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Beyond Affordability: A Statistical Analysis of Psychological and Institutional Barriers to ISSB Adoption in Nigeria's Construction Industry

***Obafemi A. Ibitoye[1], Gabriel Olaoye[2], Victoria T. Ogunleye[3], Temiloluwa O. S. Owolabi[4] & Adekunle S. Babamboni[5]**

[1,2,3,4,5] Department of Architecture, College of Environmental Science and Management, Caleb University, Imota, Ikorodu, Lagos, Nigeria
[*]Corresponding Author: obafemi.ibitoye@calebuniversity.edu.ng (+234 813 835 5721)

Abstract

Despite the growing emphasis on sustainable building materials, the uptake of Interlocking Stabilized Soil Blocks (ISSBs) in Nigerian construction remains minimal. This study investigates the psychological and institutional barriers that impede ISSB adoption, using a mixed-methods approach grounded in Innovation Diffusion Theory. A structured questionnaire was administered to 133 stakeholders, including architects, builders, and policymakers, to assess their perceptions, knowledge levels, and awareness of ISSB-related constraints. The study employed descriptive statistics, reliability analysis, and Spearman's rho correlation to analyze the data. Findings reveal moderate awareness but significant knowledge gaps: 50.4% of respondents reported moderate knowledge of ISSBs, while only 18.8% had very good knowledge. Stakeholders positively perceived ISSBs for their aesthetic appeal (66.2%) and thermal insulation (62.4%), but expressed concerns about low-cost claims (40.6%), limited market availability (48.1%), and required training (41.6%). Key institutional barriers include a lack of awareness of ISSB benefits (55.3%), insufficient technical expertise (51.1%), and resistance to traditional shift (50.4%). A Spearman's rho test identified statistically significant but weak positive correlations between: Self-reported knowledge and perception of thermal insulation ($\rho = .174$, $p = .045$), and perceived lack of technical support and thermal insulation awareness ($\rho = .191$, $p = .028$). No significant relationship was found between knowledge and recognition of technical support challenges ($\rho = .057$, $p = .518$), suggesting a disconnect between perceived expertise and institutional awareness. The findings underscore the need for targeted educational campaigns, hands-on training, and government-led incentives. While ISSBs are valued for their performance and sustainability, adoption remains hindered by psychological resistance and systemic inefficiencies. Enhancing stakeholder knowledge and addressing technical support limitations could bridge the gap between awareness and implementation, promoting wider ISSB adoption in Nigeria's construction sector.

Keywords: *Interlocking Stabilized Soil Blocks (ISSBs), Innovation Diffusion Theory, Sustainable Construction, Institutional Barriers, Stakeholder Perceptions*, Psychological Barriers, Construction Material Adoption, Nigeria Housing Sector.

INTRODUCTION

Nigeria's housing sector continues to struggle with three intertwined challenges: high construction costs, environmental degradation, and a significant shortfall in shelter supply. Current estimates suggest that over 1.5 million new units are required annually to meet demand, but formal housing initiatives fall significantly short (Tamunoikuronibo & Anthony, 2023). This deficit contributes to widespread informality and poor living conditions, driving the urgency for alternative building solutions. Interlocking Stabilized Soil Blocks (ISSBs) have emerged as a sustainable, locally sourced alternative to conventional fired or sandcrete blocks. (Ibitoye, 2025; Ibitoye, Abiola, & Babamboni, 2023). Produced from laterite or clay and stabilized with minimal cement, ISSBs boast environmental, economic, and social advantages: they significantly reduce the carbon footprint, cut construction costs by 20–48 percent, support rural livelihoods through local production, and improve thermal comfort (A et al., 2023); (Ibitoye et al., 2023).

Despite demonstrated benefits and policy endorsement, ISSB adoption in Nigeria remains disappointingly limited. Comparative studies indicate a high cost–performance ratio for ISSBs (Olaleye & Ibitoye, 2023), yet uptake remains low, a gap that cannot be accounted for by technical or economic metrics alone. This disjunction suggests the influence of psychological, sociocultural, and institutional barriers such as distrust of earth-based materials, perception of inferiority, inconsistent regulatory frameworks, and stakeholder inertia. While technical performance and cost remain critical, research shows that material adoption in the built environment is often hampered by "soft" barriers: community attitudes, cognitive biases, regulatory ambiguity, and institutional inertia. In Nigeria, these factors remain largely undocumented in ISSB discourse. Attention is needed to illuminate whether limited trust, social stigma, or lack of enforcement mechanisms hinder acceptance even when technical and affordability thresholds are met. Broader studies on innovative building materials in Nigeria echo this finding, highlighting a lack of awareness, insufficient training, and cultural resistance as key impediments to sustainable material adoption (Mogaji et al., 2024).

This study examines the psychological and institutional barriers that impede ISSB adoption in Nigerian construction. It seeks to move beyond cost and technicality to highlight deeper, often-overlooked dimensions influencing stakeholder decisions. Specifically, the study aims to:

i. Assess stakeholder perceptions and attitudes toward ISSBs using statistical techniques.
ii. Identify institutional constraints affecting ISSB integration into policy and building regulations.
iii. Analyze the influence of stakeholder knowledge and perceptions on the perceived benefits and drawbacks of ISSBs

By providing an in-depth quantitative exploration of these dimensions, this research reframes ISSB adoption from a merely technological or economic concern to a holistic challenge requiring sociocultural and policy-driven solutions.

LITERATURE REVIEW

ISSB Technology in Sub-Saharan Africa

Interlocking Stabilized Soil Blocks (ISSBs) have gained traction across several sub-Saharan African countries as a viable alternative to conventional masonry materials. ISSBs offer economic benefits such as reduced production and transportation costs, environmental sustainability due to minimal cement use and the absence of firing, and ease of use in low-tech construction environments (Ibitoye, 2025; Ibitoye et al., 2023). Despite these advantages, widespread adoption remains low, particularly outside pilot or donor-based programs. Comparative research in Southwest Nigeria shows that architects recognize ISSB's strong thermal comfort and cost-efficiency, yet uptake remains restrained by a lack of visibility and professional familiarity (Olaleye & Ibitoye, 2023). Similarly, acoustic performance studies conducted by Mbimda, Danjuma, and colleagues confirm ISSB's competitive sound-insulation qualities (sound absorption coefficients 0.71–0.99) but also highlight the ongoing absence of formal building regulations and institutional support (A et al., 2023). These findings underscore the critical role of trust, awareness, and regulatory clarity in disseminating ISSB technology beyond demonstration stages.

Existing Studies on Affordability and Performance

ISSB adoption literature often emphasizes affordability and structural performance. Comparative analyses show that ISSBs can reduce overall construction costs by up to 40% and offer better thermal insulation compared to sandcrete blocks (Ibitoye et al., 2021., Ibitoye et al., 2022; Ibitoye, 2025). These features make them suitable for Nigeria's hot climate and housing deficit. However, the overemphasis on affordability overlooks deeper adoption dynamics. Many builders continue to choose more expensive but "socially accepted" materials like sandcrete, suggesting that rational economic arguments alone are insufficient. This gap hints at the relevance of non-technical variables influencing decision-making.

Psychological, Sociocultural, and Institutional Barriers

Psychological and sociocultural attitudes significantly influence material choice in construction. In Nigeria, perceptions of soil-based materials as "poor man's architecture" remain pervasive, even with policy support for alternatives (Nwaki, Sofolahan & Eze, 2023). Negative perceptions are reinforced by a lack of visibility in urban projects, durability doubts, and a preference for "modern" aesthetics (Aghimien

et al., 2018). At the institutional level, the absence of clear regulatory pathways for ISSB use creates ambiguity. Although the National Building Code was introduced in 2006, its inconsistent domestication and enforcement at the state and local levels continue to discourage professionals concerned about approval and liability (Uwaegbulam, 2018). Moreover, there is often a disconnect between government research institutes (e.g., NBRRI) and mainstream construction stakeholders, including architects, developers, and local authorities. This fragmentation limits knowledge transfer and weakens ISSB's legitimacy within the formal construction system (Ibitoye, Abiola & Babamboni, 2023).

Theoretical Framework: Innovation Diffusion Theory

To frame these challenges, Everett Rogers' Innovation Diffusion Theory (IDT) offers a useful lens. According to IDT, innovation adoption depends on perceived attributes relative advantage, compatibility, complexity, trialability, and observability (Nimako et al., 2016). ISSBs may rank high on relative advantage but low on observability and compatibility with entrenched aesthetic norms. Empirical studies suggest that increasing trialability and visibility of ISSB projects (e.g., through demonstration buildings and celebrity endorsements) significantly improves community trust (Ibitoye et al., 2021). Understanding where ISSBs fall short across these attributes can help tailor interventions that go beyond technical promotion.

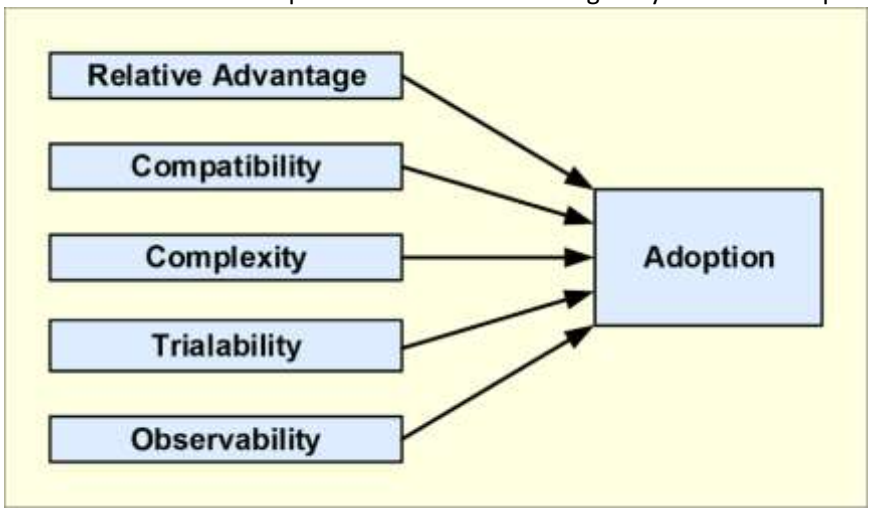

Figure 1: ISSB Characteristics Based on IDT
Source: (Hadwer et al., 2021)

RESEARCH METHOD

This study adopted a mixed-method approach with a quantitative emphasis, aimed at dissecting non-economic barriers and psychological and institutional barriers that inhibit the uptake of interlocking stabilized soil blocks (ISSB) in Nigerian construction. The design enabled statistical analysis and contextual interpretation of users' and professionals' perceptions. Primary data were gathered using a structured questionnaire, designed based on prior literature and validated by experts in construction and behavioural studies. The survey was distributed across three key stakeholder groups: construction professionals, prospective homeowners, and policymakers. A total of 133 valid responses were obtained through purposive sampling, focusing on respondents with at least basic awareness of alternative construction methods. This included built environment professionals, end-users, and government/NGO stakeholders involved in housing delivery or planning.

Dependent Variable: Perceived prospect of ISSB adoption

Independent Variables:

i. Psychological Barriers: Skepticism, aesthetic preference, fear of novelty, perceived durability
ii. Institutional Barriers: Absence of standards, regulatory uncertainty, lack of training, policy inconsistency

Each variable was measured using a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). Data were analyzed using SPSS. Descriptive statistics, including frequencies, means, and standard deviations, were used to identify trends in respondents' perceptions of ISSBs. These statistical summaries provided

insights into the psychological and institutional factors influencing stakeholder perceptions and the perceived prospects for ISSB adoption.

RESULTS AND DISCUSSION

This section presents and interprets the empirical findings from the survey conducted to assess the psychological and institutional barriers to the adoption of Interlocking Stabilized Soil Blocks (ISSBs) in Nigerian construction. The analysis explores how perceptions, knowledge, and systemic constraints influence stakeholders' attitudes and decisions regarding the material's uptake. The data were drawn from 133 respondents comprising professionals across the architecture, engineering, planning, and construction sectors.

Demographic Profile of Respondents

Tables 1–3 indicate that most respondents (70%) are within the 29–50-year age bracket, and 63.9% are male, which mirrors the broader gender imbalance in Nigeria's construction industry (Aghimien et al., 2018). The educational profile reveals that over 87% have tertiary education, confirming the respondent pool's technical awareness and potential influence on material choices and policy implementation (Mogaji et al., 2024).

Table 1: Respondents' Age Distribution

		Frequency	Percent	Cumulative Percent
Valid	18-28	21	15.8	15.8
	29-39	46	34.6	50.4
	40-50	47	35.3	85.7
	51-61	15	11.3	97.0
	62 and above	4	3.0	100.0
	Total	133	100.0	

Source: Author's SPSS Output

Table 2: Respondents' Gender Distribution

		Frequency	Percent	Cumulative Percent
Valid	Male	85	63.9	63.9
	Female	48	36.1	100.0
	Total	133	100.0	

Source: Author's SPSS Output

Table 3: Distribution of Respondents, Highest Level of Education Attained

		Frequency	Percent	Cumulative Percent
Valid	Bachelor	52	39.1	39.1
	Masters	51	38.3	77.4
	Diploma	12	9.0	86.5
	Doctorate Degree	13	9.8	96.2
	Secondary School	5	3.8	100.0
	Total	133	100.0	

Source: Author's SPSS Output

A well-educated sample: Bachelor's degree: 39.1%, master's degree: 38.3% and Doctorate degree: 9.8%. This indicates that over 87% of respondents had tertiary education, suggesting an informed stakeholder group with potential influence over design, policy, or construction processes.

Objective 1: Stakeholder Perceptions and Attitudes Toward ISSBs

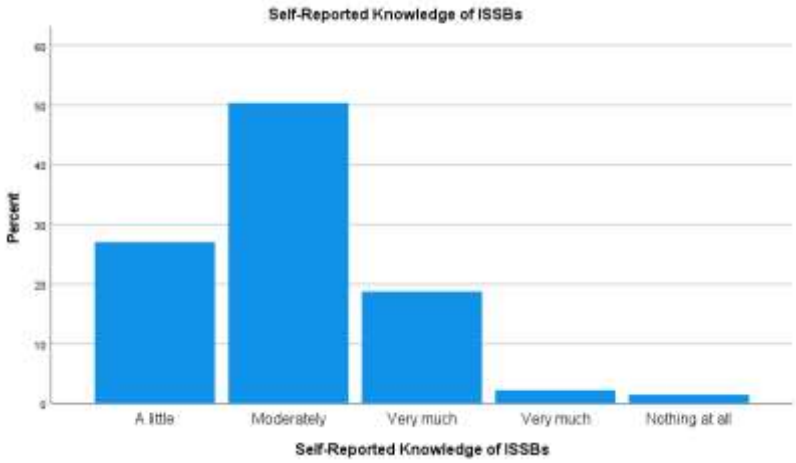

Figure 2: Bar chart of Self-reported knowledge

Source: Author's SPSS Output

As shown in Table 4 and Figure 2, 50.4% of respondents reported moderate knowledge of ISSBs, while only 2.3% claimed extreme familiarity, and 1.5% had no knowledge. These results align with Ibitoye et al. (2023), who observed a low level of public sensitization in housing estates built with ISSB technology. Although ISSBs are not entirely unknown, knowledge gaps persist, especially outside academia or research-led initiatives.

Table 4: Frequency distribution of Self-Reported Knowledge of ISSBs

		Frequency	Percent	Cumulative Percent
Valid	A little	36	27.1	27.1
	Moderately	67	50.4	77.4
	Very much	25	18.8	96.2
	Extremely	3	2.3	98.5
	Nothing at all	2	1.5	100.0
	Total	133	100.0	

Source: Author's SPSS Output

Cronbach's Alpha = 0.759 for the 5 Likert items, indicating acceptable internal consistency in perception-related questions.

Table 5: Reliability Test Results

Reliability Statistics	
Cronbach's Alpha	N of Items
.759	5

Source: Author's SPSS Output

Table 6 shows that 66.2% agreed ISSBs have aesthetic appeal and 62.4% acknowledged their thermal insulation potential. These perceptions support findings by A. B. V. et al. (2023), who demonstrated ISSBs' favorable acoustic and thermal properties in experimental studies, reinforcing their suitability for hot, humid climates. However, only 40.6% agreed that ISSBs are low-cost materials, with 41.4% remaining neutral. This uncertainty may reflect variability in production costs and the price of press machinery (Ibitoye, Dare-Abel, & Alagbe, 2021., Ibitoye et al., 2022). While ISSBs offer long-term affordability, initial costs can distort perceptions, particularly in markets where sandcrete remains subsidized or mass-produced. The limited market availability (48.1% agreement) corroborates Nwaki, Sofolahan, and Eze's (2023) study, which emphasized supply chain fragmentation as a persistent inhibitor to earth-based material adoption. Furthermore, only 41.6% believed ISSBs require minimal training, indicating technical

ambiguity. This echoes Sina (2016), who identified a lack of widespread understanding of ISSB production processes as a significant adoption barrier.

Table 6: Distribution of Stakeholder Agreement on Perceived Attributes of Interlocking Stabilized Soil Blocks (ISSBs)

ISSB Attribute	Agree + Strongly Agree (%)	Neutral (%)	Disagree + Strongly Disagree (%)
Aesthetic Appeal	66.2%	18.8%	15.1%
Thermal Insulation	62.4%	23.3%	14.3%
Low-Cost Material	40.6%	41.4%	18.0%
Limited Availability in the Market	48.1%	28.6%	23.3%
Requires minimal specialized training	41.6%	28.0%	30.1%

Source: Author's SPSS Output

Objective 2: Institutional Constraints Affecting ISSB Policy Integration

As shown in Table 7, stakeholders highlighted several institutional and psychological obstacles:

i. Lack of awareness of ISSB benefits (55.3%)
ii. Lack of technical expertise (51.1%)
iii. Resistance to traditional material shift (50.4%)
iv. Limited availability (48.1%)
v. High cost of ISSB press (48.8%)

These align with the findings of Mogaji et al. (2024), who noted that innovation in Nigerian construction is frequently hampered by risk aversion, poor knowledge diffusion, and cost-related anxieties. The prominence of resistance to change reflects the deep-rooted preference for sandcrete and the perception of ISSBs as non-mainstream a trend also observed by Olaleye and Ibitoye (2023). Lack of government incentives emerged as a major concern, with 39.4% stating there are none, and 32.6% uncertain. This aligns with Uwaegbulam (2018), who emphasized delays in implementing Nigeria's building code and the absence of a clear regulatory framework to support alternative materials like ISSBs. The perceived lack of technical expertise also mirrors Isaac Fundi et al. (2018), who found that failure characteristics of ISSB walls were often linked to improper training or unstandardized block sizes, underscoring the need for capacity-building initiatives to improve quality control.

Table 7: Stakeholder Perceptions of Psychological and Market-Related Constraints to ISSB Adoption

Constraint	Agree + Strongly Agree (%)	Neutral (%)	Disagree + Strongly Disagree (%)
Lack of Knowledge	44.3%	37.6%	18.0%
Lack of Awareness of Benefits	55.3%	30.3%	14.3%
Limited Availability in the Market	48.1%	28.6%	23.3%
Resistance to Traditional Shift	50.4%	27.1%	22.5%
High Cost of ISSB Press	48.8%	24.1%	27.0%
Lack of Technical Expertise	51.1%	29.3%	19.5%
Lack of Government Incentives	39.4% say "No"	32.6% "Not sure"	28.0% "Yes"

Source: Author's SPSS Output

Table 8: Cross-tabulation analysis of Respondents' Education Level and Perception of Indoor Air Quality of ISSB Walls

Count							
		The ISSB wall has good indoor air quality					
		Strongly Disagree (SD)	Disagree (D)	Neutral (N)	Agree (A)	Strongly Agree (SA)	Total
Highest Level of Education Attained	Bachelor	1	3	16	18	14	52
	Masters	3	9	5	23	11	51
	Diploma	0	0	3	6	3	12
	Doctorate Degree	3	1	3	3	3	13
	Secondary School	0	2	0	2	1	5
Total		7	15	27	52	32	133

Source: Author's SPSS Output

Respondents with bachelor's and master's degrees made up the majority of those who agreed or strongly agreed that ISSBs provide good indoor air quality. While opinions were somewhat scattered among PhD holders, the results suggest that higher educational attainment generally correlates with favourable perception, particularly among graduates with practical exposure.

Objective 3: Analyze the influence of stakeholder knowledge and perceptions on the perceived benefits and drawbacks of ISSBs

To explore how stakeholder knowledge correlates with their perceptions of the benefits and drawbacks of Interlocking Stabilized Soil Blocks (ISSBs), a Spearman's rho correlation analysis was conducted on three variables:

1. Self-Reported Knowledge of ISSBs
2. Perception of Limited Technical Support in ISSB Construction
3. Perception that ISSB Walls Have Good Thermal Insulation Properties

Table 9: Spearman's Rank-Order Correlation between Self-Reported Knowledge, Technical Support, and Perceived Thermal Insulation of ISSB Walls (N = 133)

Correlations					
			Self-Reported Knowledge of ISSBs	Limited technical support in ISSB construction	ISSB walls have good thermal insulation properties
Spearman's rho	Self-Reported Knowledge of ISSBs	Correlation Coefficient	1.000	.057	.174*
		Sig. (2-tailed)	.	.518	.045
		N	133	133	133
	Limited technical support in ISSB construction	Correlation Coefficient	.057	1.000	.191*
		Sig. (2-tailed)	.518	.	.028
		N	133	133	133
	ISSB walls have good thermal insulation properties	Correlation Coefficient	.174*	.191*	1.000
		Sig. (2-tailed)	.045	.028	.
		N	133	133	133
*. Correlation is significant at the 0.05 level (2-tailed).					

Source: Author's SPSS Output

A significant positive correlation exists between self-reported knowledge of ISSBs and the perception that ISSB walls offer good thermal insulation (ρ = .174, *p* = .045). This suggests that individuals who consider themselves more knowledgeable about ISSBs are more likely to recognize their thermal comfort advantages. Similarly, there is a significant positive correlation between the perception of limited technical support and recognition of thermal insulation benefits (ρ = .191, *p* = .028). This implies that even though respondents perceive a lack of technical support as a drawback, those who acknowledge this issue are also more aware of ISSBs' thermal benefits, possibly due to greater engagement or deeper reflection on their use. However, there is no statistically significant correlation between self-reported knowledge and the perception of limited technical support (ρ = .057, *p* = .518). This indicates that even those with high self-rated knowledge may not necessarily recognize technical support challenges, suggesting a disconnect between perceived expertise and awareness of systemic implementation issues.

These findings reveal nuanced stakeholder perspectives on ISSBs:

a. The weak but statistically significant link between knowledge and recognition of thermal benefits supports the idea that awareness and education can positively shape perceptions of ISSBs' performance.
b. Interestingly, awareness of drawbacks like limited technical support does not appear to be influenced by how knowledgeable a stakeholder feels. This might imply that technical constraints are either underreported or underestimated, especially by those who view ISSBs favorably.
c. The coexistence of perceived benefits and challenges in stakeholders' views indicates that promotion of ISSBs should not only highlight their environmental and comfort advantages but also acknowledge and address implementation barriers, such as access to skilled labor, tools, and maintenance know-how.

Implications for Design and Policy

i. Capacity building and hands-on demonstrations could bridge the gap between perception and practical understanding, ensuring stakeholders develop realistic expectations and problem-solving capabilities for ISSB construction.
ii. Policy advocacy should focus on institutionalizing support systems, technical training, user manuals, and professional networks to scale adoption without compromising performance or user confidence.

CONCLUSION

This study has illuminated the complex interplay of psychological and institutional factors that shape the adoption or lack thereof of Interlocking Stabilized Soil Blocks (ISSBs) in Nigeria's construction sector. While the technical merits of ISSBs, such as thermal comfort and visual appeal, are acknowledged by most stakeholders, non-technical barriers continue to stifle their mainstream use. The research confirms that adoption is not simply a matter of material performance, but a function of stakeholder perceptions, cultural familiarity, and institutional legitimacy. Notably, the study finds that misinformation about cost, low public awareness, and the absence of formalized training or standards discourage professionals and clients alike. Furthermore, institutional inertia manifested in weak regulatory backing and fragmented promotion prevents ISSBs from gaining policy traction. These insights affirm the relevance of Innovation Diffusion Theory in analyzing construction technology uptake, particularly the role of observability, trialability, and compatibility in fostering or hindering innovation diffusion.

ISSBs face both a perception problem and a policy gap. Without targeted interventions to build trust, improve visibility, and establish regulatory frameworks, their adoption will remain piecemeal, despite their sustainability potential.

RECOMMENDATIONS

1. **Awareness and Education Campaigns**

Launch multi-level advocacy programs that include stakeholder workshops, public seminars, and social media campaigns to demystify ISSB construction and highlight its benefits. Demonstration sites and pilot projects in urban and peri-urban areas can provide tangible proof of performance.

2. **Curriculum Integration and Vocational Training**

Incorporate ISSB technology into architecture, engineering, and technical school curricula. Vocational centers should offer hands-on training to masons, builders, and artisans to build skill confidence and dispel myths about complexity.

3. **Policy Mainstreaming and Code Inclusion**

Lobby for the inclusion of ISSBs in Nigeria's National Building Code and local urban planning policies. Standardization and certification mechanisms should be developed in collaboration with professional bodies to boost legitimacy and regulatory support.

4. **Incentivization and Subsidies**

Government and private sector actors should provide incentives such as tax rebates, subsidies, or fast-tracked approvals for projects that incorporate ISSBs. Such policy tools can accelerate diffusion by lowering initial resistance among developers.

5. **Strategic Partnerships and Local Production Hubs**

Encourage partnerships between the government, NGOs, and private firms to establish ISSB production hubs across regions. Localized manufacturing can address availability challenges and reduce transportation costs, making ISSBs more competitive.

6. **Further Research and Impact Assessment**

Future studies should explore user satisfaction in existing ISSB buildings, the life-cycle cost comparison with conventional materials, and psychological adoption patterns across rural and urban demographics. This would enrich the empirical base for policy advocacy.

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