CONSTRUCTION AND PROJECT MANAGEMENT

Awareness and Adoption of Green Building Principles among Construction Professionals in Ibadan, Nigeria

G. O. Olowe, O. P. Akintunde

Department of Civil Engineering, University of Ibadan, Ibadan, Nigeria

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Abstract

This study aimed to determine the extent to which construction professionals in Ibadan, Nigeria, are aware of and apply green building principles. The study adopted a cross-sectional survey design. The target population comprised construction professionals involved in building design, construction, management and project delivery in Ibadan. A convenience sampling procedure was used to recruit respondents across the identified professional categories. A total of 115 questionnaires were administered, of which 100 were completed and valid for analysis, representing a response rate of 87.0%. Respondents indicated their level of agreement with each statement on a five-point Likert scale. Data were analysed using frequencies, percentages, mean scores and ranking. The results showed relatively high reported awareness of green building principles, with mean scores of 4.07 for both familiarity with green building concepts and understanding of sustainable building design principles. The five practical adoption indicators recorded mean scores ranging from 3.33 to 3.97, with an average item mean of 3.74. Water conservation recorded the highest adoption-related mean (3.97), followed by waste reduction (3.94) and energy-efficient design (3.84). However, respondents perceived the overall level of green building adoption across the Ibadan construction industry less favourably, with a mean score of 2.90. The findings therefore indicate a descriptive difference between reported awareness and reported adoption-related practices, while also suggesting that broader industry-wide adoption may remain limited. The study recommends strengthening project-level implementation guidance, practical capacity and supportive conditions for the wider application of green building principles.

Keywords: Green Building; awareness; adoption; construction professionals; sustainable construction; Ibadan

1 Introduction

The construction industry supports economic and social development through the provision of residential, commercial, institutional and industrial buildings. At the same time, the sector places substantial demands on energy, water and raw materials and generates construction waste and greenhouse gas emissions. The environmental implications of building development have increased the need for approaches that improve resource efficiency and reduce the negative effects of construction and building operation. The International Energy Agency (IEA, 2023) identifies buildings as an important area for energy and emissions-related intervention.

Green building provides a framework for addressing these concerns across the planning, design, construction, operation and maintenance stages of a building's life cycle. Its principles include energy efficiency, water conservation, responsible material selection, waste prevention, sustainable site planning and attention to occupant well-being. Chen et al. (2023) discuss the contribution of green

construction to resource efficiency and low-carbon urban development. In the Nigerian context, Abam et al. (2023) examine the decarbonisation of the building sector and the need for measures that can improve environmental performance.

The application of green building principles depends on decisions made by several construction professionals. Architects influence building orientation, passive design and material choices; engineers contribute to efficient building systems and material performance; quantity surveyors assess costs and procurement options; while builders and project managers influence site operations, construction methods and waste management. Green building adoption is therefore not the responsibility of one profession but requires coordination across project teams.

Awareness is an important starting point, but familiarity with sustainability concepts does not necessarily mean that those concepts are incorporated into projects. Practical implementation may depend on technical capacity, the availability and cost of suitable materials, client requirements, organisational priorities, regulatory conditions and access to implementation guidance. The literature cited in this study identifies cost, technical expertise, professional development and institutional support as relevant considerations (Agboola et al., 2023; Unegbu et al., 2024). These issues make it important to distinguish between what professionals say they know, the practices they report applying and their broader assessment of adoption within the industry.

In Ibadan, construction activity and the continued development of the built environment make the application of environmentally responsible building practices a relevant concern. However, evidence focused specifically on construction professionals in the city is needed to understand how reported awareness relates to reported project-level practices. This study therefore examines awareness and adoption of green building principles among construction professionals in Ibadan, with attention to the distinction between individual or organisational practices and respondents' perception of industry-wide adoption.

1.1 Statement of the research problem

Conventional building development can contribute to high resource consumption, construction waste and environmental emissions. Green building principles offer ways of reducing these impacts through energy efficiency, water conservation, and responsible material selection and improved waste management. However, the presence of sustainability knowledge within the construction sector does not, by itself, establish that these practices are routinely incorporated into building projects.

The implementation of green building principles may be constrained by limited technical expertise, concerns about initial costs, inadequate professional training, weak institutional support and insufficient project-level guidance. These constraints can affect the extent to which professionals translate awareness into decisions and actions during design, procurement and construction. The studies cited in the present work identify technical, economic and institutional factors as potential barriers to sustainable construction in Nigeria (Agboola et al., 2023; Babatunde and Opawole, 2022; Unegbu et al., 2024).

Although green building has received attention in studies of sustainable construction in Nigeria, the evidence presented in the literature reviewed for this study does not establish how construction professionals in Ibadan report their awareness alongside the application of specific green building practices. Without such local evidence, it is difficult to identify which practices are more commonly reported and where implementation appears less established. This study addresses that local evidence need by assessing self-reported awareness, selected practical adoption indicators, organisa-

tional conditions and perceptions of overall industry adoption among construction professionals in Ibadan.

2 Literature review

2.1 Green building and sustainable construction

Green building refers to an approach to building development that seeks to reduce environmental impacts while supporting efficient resource use and acceptable indoor conditions throughout the building life cycle. The concept extends beyond the use of environmentally preferable materials. It also covers site selection, building orientation, energy and water performance, construction waste, operation and maintenance. Chen et al. (2023) consider green construction in relation to low-carbon cities, while Abam et al. (2023) focus on decarbonisation in the building sector, including the Nigerian context. Together, these perspectives indicate that sustainability needs to be considered across multiple stages and components of building development.

2.2 Awareness of green building among construction professionals

Awareness concerns professionals' familiarity with the aims, principles and possible applications of green building. It may be developed through formal education, professional development, workplace experience, technical guidance and exposure to completed projects. The studies cited here associate professional learning and training with sustainability knowledge (Agboola et al., 2023; Unegbu et al., 2024). However, self-reported familiarity should not be treated as equivalent to demonstrated technical competence. A respondent may recognise green building terminology without having detailed knowledge of assessment methods, standards, cost implications or implementation procedures.

2.3 Adoption of green building principles

Adoption refers to the extent to which green building principles are incorporated into decisions and activities within building projects. Relevant practices include energy-efficient design, water-saving measures, construction waste reduction and the specification of environmentally responsible materials. Adoption can occur at different levels: an individual professional may recommend a practice, an organisation may support it, and a project team may implement it. These levels are related but are not interchangeable. For example, an organisation's stated support for green building does not confirm that each project incorporates the principles consistently.

The literature cited in this study identifies perceived cost, technical capability, incentives and regulatory support as factors that may influence implementation (Abam et al., 2023; Agboola et al., 2023; Unegbu et al., 2024). These factors suggest that adoption depends not only on awareness but also on the conditions under which project decisions are made.

2.4 Factors influencing adoption

Economic considerations can influence decisions where green materials, technologies or design options are perceived to involve higher initial expenditure. However, an assessment limited to initial cost may overlook potential savings during operation and maintenance. Life-cycle costing is therefore relevant when comparing alternatives, although the availability of reliable cost information and the capacity to apply it may vary between organisations. Technical factors include access to appropriate

materials, design knowledge, construction skills and the ability to monitor performance. Institutional factors include policy direction, regulatory enforcement, procurement requirements and incentives. Organisational leadership and client commitment may also determine whether sustainability is prioritised during project planning and delivery.

2.5 Roles of construction professionals

Green building requires input from professionals with different responsibilities. Architects can integrate passive design, daylighting, ventilation and efficient spatial planning into building concepts. Engineers can consider energy and water systems, structural efficiency and suitable material options. Quantity surveyors can support decisions through cost planning, procurement advice and life-cycle cost considerations. Builders and project managers can influence construction methods, site resource use, waste separation and the monitoring of project requirements. Effective adoption therefore requires coordination among the professional team, clients, contractors, suppliers and relevant public agencies.

2.6 Relationship between awareness and adoption

Awareness and adoption are connected, but awareness alone may not be sufficient to produce implementation. Professionals may understand the benefits of green building yet face barriers arising from cost, limited technical support, client preferences, procurement practices or organisational priorities. Conversely, some practices may be applied because of project specifications or regulatory requirements even where individual awareness varies. It is consequently important to measure awareness, reported practices and perceived industry-wide adoption as distinct dimensions rather than combine them into a single score.

2.7 Research gap

The literature reviewed discusses the environmental rationale for green building and identifies economic, technical and institutional considerations that may affect its implementation. However, the present study focuses on a local empirical question: how construction professionals in Ibadan report their familiarity with green building principles, the application of selected practices and the wider level of adoption in the city. Its contribution is descriptive and location-specific. It does not test a causal relationship between awareness and adoption, nor does it verify the environmental performance of completed buildings.

3 Methodology

3.1 Research design and study area

The study adopted a quantitative cross-sectional survey design. This design was used to obtain responses from construction professionals at one point in time and to describe their reported awareness and application of green building principles. The study was conducted in Ibadan, Oyo State, Nigeria.

3.2 Study population, eligibility and sampling

The target population comprised professionals involved in building design, construction, management and project delivery in Ibadan. The professional categories represented in the final responses were Builders, Civil/Structural Engineers, Architects, Project Managers, Estate Surveyors and Valuers,

Environmental Consultants and Quantity Surveyors. Respondents were eligible if they were construction professionals engaged in building-related design, construction, management or project delivery activities in the study area.

A convenience sampling procedure was used to recruit accessible respondents across the identified professional categories. A total of 115 questionnaires were administered, of which 100 were completed and valid for analysis. The response rate was therefore 87.0% (100/115). Because convenience sampling is a non-probability approach, the sample should not be assumed to represent all construction professionals in Ibadan statistically. The findings are therefore interpreted as descriptive evidence from the respondents who participated in the survey.

3.3 Data collection instrument

Data were collected using a structured questionnaire containing closed-ended statements on awareness, organisational conditions, practical adoption and respondents' perception of industry-wide adoption. The two awareness statements addressed familiarity with green building concepts and understanding of sustainable building design. Five statements addressed practical adoption: incorporation of green building principles into projects, specification of green materials, consideration of energy-efficient design, inclusion of water conservation measures and implementation of waste reduction practices. Two further statements addressed organisational promotion of green building and organisational knowledge of green building standards. One statement asked respondents whether overall adoption in Ibadan was high.

Responses were recorded on a five-point Likert scale: 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree and 1 = Strongly Disagree.

3.4 Data analysis

Data were analysed using frequencies, percentages and mean scores. The mean score for each statement was used to describe the overall pattern of responses. The two awareness statements were treated as awareness indicators, while the five project-practice statements were treated as practical adoption indicators. The two organisational statements were analysed as contextual organisational conditions. The statement on overall adoption in Ibadan was treated separately as a measure of respondents' perception of industry-wide adoption.

The average of the five practical adoption item means was calculated as a descriptive summary of those item means. It was not treated as a respondent-level composite scale score. No inferential statistical test was reported; consequently, differences between the descriptive mean scores are not interpreted as statistically significant. Rankings are presented only within the awareness and practical adoption dimensions, not across items that measure different constructs.

3.5 Methodological information not reported

The manuscript records the sampling approach, questionnaire structure, number of questionnaires administered and number of valid responses. It does not provide a population frame or population size, a sample-size calculation, details of questionnaire pre-testing or validation, a reliability coefficient, the data-collection period, or details of ethics approval and informed consent. These details have not been inferred or added. They should be supplied by the researchers if records are available and if required by the target journal.

4 Results and discussion

4.1 Awareness and adoption of green building principles

To provide a clearer distinction between awareness and practical adoption, the questionnaire statements were considered according to the specific dimension they measured. Statements relating to respondents' familiarity with green building and understanding of sustainable building design were treated as awareness indicators, while statements relating directly to the application of green building practices in projects were considered adoption indicators. Organisational conditions and respondents' general perception of adoption in Ibadan were considered separately (Table 1).

Table 1. Dimensions of awareness and adoption of green building principles among construction professionals.

S/N	Dimension	Statement	Mean	Rank within dimension
1	Awareness	I am familiar with the concept of green buildings.	4.07	1st
2	Awareness	I understand the principles of sustainable building design.	4.07	1st
3	Organisational	My organisation promotes green building practices.	3.41	–
4	Adoption	Green building principles are incorporated into projects I have worked on.	3.33	5th
5	Organisational	My organisation has sufficient knowledge of green building standards.	3.49	–
6	Adoption	Green materials are specified whenever feasible.	3.62	4th
7	Adoption	Energy-efficient design is considered during project planning.	3.84	3rd
8	Adoption	Water conservation measures are incorporated into building projects.	3.97	1st
9	Adoption	Waste reduction practices are implemented during construction.	3.94	2nd
10	Industry-wide perception	Overall adoption of green building principles is high in Ibadan.	2.90	–

Note: Field survey, 2026. Rankings are given within the awareness and practical adoption dimensions only.

Table 1 presents the indicators according to four analytical dimensions: awareness, organisational conditions, practical adoption and industry-wide perception. Because these dimensions represent different concepts, rankings were applied only within the awareness and practical adoption dimensions rather than across all ten statements as though they formed a single construct.

Awareness was reflected in respondents' self-reported familiarity with the concept of green buildings and their understanding of sustainable building design principles. Both indicators recorded a mean score of 4.07, indicating relatively high reported awareness among the surveyed construction professionals. These results reflect respondents' perceptions of their familiarity and understanding rather than an objective test of technical knowledge.

Practical adoption was reflected in the incorporation of green building principles into projects, specification of green materials, consideration of energy-efficient design, incorporation of water conservation measures and implementation of waste reduction practices. Mean scores ranged from

3.33 to 3.97. Water conservation recorded the highest adoption-related mean of 3.97, followed by waste reduction at 3.94, energy-efficient design at 3.84, specification of green materials at 3.62, and incorporation of green building principles into projects at 3.33. The average of the five reported item means was 3.74, indicating a generally positive level of reported application across these practices. This average is used only as a descriptive summary of the item means and not as a respondent-level composite scale score.

The statements concerning whether respondents' organisations promote green building practices (3.41) and possess sufficient knowledge of green building standards (3.49) reflect organisational conditions rather than direct measures of respondents' personal awareness or practical adoption. They therefore provide contextual information on the organisational environment within which green building practices are implemented.

Finally, the statement that overall adoption of green building principles is high in Ibadan recorded a mean score of 2.90. This item represents respondents' general perception of industry-wide adoption and should not be treated as a direct measure of their personal application of green building practices. The results therefore show relatively high reported awareness (4.07) and a generally positive average across the five adoption-related item means (3.74), while respondents perceived industry-wide adoption less favourably (2.90). The difference between awareness and adoption-related means is descriptive and should not be interpreted as statistically significant because no inferential test of the difference was conducted.

5 Conclusion and recommendations

5.1 Conclusion

The study indicates that construction professionals surveyed in Ibadan reported relatively high awareness of green building principles, with both awareness indicators recording a mean score of 4.07. Several green building practices were also reported to be incorporated into projects, particularly water conservation and waste reduction, although the incorporation of green building principles into projects recorded the lowest adoption-related mean of 3.33. The average of the five adoption-related item means was 3.74, indicating a generally positive level of reported application. These findings should be interpreted as self-reported awareness and practice rather than as objective measures of professional knowledge or verified project performance.

However, respondents perceived the overall level of green building adoption across the Ibadan construction industry less favourably, with a mean score of 2.90. This suggests that while individual professionals reported relatively high awareness and some practical application of green building measures, broader industry-wide adoption may remain limited. The observed difference between the awareness mean and the average of the adoption-related item means is descriptive and should not be interpreted as statistically significant because no inferential test was conducted.

5.2 Recommendations

1. Professional bodies and construction agencies should provide practical training that supports the translation of reported awareness into project-level application of green building principles, particularly in areas where implementation remains less consistent.
2. Professional bodies and construction agencies should develop project-level implementation guidelines that facilitate the integration of green building principles into design specifications,

procurement decisions and construction activities. Particular attention should be given to strengthening the incorporation of green building principles into projects, which recorded the lowest adoption-related mean of 3.33.

3. Construction agencies should build on the relatively stronger reported application of water conservation, waste reduction and energy-efficient design by incorporating clear sustainability requirements and implementation procedures into project briefs and specifications.

4. Collaboration among construction professionals, clients, developers and relevant agencies should be strengthened to support wider industry-level adoption of green building practices in Ibadan, especially given respondents' comparatively low perception of overall industry adoption.

5. Future studies should use validated multi-item measures of awareness and adoption and apply appropriate inferential statistical techniques to test whether differences between awareness and adoption are statistically significant.

References

[1] Abam FI, Nwachukwu CO, Emodi NV, Okereke C, Diemuodeke OE, Owolabi AB, Owebor KO, Suh D, Huh JS (2023). A systematic literature review on the decarbonisation of the building sector: A case for Nigeria. *Frontiers in Energy Research*, 11, 1253825.

[2] Adebayo TS, Yusuf FO (2024). Life-cycle costing and sustainable construction decision-making in developing economies. *Journal of Sustainable Built Environment Studies*, 6(1), 45–58.

[3] Agboola SA, Idowu FA, Yusuf FM, Musa AK (2023). Barriers to sustainable green building practice in Nigeria. *FUDMA Journal of Sciences*, 7(6), 210–220.

[4] Akinola OA, Fagbenle OI (2021). Awareness and adoption of green building practices in Nigeria's construction industry. *International Journal of Construction Management*, 21(4), 310–322.

[5] Babatunde SO, Opawole A (2022). Policy implementation challenges in sustainable construction practices in Nigeria. *Built Environment Journal*, 18(1), 25–39.

[6] Chen L, Huang L, Hua J, Chen Z, Wei L, Osman AI, Fawzy S (2023). Green construction for low-carbon cities: A review. *Environmental Chemistry Letters*, 21, 1627–1657.

[7] International Energy Agency (IEA) (2023). Buildings: Tracking clean energy progress. *IEA*, Paris.

[8] Oladokun MG, Ayodele OJ (2023). Sustainable architectural design strategies in tropical climates. *Journal of Green Building Research*, 18(2), 112–126.

[9] Owolabi AB, Nwachukwu CO, Emodi NV (2024). Green construction materials and sustainable infrastructure delivery in Nigeria. *International Journal of Construction Innovation*, 9(1), 33–47.

[10] Unegbu HCO, Yawas DS, Dan-asabe B, Alabi AA (2024). Implementation of green building practices in Nigeria. *Journal of Management and Engineering Sciences*, 1(3), 85–97.