quantitative Evidence
Awareness without authority	High awareness means vs. low implementation mean
Client driven economic rationality	High RII for cost and client resistance
Weak regulatory framework	Highest ranked barrier (RII = 0.84)
Poorly coordinated project delivery	Top ranked organisational barrier
Organisational capacity constraints	Factor analysis loading
Technical skill gaps	Moderate RII values

Source: Field Survey, 2025

4.9.1 Awareness Is Necessary but Not Sufficient for Implementation

The quantitative results indicate relatively high levels of awareness of green building principles among respondents, particularly regarding energy efficiency and passive design strategies. However, implementation levels remain low to moderate, revealing a clear awareness-implementation gap. The statistically significant but moderate association between awareness and implementation confirms that knowledge contributes to adoption likelihood but does not guarantee action. This finding aligns with critiques of linear behaviour models that assume awareness naturally leads to practice [18], [21]. Qualitative evidence reinforces this conclusion by demonstrating that professionals often possess the knowledge and willingness to adopt green strategies but lack the structural conditions required to act on that knowledge. Interviewees consistently described scenarios where sustainability proposals were diluted or abandoned due to client decisions, cost pressures, or construction stage compromises. Together, these findings support the argument that green building challenges in Lagos are rooted in implementation capacity rather than cognitive deficiency.

4.9.2 Institutional Weakness as a Primary Constraint

Weak regulatory enforcement emerged as the highest ranked barrier in the quantitative analysis, a finding that is strongly corroborated by qualitative accounts. Professionals repeatedly emphasized the absence of enforceable green building standards and the limited capacity of regulatory agencies to monitor compliance. In such an environment, sustainability remains discretionary rather than mandatory, reducing incentives for both professionals and clients to pursue green solutions. This institutional context diminishes perceived behavioural control, a key construct within the Theory of Planned Behaviour [23]. While professionals may hold positive attitudes toward green building, the lack of regulatory backing undermines their confidence in implementing these strategies. This observation supports recent scholarship advocating for the integration of institutional variables into behavioural models of sustainability adoption [21],[4].

4.9.3 Economic Rationality and Client Driven Decision-making

Economic considerations ranked prominently among implementation barriers, with high initial costs and client resistance identified as critical constraints. Quantitative rankings indicate that cost related factors exert greater influence than technical knowledge deficits, suggesting that financial logic dominates sustainability decisions in Lagos based projects. Qualitative narratives provide depth to this finding by revealing that clients often prioritize short-term capital expenditure over lifecycle performance benefits. Professionals

reported difficulty convincing clients of long-term savings due to uncertainty surrounding payback periods and concerns about maintenance. This short-term economic rationality mirrors patterns observed in other developing markets, where weak financial incentives and limited access to green financing discourage sustainable investment [9],[18].

4.9.4 **Professional Authority, Firm Characteristics, and Power Dynamics**

Firm characteristics and professional roles play a mediating role in translating awareness into implementation. Quantitative analysis suggests that organisational and technical constraints significantly influence adoption outcomes, while qualitative findings highlight limited professional authority as a recurring challenge. Architects, despite their central role in design, often lack the contractual power to enforce sustainability decisions during construction. Smaller firms, which dominate the Lagos construction industry, face additional constraints related to limited resources, reduced bargaining power, and dependence on client preferences. These dynamics restrict the ability of professionals to champion green strategies, even when awareness and motivation are present. This finding aligns with organizationally studies that emphasized the role of firm capacity and leadership support in driving sustainable practice [6],[4],[18].

4.9.5 **Poorly coordinated project Delivery and Loss of Design brief**

Poor coordination within project delivery systems emerged as a critical barrier to implementation, particularly during the transition from design to construction. Quantitative RII rankings place project poor coordination among the top barriers, while qualitative accounts describe frequent misalignment between sustainability intentions and construction realities. Poor interdisciplinary coordination often leads to substitution of specified materials, improper installation of systems, or complete omission of green features. This finding underscores the importance of integrated project delivery frameworks that align architects, engineers, and contractors around shared sustainability objectives. Similar conclusions have been reached in recent global studies linking poor coordination to sustainability failure in construction projects [4],[18].

4.9.6 Implications for Theory and Practice

The integrated findings suggest that the Theory of Planned Behaviour remains useful for explaining awareness and intention formation but is insufficient for predicting implementation in contexts characterized by institutional and organisational constraints. Extending TPB to incorporate implementation capacity provides a more accurate representation of sustainability decision making in Lagos. From a practical perspective, the findings highlight the need to shift green building interventions away from awareness focused training alone toward structural reforms that enhance enforcement, strengthen professional authority, and incentivize client participation. Without addressing these systemic conditions, improvements in awareness are unlikely to yield meaningful changes in building outcomes.

4.9.7 Summary of Discussion

The discussion confirms that green building implementation failure in Lagos is driven by a convergence of institutional weakness, economic rationality, professional power imbalance, and poorly coordinated delivery systems. By integrating quantitative and qualitative evidence, the study demonstrates that awareness is a necessary foundation but not the primary barrier to sustainable construction. Addressing the implementation gap therefore requires coordinated policy, organizational, and market-based interventions that enable professionals to act on their sustainability knowledge.

5. Conclusion, Implications and Recommendations

5.1 Conclusion

This study findings demonstrate that while awareness of green building principles is relatively high, actual implementation remains low and inconsistent. Quantitative results revealed a statistically significant but moderate relationship between awareness and implementation, indicating that knowledge alone is insufficient to drive sustainable practice. The Relative Importance Index and factor analysis further showed that weak regulatory enforcement, cost driven client resistance, poorly coordinated project delivery, limited professional authority, and organizational capacity constraints are the dominant barriers of implementation. These statistical patterns were strongly corroborated by qualitative narratives, which revealed how sustainability intentions are routinely diluted or abandoned during project execution. The combined findings confirm that green building challenges in Lagos are not primarily the result of professional ignorance or resistance to innovation. Rather, they reflect systemic institutional and organizational conditions that constrain professional agency and prioritize short-term economic considerations over long-term environmental performance. By reframing green building adoption as an implementation capacity problem rather than an awareness deficit, this study provides a more accurate explanation of sustainability outcomes in Lagos and similar developing urban contexts. Advancing green building practice in Lagos requires moving beyond awareness campaigns toward systemic reforms that empower professionals, regulate markets, and align economic incentives with environmental goals. Until sustainability is embedded within institutional frameworks and project delivery structures, green building will remain more visible in discourse than in the built fabric of the city.

5.2 Theoretical Implications

From a theoretical perspective, the study contributes to green building and sustainability scholarship by extending the explanatory limits of awareness based behavioural models. While the Theory of Planned Behaviour remains useful for understanding intention

formation, the findings demonstrate that intention does not reliably predict action in contexts characterized by weak regulatory frameworks and poorly coordinated delivery systems. Integrating implementation capacity including institutional enforcement, organisational support, and professional authority offers a more robust framework for explaining sustainability behaviour in the built environment. This contribution responds directly to recent calls for sustainability research that moves beyond individual cognition to incorporate institutional and organisational dynamics, particularly in Global South contexts where formal governance structures remain underdeveloped.

5.3 Practical Implications for Professional Practice

The findings carry significant implications for built environment professionals in Lagos with practical implications which include:

1. Professional bodies and firms must recognize that awareness and training, while important, are insufficient in isolation. Strengthening professional bodies through clearer contractual roles, sustainability clauses, and integrated project delivery arrangements can improve the likelihood that green strategies survive the transition from design to construction.
2. Interdisciplinary collaboration should be prioritized to reduce poor coordination across project stages. Early and continuous engagement between architects, engineers, contractors, and facility managers can help align sustainability intentions with construction and operational realities.
3. Firms particularly small and medium sized practices should invest in internal sustainability capacity, including technical training, documentation systems, and post occupancy evaluation processes, to enhance credibility and bargaining power when advocating for green solutions.

5.4 Policy Implications

The study highlights the central role of government and regulatory institutions in shaping green building. Furthermore, without enforceable sustainability standards, green building adoption remains discretionary and vulnerable to market pressures. Policymakers should therefore prioritize the development and enforcement of context appropriate green building regulations, supported by monitoring mechanisms and compliance incentives. In addition, financial and fiscal incentives such as tax rebates, expedited approvals, or access to green financing can help offset perceived cost barriers and encourage client participation. Embedding sustainability requirements within planning approval processes would further shift green building from optional practice to normative expectation.

5.5 Recommendations

Based on the findings, the following recommendations are proposed:

1. Strengthen regulatory enforcement by integrating green building requirements into existing building approval and inspection systems.
2. Enhance professional authority through contractual frameworks that protect sustainability decisions during construction.
3. Promote integrated project delivery models to minimize poor coordination and loss of design brief.
4. Introduce client-oriented incentives that reframe green building as an economically viable investment rather than an added cost.
5. Support capacity building initiatives that focus on implementation skills, maintenance planning, and lifecycle performance evaluation.

5.6 Limitations and Future Research

The focus on Lagos limits generalizability to other Nigerian cities with different regulatory and market conditions. Future studies could adopt comparative approaches across multiple cities or regions. Longitudinal research tracking projects from design through post-occupancy would also deepen understanding of how implementation decisions evolve over time.

5.7 Conceptual Framework for Green Building Implementation in Lagos

The strategic framework in figure 2 illustrates the relationship between green building awareness and actual implementation outcomes within the professional practice context of Lagos. The framework is grounded in the Theory of Planned Behaviour and extended by incorporating implementation capacity factors, which this study identifies as decisive mediators between intention and action. [23]

Fig. 2: Recommended Strategic Framework for GB Implementation
Author's fieldwork (2025)

- At the first level, **Green Building Awareness** shaped by education, professional training, and exposure to sustainability discourse influences professionals' attitudes and intentions toward green building adoption. This stage reflects the cognitive and motivational components widely addressed in existing literature.
- At the second level, the framework introduces **Implementation Capacity**, conceptualized as a composite of four interrelated dimensions:
    1. Institutional Capacity (regulatory frameworks, enforcement strength, policy incentives)
    2. Economic and Client Factors (initial cost considerations, client willingness, access to green finance)
    3. Organisational Capacity (firm size, leadership support, internal expertise, decision-making authority)
    4. Project Delivery Structure (level of integration, interdisciplinary coordination, construction stage control)

  These factors mediate the relationship between awareness and implementation by either enabling or constraining professional action. Weaknesses at this level disrupt the translation of sustainability intentions into built outcomes, even when awareness is high.
- At the final level, **Green Building Implementation Outcomes** are expressed through the consistent application of green strategies in design, construction, and operation. Feedback loops within the framework indicate that successful implementation reinforces professional confidence and client acceptance, while repeated implementation failure perpetuates skepticism and resistance.

This framework positions green building adoption in Lagos as a structurally mediated process rather than a linear knowledge driven outcome, aligning with the mixed methods findings of this study.

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