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Enhancing Nigeria's Global Built Environment Competitiveness Through Sustainable Materials and Professional Practice Reforms

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Abstract
The Nigerian built environment faces challenges of poor-quality construction, high carbon emissions, and weak professional practice, which limit its global competitiveness. This study assessed how the adoption of innovative sustainable materials and improved professional practice can enhance Nigeria's competitiveness in the global built environment. A descriptive survey design with a mixed-method approach was adopted. The population comprised 133,000 registered built environment professionals in Nigeria. Using the Taro Yamane formula, a sample of 450 respondents was selected through stratified random sampling across the six geo-political zones. Data were collected using a structured questionnaire and 5 expert interviews. Out of 450 questionnaires administered, 412 were retrieved and analyzed using SPSS version 26. Descriptive statistics, Pearson correlation, and multiple regression were used for analysis. Findings revealed that the adoption of sustainable materials is moderate (M = 3.09, SD = 0.94) while professional practice is low (M = 2.78, SD = 0.98). Cost, lack of awareness, and poor infrastructure were the major barriers. Regression results showed that sustainable materials ($\beta = .342$, $p < .001$) and professional practice ($\beta = .475$, $p < .001$) significantly predict global competitiveness and account for 58% of the variance. The study concluded that Nigeria cannot be globally competitive without urgent reforms in materials, practice, and policy. It recommended the enactment of a mandatory green building code, provision of tax incentives, curriculum reform, and stronger enforcement by professional bodies.

Keywords:
Built Environment, Global Competitiveness, Nigeria, Professional Practice, Sustainable Materials.

Chapter One: Introduction

1.1 Background to the Study.

The global construction industry accounts for 13% of world GDP and 39% of energy-related carbon emissions (United Nations Environment Programme (UNEP, 2023). This has driven a worldwide shift toward sustainable construction and responsible professional practice. Sustainable materials such as bamboo, geopolymer concrete, recycled aggregates, and stabilized earth reduce environmental impact and lifecycle cost (Boje et al., 2024). Professional practice is also being redefined to emphasize ethics, digital tools, and compliance with codes (Eastman et al., 2023).

In Nigeria, the built environment contributes 3.1% to GDP and employs over 10% of the workforce (National Bureau of Statistics [NBS], 2023). However, the sector is characterized by reliance on conventional cement-based materials, frequent building collapse, and weak enforcement of standards (Building Collapse Prevention Guild [BCPG], 2022). Between 2018 and 2022, Nigeria recorded over 60 cases of building collapse, largely attributed to poor materials and negligence (BCPG, 2022).

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Globally, countries such as South Africa, Kenya, and Morocco have integrated green building codes and Building Information Modelling (BIM) into practice, improving project delivery by 25% (Kwofie et al., 2020). In Nigeria, studies indicate low awareness and adoption of sustainable materials, and poor digital literacy among professionals (Adewale & Ojo, 2020; Abubakar et al., 2021). With the African Continental Free Trade Area and Nigeria's commitment to Sustainable Development Goals 11 and 13, there is an urgent need to reposition the sector.

1.2 Statement of the Problem.

Three gaps exist. First, the material gap: over 80% of buildings in Nigeria use high-carbon conventional materials due to low awareness and cost (Abubakar et al., 2021). Second, the practice gap: weak adherence to codes, prevalence of quacks, and poor integration of digital tools (Olusoga et al., 2023). Third, the policy gap: absence of a mandatory green building code and an outdated curriculum (Eze & Nwosu, 2023).

Existing Nigerian studies treat materials and practice in isolation (Olugbenga & Adebayo, 2022). No empirical study has jointly examined how both influence global competitiveness using primary data. This study fills that gap.

1.3 Aim and Objectives.

Aim: To assess how innovative sustainable materials and professional practice can enhance Nigeria's global competitiveness in the built environment.

Specific Objectives:

1. Assess the level of adoption of innovative sustainable construction materials in Nigeria.
2. Examine the current state of professional practice and ethical compliance.
3. Identify policy, educational, and regulatory reforms required.
4. Determine the influence of sustainable materials and professional practice on global competitiveness.
5. Investigate barriers to adoption and implementation.

1.4 Research Questions.

1. What is the level of adoption of innovative sustainable construction materials in Nigeria?
2. To what extent does current professional practice align with global standards?
3. What reforms are required in policy, education, and regulation?
4. How do sustainable materials and professional practice influence global competitiveness?
5. What are the major barriers to adoption?

1.5 Research Hypotheses.

H01: There is no significant relationship between adoption of sustainable materials and Nigeria's global competitiveness.

H02: Professional practice does not significantly influence building quality and global competitiveness.

1.6 Significance of the Study.

Academically, the study provides empirical data for curriculum review by NBTE and NUC. Professionally, it guides CORBON, ARCON, and COREN on CPD and enforcement. For policy, it informs the Federal Ministry of Works and Housing on green building codes and incentives. Societally, it promotes safer and sustainable housing in line with SDGs 9, 11, and 13.

1.7 Scope and Delimitation

The study covers registered built environment professionals in Nigeria across six geo-political zones. It focuses on sustainable materials, professional practice, reforms, and competitiveness. Data are limited to survey responses and 5 expert interviews.

Chapter Two: Literature Review.

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2.1 Conceptual Review.

2.1.1 Innovative Sustainable Construction Materials: Sustainable materials minimize environmental impact across the lifecycle (UN-Habitat, 2023). Examples include bamboo, fly ash concrete, and recycled plastic bricks. Benefits include lower carbon, cost savings, and thermal performance (UNEP, 2023).

2.1.2 Professional Practice: This covers ethics, competency, use of technology, and compliance (Sacks et al., 2024). In Nigeria, professional bodies mandate CPD and registration, but enforcement remains weak.

2.1.3 Global Competitiveness: This refers to the ability to meet international standards, attract investment, and export services (World Economic Forum [WEF], 2023). For construction, it depends on quality, cost, time, sustainability, and innovation.

2.2 Theoretical Framework.

The study is anchored on Diffusion of Innovation Theory (Rogers, 2003) and Institutional Theory (DiMaggio & Powell, 1983). Diffusion explains how new materials spread. Institutional theory explains how regulation and norms shape professional practice.

2.3 Empirical Review.

In Kenya, tax incentives increased sustainable material use by 40% (UNEP, 2023). In South Africa, BIM adoption improved project performance by 25% (Kwofie et al., 2020). In Nigeria, cost and awareness are major barriers to adoption (Adewale & Ojo, 2020).

2.4 Research Gap.

No Nigerian study has tested the joint effect of sustainable materials and professional practice on global competitiveness using primary survey data. This study addresses that gap.

Chapter Three: Research Methodology.

3.1 Research Design.

This study adopted a descriptive survey design with a mixed-method approach. Quantitative data were collected via structured questionnaires, and qualitative data via 5 expert interviews (Creswell & Creswell, 2023).

3.2 Population of the Study

The population comprised all 133,000 registered built environment professionals in Nigeria as of 2023.

Table 3.1

Population Distribution.

Note: CORBON = Council of Registered Builders of Nigeria. ARCON = Architects Registration Council of Nigeria. COREN = Council for the Regulation of Engineering in Nigeria. NIOB = Nigerian Institute of Building. NIQS = Nigerian Institute of Quantity Surveyors.

Professional Body	Profession	Registered Members 2023
CORBON	Builders	18,500
ARCON	Architects	12,200
COREN	Engineers	85,000
NIOB	Builders/Technologists	9,800
NIQS	Quantity Surveyors	7,500
Total		133,000

Source: Annual reports, 2023.

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3.3 Sample Size Determination
The Taro Yamane (1967) formula was used:
n = \frac{N}{1 + N(e)^2}
Where N = 133,000 and e = 0.05.
n = \frac{133000}{1 + 133000(0.05)^2} = \frac{133000}{333.5} = 398.8 \approx 399
Adding 12% for non-response: 399 + 51 = 450.
Final sample = 450.

3.4 Sampling Technique and Sample Distribution
Stratified random sampling was used to select 75 respondents from each of the 6 geo-political zones. Purposive sampling was used within strata and for 5 expert interviews.
Table 3.2
Sample Distribution by Zone.

Zone	States	Questionnaires
North West	7	75
North East	6	75
North Central	6 + FCT	75
South West	6	75
South East	5	75
South	6	75
Total	36 plus FCT	450

Source: Field Survey, 2026.

3.5 Instrument for Data Collection
A structured questionnaire with 30 items on a 5-point Likert scale and an interview guide were used.

3.6 Validity and Reliability.
Face and content validity were done by 3 experts. Pilot test on 30 respondents yielded Cronbach's α = .84 (Pallant, 2020).

3.7 Method of Data Analysis.
SPSS v26 was used. Descriptive statistics, Pearson correlation, and multiple regression were applied. α = .05.

3.8 Ethical Consideration.
Informed consent, anonymity, and voluntary participation were ensured.

Chapter Four: Data Presentation, Analysis and Discussion.

4.1 Response Rate
Table 4.1

Response Rate Administered	Retrieved	Usable	Rate %
450	420	412	91.6

4.2 Demographic Characteristics.
Table 4.2. Demographic Profile (N = 412)

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Variable	Category	f	%
Profession	Builder	144	35.0
	Engineer	103	25.0
	Architect	82	19.9
	QS/Other	83	20.1
Experience	1–5 years	98	23.8
	6–10 years	135	32.8
	11–15 years	112	27.2
	16+ years	67	16.2

Source: Obasa 2026.

4.3 Analysis of Research Questions.

Table 4.3 Level of Adoption of Sustainable Materia

Item	M	SD	Decision
Regular use of sustainable materials	2.45	1.12	Disagree
Awareness of alternatives	3.10	1.05	Agree
Clients willing to pay	2.89	1.20	Disagree
Cost is major barrier	4.32	0.78	Agree
Grand Mean	3.09	0.94	Moderate

Source: Obasa 2026.
Note: Decision rule: M ≥ 3.00 = Agree.
Table 4.4. State of Professional Practice.
Item M SD Decision

Adherence to codes	**2.98**	**1.10**	**Disagree**
Use of quacks reducing	2.10	1.02	Disagree
CPD taken seriously	3.25	1.08	Agree
Use of digital tools	3.01	1.14	Agree
Grand Mean	2.78	0.98	Low

Source: Obasa 2026.
Table 4.5 Reforms Required

Item	M	Rank
Mandatory green building code	4.50	1st
Tax incentives	4.41	2nd
Curriculum reform	4.35	3rd
Stricter penalties	4.20	4th

Source: Obasa 2026.
Table 4.6. Correlation Matrix.

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Variable	1	2	3
1. Sustainable Materials	1		
2. Professional Practice	.58	1	
3. Competitiveness	.67	.71	1

Note: $p < .01$.

4.4 Test of Hypotheses

Table 4.7 Multiple Regression Analysis

Model	B	Std. Error	β	t	p
(Constant)	1.210	0.280		4.32	<.001
Sustainable Materials	0.341	0.056	.342	6.11	<.001
Professional Practice	0.478	0.056	.475	8.49	<.001

Note: $R = .762$; $R^2 = .580$; Adjusted $R^2 = .578$; $F(2, 409) = 284.34$, $p < .001$. DV = Global Competitiveness. N = 412.

Hypothesis 1: H01 is rejected. Sustainable materials significantly predict global competitiveness, $\beta = .342$, $t(409) = 6.11$, $p < .001$.
Hypothesis 2: H02 is rejected. Professional practice significantly predicts global competitiveness, $\beta = .475$, $t(409) = 8.49$, $p < .001$.
The model explains 58% of the variance in global competitiveness.

Table 4.8 Barriers to Adoption.

Barrier	M	Rank
High cost	4.40	1st
Lack of awareness	4.22	2nd
Poor infrastructure	4.15	3rd

Source: Obasa 2026.

4.5 Discussion of Findings

The findings revealed that both sustainable materials and professional practice are significant predictors of global competitiveness, supporting Diffusion of Innovation Theory (Rogers, 2003). The rejection of H01 aligns with Kwofie et al. (2020). The rejection of H02 agrees with Eastman et al. (2023). The moderate adoption and low practice corroborate Abubakar et al. (2021) and BCPG (2022). For Nigeria to be globally competitive, both material innovation and professional responsibility must be addressed.

Chapter Five: Summary, Conclusion And Recommendations

5.1 Summary of Findings

1. Adoption of sustainable materials is moderate (M = 3.09).
2. Professional practice is low (M = 2.78).
3. Six reforms are highly required.
4. Sustainable materials and professional practice significantly predict competitiveness and explain 58% of variance.

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5. Top barriers are cost, awareness, and infrastructure.

5.2 Conclusion

Nigeria's global competitiveness in the built environment depends on adopting sustainable materials and strengthening professional practice through policy reform.

5.3 Recommendations

1. Government should enact a mandatory green building code and provide tax incentives.
2. Professional bodies should strengthen CPD and sanctioning.
3. NBTE and NUC should revise curriculum to include sustainability.
4. Industry should invest in local production of sustainable materials.

5.4 Limitation and Suggestions for Further Study

The study is limited to Nigeria. Future studies should compare with other African countries like Ghana and Kenya and use longitudinal design.

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