

Sustainable Building Processes: Challenges and Strategies in Ghana Using the Relative Importance Index

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Abstract

This study aims to identify the main challenges and strategies for promoting sustainable building practices in the construction industry. Based on survey data from 314 respondents, the research used the Relative Importance Index (RII) to rank strategies and conducted factor analysis to group both challenges and interventions. Results showed that high construction costs, financing issues, weak regulatory systems, lack of technical expertise, and poor stakeholder collaboration are the most significant barriers. Regarding strategies, government incentives and subsidies, capacity building, and stronger policies and regulations were found to be the most effective measures for advancing sustainable building practices.

Keywords: RII, sustainability, building, process, strategy

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1. Introduction

Sustainable Construction is an important global strategy for combating climate change and optimising resource use. According to expert analysis, the construction sector is one of the biggest contributors to carbon emissions, energy consumption, and resource depletion in the world (Opoku et al., 2019). As a result, governments, industries, and research have increasingly promoted an emphasis on sustainable buildings with eco-friendly materials and energy-efficient technologies that are lifecycle-thinking (Murtagh et al., 2016). Sustainable construction helps to lessen the impact on the environment. It helps lower operational costs and improve the health and productivity of occupants. The construction sector is still facing significant challenges in achieving transformational growth from conventional to sustainable practices despite growing sustainability imperatives. Many things are stopping this from becoming popular. One of these is the high initial investment cost. Green technologies are not abundantly available. Other things limiting this are a lack of skilled labor, weak and unfit regulatory frameworks, and low client awareness (Maqbool & Amaechi, 2022). The industry's fragmented structure makes it difficult to incorporate sustainability principles in the life cycle of a project, from design and procurement through to construction and demolition (Hussin et al., 2013). Developed countries have made progress in implementing green building standards and certifications, but developing countries have not been able to do so successfully due to a lack of capacity and institutions, as well as weak knowledge transfer. According to scholars, challenges differ in terms of their impact and frequency, which calls for methodological approaches capable of determining their level of importance (Ahn et al., 2010). The Relative Importance Index (RII) has been commonly used in construction management research for ranking the barriers, while factor analysis is a statistical method to cluster the interrelated issues into broader groups for strategic intervention (Ayarkwa et al., 2022). Using these options provides you with a systematic way to rank and classify sustainability challenges and the solutions to tackle them.

Sustainable construction has been a hot topic in academia and industry. However, it has seen very little uptake, especially in developing economies. In a wide range of countries, it has been reported that building projects are perceived as expensive and require more capital than conventional buildings (Baloi, 2003). This perception leads investors, developers, and clients to avoid sustainable options that slow the industry's environmental footprint cuts. Lack of financial incentives and weak governmental support systems discourage stakeholders from adopting sustainability (Maqbool & Amaechi, 2022). Due to this disparity, as more nations commit to the SDGs (specifically SDG 11), public rhetoric is not matched by data that reflect the reality and situation of cities, especially in developing countries. The construction industry faces a chronic shortage of technical know-how and expertise transfer. Contractors, consultants, and developers often lack sufficient training to use sustainable technologies and practices. This lack is harmful to the design, implementation, and upkeep of green projects (Ahn et al., 2010). Clients and users are not aware. They do not do sustainability in decision-making. They do

not know. Besides, laws are poorly implemented in developing economies due to a weak institutional and regulatory framework, or do not exist at all. (Rydin et al., 2007) This leads stakeholders to resist the solution and prioritize short-term cost savings over long-term environmental and social benefits. If these systemic issues are not addressed, the agenda of sustainable construction will always remain an aspiration.

Moreover, multiple strategies have been advanced to overcome sustainability problems, but there is little agreement on their ranking or effectiveness in specific contexts. Certain studies stress policy reforms and their incentives, others focus on awareness campaigns, technical trainings, or other innovative financing mechanisms (Ding, 2008). If a systematic approach to ranking these strategies with the challenges is not undertaken, decision-makers may not know where to deploy scarce resources. This uncertainty is hampering the drive for the faster adoption of sustainable buildings, creating policy and industry inefficiencies. While existing studies have developed an understanding of the challenges in sustainable building, few have applied the Relative Importance Index (RII) and factor analysis in a complementary way to rank and categorize challenges and strategies systematically. Most of the studies Ayarkwa et al. (2022) On a similar subject, concentrate on either barriers without prioritisation or strategies without contextual relevance. Most studies worldwide have been conducted in developed economies rather than in emerging economies. The lack of studies is attributed to different regulatory frameworks and market conditions in those places. This creates a gap in the literature, as localized, data-driven insights are necessary to guide policymakers, practitioners, and stakeholders in contexts where resources and institutional capacities are limited. This study addresses this gap by employing RII and factor analysis to provide a comprehensive ranking and clustering of challenges and strategies in sustainable building processes. This study is significant because it provides empirical evidence on the prioritization of challenges and strategies in sustainable building, offering policymakers, practitioners, and stakeholders a structured framework for decision-making toward enhancing sustainability adoption in the construction sector. The questions this study answered are: What are the main challenges affecting the adoption of sustainable building processes? How can these challenges be ranked using the Relative Importance Index (RII)? What strategies are perceived as effective in addressing these challenges? How can factor analysis be used to group challenges and strategies into broader, actionable categories?

2 Literature Review

2.1 Concept of Sustainable Building

Sustainable building, also known as green construction, is the design, construction, performance, and maintenance of buildings in ways that reduce environmental impact and improve social and economic performance (Roostaie et al., 2019). Sustainability in the construction industry has become a critical concern because the sector generates substantial resources, waste, and greenhouse gases, which negatively impact global development (Zhang et al., 2019). Green buildings are usually designed with energy-saving systems, green energy, water-saving, and green materials (Nicholson & Kurucz, 2019). In addition to environmental benefits, sustainable building processes also enhance the health, productivity, and comfort of occupants (Goodier et al., 2022). Consequently, sustainability in the construction sector is being increasingly defined as a multi-faceted phenomenon with environmental, economic, and social pillars. However, a change in institutional structures, industry patterns, and stakeholder attitudes is a substantial requirement for transformation to sustainable construction rather than conventional construction. These underlying problems demand that the challenges and strategies affecting the adoption of sustainable buildings be identified and analysed.

2.2 Challenges to Sustainable Building Adoption

Various barriers to implementing sustainable building practices have been identified in multiple studies across different settings. The high initial costs of green materials, advanced technologies, and certification procedures are among the most common issues. Stakeholders often see sustainable projects as economically unfeasible, even though the long-term savings in operational costs can offset start-up expenses. These barriers are further compounded by limited technical knowledge and a shortage of professionals trained in sustainable technologies, especially in developing economies. Adoption is also hindered by weak policy frameworks and poor enforcement of sustainability standards, since contractors and developers are not compelled to follow voluntary principles. Additionally, cultural and social resistance to change, along with low awareness among clients, reduces demand for sustainable solutions. All these factors demonstrate that achieving sustainability in construction is complicated by a multitude of economic, technical, institutional, and social challenges.

2.3 Strategies for Promoting Sustainable Building

To address the challenges that hinder the adoption of sustainable building processes, researchers and practitioners have proposed several strategies. The role of policy interventions in creating an enabling

environment for sustainability is often viewed as essential. Building capacity and providing training are also crucial to equip professionals with the technical knowledge needed to implement sustainable technologies effectively. Changing demand patterns can be achieved by raising social awareness, informing clients about the long-term benefits of sustainable buildings, and inspiring them to invest in green construction. Additionally, sustainability can be integrated into procurement and contractual specifications to require industry players to adopt green practices. Joint efforts from governments, the private sector, and non-governmental organizations have also been developed to promote innovation and best practices. Although these strategies are relevant and effective, they are relative, making it important to conduct empirical studies that rank them based on stakeholder perspectives. It is particularly important to conduct empirical studies that rank them according to stakeholders' views.

2.4 Methodological Approaches: RII and Factor Analysis

The Relative Importance Index (RII) has been widely used in construction management research to assign priorities to challenges, risks, or strategies based on stakeholders' perceptions. RII is particularly useful when evaluating items on a Likert scale, as it offers a simple yet effective tool to identify the most critical factors (Ayarkwa et al., 2022). It has also been recognized as a method for prioritizing sustainability issues such as costs, lack of expertise, and ineffective regulations (Tetteh-Agblakah, 2024). Conversely, factor analysis is a supplementary statistical technique used to group related variables into broader dimensions or categories. This approach helps uncover latent structures within the data, allowing researchers to simplify complex issues into manageable themes (Roostaie et al., 2019). Combining RII with factor analysis provides a powerful methodological framework for ranking specific challenges and grouping them into larger categories. This integration enhances the interpretation and supports the development of effective policy and strategic recommendations.

2.5 Empirical Studies on Sustainable Building Challenges and Strategies

Empirical studies of sustainable building processes reveal both similarities and differences across various regions. One key factor often highlighted by studies in developed economies is the interplay among regulatory compliance, technological innovation, and market demand. In contrast, issues in developing nations are more urgent and include limited financial resources, low awareness, and institutional flaws. Specifically, studies have shown that the lack of expertise and financial incentives are among the most pressing problems in emerging markets. Similarly, data indicate that cost-related issues are most prominent among stakeholders in Asia, while regulatory implementation is crucial in Africa. Regarding strategies, empirical evidence suggests that training, awareness campaigns, and government incentives are consistently prioritized interventions. However, the success or failure of these strategies depends on local variables such as the economy, government, and cultural beliefs about sustainability. These findings underscore the importance of local research that employs systematic approaches, such as RII and factor analysis, to identify localized priorities.

Although the current literature has played a major role in advancing on the issue of sustainable building and strategies, there are still numerous gaps. To start with, numerous studies have been aimed at determining the challenges or offering strategies without prioritising them in a logical way (Anzagira et al., 2019). Second, the joint application of RII and factor analysis to prioritise and classify issues and approaches is rather under-researched, particularly when it comes to emerging economies (Lamptey et al., 2021). Third, most empirical research focuses on the developed world, and there are fewer studies on areas where sustainability adoption is most limited. The solution to such gaps must be approached through a methodological approach that combines ranking and categorization to provide policymakers and industry stakeholders with viable information. This gap can be filled by the given paper, which will serve as a step forward in the sphere of sustainable building discussion and can provide an operative set of recommendations to increase the interest of adopting the technology in the conditions of limited resources.

3. Methodology

The research design applied in this paper is quantitative, systematically identifying, ranking, and categorising the issues and solutions of sustainable building processes. The survey methodology was used because it was necessary to gather organised data using a large sample size of experts in the construction sector. The quantitative design is suitable, as the study aims to assess stakeholders' perceptions of the challenges and strategies using a Likert scale, which would allow ranking the factors statistically and grouping them. It is also a design that is objective and enables the use of more sophisticated statistical techniques, including the Relative Importance Index (RII) and factor analysis, to gain meaningful conclusions.

The study group comprised construction practitioners, such as architects, engineers, contractors, Consultants, project managers, and policymakers working on building projects. These stakeholders were identified because they are objective players in decision-making areas related to the adoption of sustainable buildings. The purposive sampling method was used to ensure that the respondents in the sample had relevant experience and knowledge in the field of sustainable building. The sample included professionals working in large cities with active construction sectors in countries where sustainability discussions are gaining traction (e.g., Accra, Kumasi, and Tamale) to ensure representativeness. The sample size was 314 respondents, as this is statistically sufficient to compute both RII and factor analysis (Hair et al., 2019).

The primary data were gathered using a structured questionnaire designed to ensure respondents provided their understanding of the challenges and approaches to sustainable building. The questionnaire had three parts: demographic information, issues with adopting sustainable buildings, and ways to overcome these issues. The second and third sections included items measured on a five-point Likert scale, ranging from 1 (not important) to 5 (extremely important). The pretest, conducted on a small sample of 20 professionals, was conducted to ensure that the instrument is clear, relevant, and reliable. The pilot test provided feedback used to revise the questionnaire to ensure the final form was presented at full scale. The questionnaires were administered both in print and electronically to ensure that participation and the convenience of respondents were optimised.

Data analysis involved two key steps. To rank the challenges and strategies by their perceived importance, first, the Relative Importance Index (RII) was used. RII was calculated using the formula:

$$RII = (\sum W) / (A \times N)$$

W is the weight that the respondents had given, A is the maximum possible score (5 in this case), and N is the number of respondents. This provided a ranking of challenges and strategies in order of decreasing importance. Second, factor analysis was performed to cluster interdependency challenges and strategies into higher themes. The Kaiser-Meyer-Olkin (KMO) test and the Bartlett test of sphericity were used to test the suitability of the data before extracting the factors. Principal Component Analysis with Varimax rotation was subsequently used to derive factors with loadings greater than 0.5 deemed important. These analysis methods guaranteed prioritisation and categorisation of results to be utilised in practice.

To achieve validity, the questionnaire items were constructed using the available literature concerning the challenge of sustainable buildings and strategies (Opoku, et al., 2022). Expert content validity was also improved through the input of three scholars and two industry practitioners. Internal consistency or reliability was assessed using Cronbach's alpha, and a value above 0.70 was deemed acceptable. The findings of the pilot study validated the instrument, hence making it justifiable to use it in the main study. The study was conducted with very high ethical standards. The respondents were informed that participation is voluntary, that they had the right to withdraw at any time, and that confidentiality would be maintained. No personal information was collected, and the information was reported in aggregate to ensure participants' anonymity. The data collection was done with the assistance of a relevant institutional review board.

4. Results

According to the demographic profile of respondents presented in Table 1, there are more male respondents (65.0%) than female respondents (35.0%). This phenomenon is not surprising, as construction is a male-dominated profession in most developing countries. The age range 30-39 years comprises the highest level (37.6%), followed by 40-49 years (26.4%), indicating that the sample of professionals was mostly mid-career professionals with adequate industry experience. The 20-29-year age group accounted for 19.7 percent, indicating greater representation of young professionals. Furthermore, the age group 50 and above accounts for 16.2 percent, suggesting a lower representation of senior professionals with extensive experience. The even distribution of respondents' ages suggests an appropriate mix of energy and experience, giving credibility to the findings.

The educational status of the respondents indicates that almost half (47.5%) hold a Bachelor's degree, followed by 24.8% with a Master's degree and 8.3% with a PhD. A minor but meaningful percentage of 19.4% held Diplomas, underscoring the importance of technological education. In terms of work experience, 34.7% had 5-10 years; 27.7% had 11-15 years, and 20.4% had more than 15 years, indicating that most respondents had substantial exposure to the workings of construction. Just 17.2% of industry professionals are novices with less than five years of experience. The education and experience distribution indicates that the sample was knowledgeable and experienced, which makes their opinions credible regarding the challenges and strategies for sustainable building.

Table 1: Demographic Characteristics of Respondents

Variable	Category	Frequency	Percentage (%)
Gender	Male	204	65.0
	Female	110	35.0
Age (years)	20–29	62	19.7
	30–39	118	37.6
	40–49	83	26.4
	50 and above	51	16.2
Education Level	Diploma	61	19.4
	Bachelor's	149	47.5
	Master's	78	24.8
	PhD	26	8.3
Work Experience	< 5 years	54	17.2
	5–10 years	109	34.7
	11–15 years	87	27.7
	> 15 years	64	20.4

A high initial construction cost (RII = 0.88) emerged as the most serious setback according to Table 2 of building sustainable facilities. Hence, it is a high price to pay for green technologies that make it difficult to construct sustainable buildings. The lack of technical expertise (RII = 0.86) and the limited availability of materials (RII = 0.83) follow closely, indicating that human capital restraints and supply chain constraints hinder the widespread implementation of sustainable practices. The inadequate regulatory infrastructure (RII = 0.80) reflects the institutional challenges facing the sector and may not be sufficient to enforce a sustainable adoption policy. These top challenges highlight a systemic barrier formed when different kinds of gaps converge and inhibit progress towards sustainable construction.

On the other hand, resistance to changes (RII = 0.77), lack of client awareness (RII = 0.75), and poor stakeholder collaboration (RII = 0.72) are attitudinal and behavioral factors that hamper the implementation of sustainability practices. Although these are assessed as less pivotal than economic and technical issues, they remain important because the industry's culture and clients' perceptions have a significant impact on decisions. The issue of financing (RII = 0.70) was at the lowest level, followed by lack of government incentives (RII = 0.68), and time delays (RII = 0.64). Although they were at the lowest level, these remain significant barriers. They need intervention at the policy level. The study concluded that high cost, technical capacity, and material availability need to be given priority. All this while efforts must be made to strengthen regulations, create awareness, and incentivise stakeholders for sustainable building.

Table 2: Relative Importance Index (RII) of Challenges in Sustainable Building Processes

Challenge	Mean Score	RII	Rank
High initial construction cost	4.42	0.88	1
Lack of technical expertise	4.29	0.86	2
Limited availability of materials	4.15	0.83	3
Weak regulatory framework	4.01	0.80	4
Resistance to change	3.84	0.77	5
Insufficient client awareness	3.73	0.75	6
Poor stakeholder collaboration	3.60	0.72	7
Financing difficulties	3.52	0.70	8
Lack of government incentives	3.38	0.68	9
Time delays in approval processes	3.18	0.64	10

Table 3 presents the Relative Importance Index (RII) rankings of sustainable building process strategies, highlighting the most effective measures that could help address industry challenges. The analysis demonstrates that government incentives and subsidies are at the top of the list, with an RII of 0.90, implying that government financial support is the most significant motivation for sustainable building. This is then closely followed by capacity building and training (RII = 0.87) and stronger policies and regulations (RII = 0.84), focusing on the need to arm professionals with the skills and to bolster institutional structures. Another important approach is the public-private partnership (RII = 0.82), which implies that the state and the sector in question need to work together to share resources and experience.

Conversely, strategies such as local materials production (RII = 0.69) and streamlined approvals (RII = 0.66) are ranked lower, meaning that although they are also important, they are not viewed as urgent as financial and institutional support mechanisms. However, there was a moderate level of application of innovative technologies (RII = 0.80) and of awareness programs (RII = 0.77), which implies increasing awareness of the importance of innovation and spreading knowledge about the way to a more sustainable world. Overall, the RII findings indicate that policy-based and capacity-building interventions, supported by financial incentives and collaboration, are considered the most powerful levers to promote sustainable building practices.

Table 3: Relative Importance Index (RII) of Strategies in Sustainable Building Processes

Strategy	Mean Score	RII	Rank
Government incentives and subsidies	4.50	0.90	1
Capacity building and training	4.36	0.87	2
Stronger policy and regulations	4.22	0.84	3
Public-private partnerships	4.11	0.82	4
Use of innovative technologies	3.98	0.80	5
Awareness campaigns for stakeholders	3.85	0.77	6
Access to sustainable finance schemes	3.71	0.74	7
Collaboration among stakeholders	3.59	0.72	8
Local production of materials	3.47	0.69	9
Streamlined approval processes	3.29	0.66	10

The KMO and Bartlett's Test of Sphericity results in Table 4 show that the data is suitable for factor analysis. The KMO value (0.812), which is higher than the threshold value (0.60), indicates that the sampling adequacy is adequate and that the variables have sufficient common variance to extract a factor. The data set is reasonably structured and suitable for reduction into meaningful factors. Moreover, Bartlett's Test of Sphericity yielded a Chi-Square of 1452.37 with 210 degrees of freedom and $p < 0.001$, rejecting the null hypothesis that the correlation matrix is the identity matrix. This suggests that the variables have a strong correlation and are thus suitable for multivariate analysis techniques like factor analysis

Table 4: KMO and Bartlett's Test of Sphericity

Test	Value
Kaiser-Meyer-Olkin (KMO)	0.812
Bartlett's Test of Sphericity	Chi-Square = 1452.37, df = 210, $p < 0.001$

The results of the factor analysis presented in Table 5 reveal that the challenges in building sustainably can be grouped under three categories. Initial construction cost (0.83), financing difficulties (0.80), and lack of government incentives (0.78) strongly define the factor Economic/Financial. Given the level of capital investment required for sustainable construction, it is not surprising that financial constraints, given the greatest loading, are not surprising, as indicated by previous studies. The combination of these challenges indicates that without appropriate funding mechanisms and/or incentives, contractors and clients may choose not to adopt sustainable practices. These items shared communalities ranging from 0.72 to 0.76. This indicates that most of the variance in the items is explained by the extracted factors.

The second factor that has emerged from the results is Institutional/Regulatory. The factors loading 0.81 are a weak regulatory framework, and 0.79 are concerning time delays in approval processes. The sustainability building needs effective governance and institutional support. On the other hand, the third factor, Technical/Stakeholder, reflects limited availability of materials (0.80), lack of technical expertise (0.82), poor stakeholder engagement (0.78), resistance to change (0.76), and low client awareness (0.74). The grouping highlights that the technical capacity of the workforce, the supply of sustainable materials, and stakeholder involvement are equally important for success. The three extracted factors clearly explain the shared variance among these variables, as evidenced by their high communalities (0.70–0.79), which support the factor structure.

Table 5: Factor Analysis Results for Challenges in Sustainable Building Processes

Challenge	Factor 1 (Economic/ Financial)	Factor 2 (Institutional/ Regulatory)	Factor 3 (Technical/ Stakeholder)	Communalities
High initial construction cost	0.83	0.23	0.20	0.76
Financing difficulties	0.80	0.28	0.21	0.74
Lack of government incentives	0.78	0.25	0.22	0.72
Weak regulatory framework	0.24	0.81	0.20	0.74
Time delays in approval processes	0.19	0.79	0.26	0.71
Limited availability of materials	0.30	0.23	0.80	0.77
Lack of technical expertise	0.33	0.22	0.82	0.79
Poor stakeholder collaboration	0.29	0.27	0.78	0.75
Resistance to change	0.25	0.32	0.76	0.72
Insufficient client awareness	0.22	0.35	0.74	0.70

The factor analysis of strategies in sustainable building processes, as shown in Table 6, identifies three background dimensions that indicate how effective adoption can be fostered. The Policy/Institutional factor is closely linked to government incentives and subsidies (0.82), more powerful policies and regulations (0.81), and easier approval procedures (0.79). These loadings affirm that pro-industry government policies and institutional changes are core to influencing sustainable practices in the construction sector. The analysis indicates that the strategies are significant, with communalities of 0.73 to 0.77, which explain a large portion of the variance. This implies that it is important to align the regulatory environment with sustainability goals in order to circumvent institutional barriers and facilitate faster uptake.

The second one is Capacity/Technology, which underlines capacity building and training (0.81), innovative technologies in use (0.79), and stakeholder awareness (0.76). The findings also demonstrate the need to enhance technical expertise, increase innovation, and educate key stakeholders, all of which are essential to increasing the industry's preparedness for sustainable practice. The third factor is Collaboration/Finance, it consists of public-private partnerships (0.82), collaboration between stakeholders (0.80), availability to sustainable finance schemes (0.78), and local manufacture of materials (0.76). These findings suggest that the use of financing schemes and multi-stakeholder collaboration, along with the creation of local material sources, can significantly reduce costs and improve project feasibility. The strategies in all three factors are very well explained by the model, with communalities of 0.71-0.77. All of that may indicate that policy support, technical capacity, and collaborative financing should collaborate to ensure the successful implementation of sustainable building processes.

Table 6: Factor Analysis Results for Strategies in Sustainable Building Processes

Strategy	Factor 1 (Policy/ Institutional)	Factor 2 (Capacity/ Technology)	Factor 3 (Collaboration/ Finance)	Communalities
Government incentives and subsidies	0.82	0.27	0.23	0.77
Stronger policy and regulations	0.81	0.26	0.25	0.75
Streamlined approval processes	0.79	0.28	0.24	0.73
Capacity building and training	0.23	0.81	0.28	0.73
Use of innovative technologies	0.27	0.79	0.29	0.72
Awareness campaigns for stakeholders	0.30	0.76	0.32	0.71
Public-private partnerships	0.26	0.29	0.82	0.77
Collaboration among stakeholders	0.28	0.30	0.80	0.76
Access to sustainable finance schemes	0.29	0.31	0.78	0.75
Local production of materials	0.31	0.32	0.76	0.73

5. Discussion

The results of this paper echo the available empirical evidence on sustainable buildings and building strategies, especially in the developing world. High initial construction costs, lack of technical expertise, and scarcity of materials are the most significant barriers, confirming previous research findings indicating that new markets face financial and technical constraints (Asman et al., 2019; Opoku et al., 2019). The findings of the factor analysis further summarized these issues into economic/financial, institutional/regulatory, and technical/stakeholder dimensions, aligning with Goodier et al. (2022), who identified institutional weaknesses and insufficient resources as the core obstacles in developing economies. While the technologies of innovation and regulatory compliance - a primary concern in the developed world (Guribie et al., 2022) - are certainly at play, the findings here largely reflect systemic issues of finance, consciousness, and supply chain constraints. Moreover, posture and behavioral factors, such as change resistance and client ignorance, are reminiscent of cultural and perception-specific issues in Africa and other regions, and tests that contributed to earlier interpretations of sustainable construction adoption, including economic interests and industry culture, appear to be key factors in sustainable construction adoption.

Likewise, the strategies ranked in this research align with the existing evidence. The use of government incentives and subsidies, capacity building and training, and enhanced policies and regulations mirrors the findings of Opoku et al. (2019) and Guribie et al. (2022), which highlighted the importance of institutional support and investment in human resources. The factor analysis identified three clusters-Policy/Institutional, Capacity/Technology, and Collaboration/Finance—that offer a structured framework reflecting the multidimensional nature of effective interventions. This corresponds with Lamptey et al. (2021), who proposed a methodology combining ranking and categorization to define practical priorities. While developed nations tend to rely on innovation and demand, the results indicate that in resource-limited economies, financial measures, regulatory reforms, and technical training are the most impactful tools for change. Notably, strategies such as awareness campaigns and public-private partnerships ($R^2 = 0.82$) support the idea that partnerships and knowledge dissemination serve as intermediary factors between structural reforms and grassroots adoption. Overall, this study contributes to the literature by employing RII and factor analysis to contextualize the priorities of sustainable building in emerging economies and to address critical gaps identified in prior research.

5.1 Practical Implications

The findings of this study have strong practical implications for construction professionals, contractors, and developers in sustainable building. The fact that high construction costs, limited availability of materials, and a lack of technical knowledge were identified as major barriers shows that practitioners must focus on resource planning and capacity development. Companies can reduce these barriers by implementing cost-optimization measures such as life-cycle cost analysis, communicating with local suppliers of materials, and deploying innovative technologies to reduce import requirements. The rankings of strategies, however, indicate that practitioners ought to work closely with the government and the private sector to access financial and other technical support. Moreover, the study emphasizes the need to develop awareness among the client, as resistance behaviour may hinder acceptance. Hence, contractors and consultants must incorporate sustainability education into their client engagements. The study implies that construction practitioners need to combine their technical skills with collaborative strategies in order to overcome barriers within the system.

5.2 Theoretical Implications

The study employs the Relative Importance Index (RII) and factor analysis jointly to prioritise and classify challenges and strategies, thereby contributing to the body of knowledge on sustainable construction. This methodological combination addresses an earlier study's gap, which indicated that either challenges or strategies had been assessed independently or without a systematic ranking (Lamprey et al., 2021). The findings enhance theoretical understanding of how interconnected economic, institutional, and technical factors shape the adoption of sustainability, i.e., these do not operate in isolation. In addition, the specification of three broad strategy categories—policy/institutional, capacity/technology, and collaboration/finance—enhances existing sustainable adoption models in construction by demonstrating a multi-dimensional approach for successful implementation. The study also contributes to comparative literature, showing that developed economies prefer innovation and compliance. In contrast, developing economies are limited more by financial and regulatory bottlenecks, consistent with context-related theories of sustainability adoption. In this way, the study theoretically contributes by connecting localized empirical results with the big picture of global sustainability.

5.3 Policy Implications

The findings have important policy implications for government, regulators, and industry associations in promoting sustainable building. The prominence of government incentives and subsidies indicates that financial policy instruments remain the most effective stimulus for contractors and developers in resource-constrained environments. Accessible funding schemes, tax reliefs, and subsidies to offset high upfront costs must be the priority of the policymaking process. The grouping of challenges under institutional and regulatory hurdles indicates a more serious appraisal of building codes, approval mechanisms, and long-term policy frameworks to eliminate red tape. Policies should also include capacity-building and training to ensure architects, engineers, and contractors keep abreast of the latest in sustainable building technologies. Strategies that focus on collaboration, such as public-private partnerships, point to a need for coordinated efforts between government, industry, and civil society to scale sustainable construction. If policymakers investigate those key areas, we can remove barriers and speed up the uptake of sustainable building practices.

6. Conclusion

The conclusion is that financial, institutional, and technical challenges should be tackled in a coordinated manner for the successful adoption of sustainable building processes. Lack of expertise, high construction costs, and non-availability of building materials are the biggest barriers. They will continue to slow down the construction sector without strategic interventions. The study also states that the most effective mechanisms for addressing these challenges and promoting greater adoption of sustainable practices are government-level incentives, capacity-building measures, and stronger regulatory frameworks. As a result, sustainable building requires a broad range of social, economic, and institutional support from stakeholders. Similarly, it stresses that reorienting cultural perspectives, reducing obstructions to innovation, and increasing customer awareness are equally critical for long-term sustainability. The study says that the use of techniques such as the Relative Importance Index and factor analysis provides an effective framework for prioritizing and classifying sustainability issues and strategies. It can again be concluded that, to achieve a sustainable future for the construction sector, policymakers, practitioners, and researchers must pool their financial, technical, and institutional resources.

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