

## The challenges of sustainable buildings in Nigeria

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### ABSTRACT

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The world has gradually moved from conventional buildings to more sustainable ones that promote greater energy efficiency and less environmental impact. However, while the developed countries have steadily embraced the concept of sustainability in their buildings. Nigeria, like most of the Sub-Saharan African countries, is still grappling with traditional building architecture and designs. Previous empirical analyses reveal three (3) competing elements at the berk of current challenges: awareness, poverty (absence of funds) and lack of motivation. Therefore, the objective of this study was not only to evaluate the challenges of sustainable buildings but to focus on the readiness of academic institutions to create awareness among the people so that sustainability is incorporated into building development in Nigeria. The literature search and interviews were used to achieve the study objective. Findings reveal that lack of awareness and finance to going green are Nigeria's twin main challenges of sustainability. Additionally, results also show the unwillingness of the people to adopt because of social and cultural reasons and the lack of government legislation and incentives that would encourage developers to incorporate green building features into their construction projects. The educational institutions are, however, willing to assist in teaching students, organizing conferences, outreaches, and workshops and creating awareness of the benefits of sustainable green buildings.

**Keywords:** awareness; green building; built environment; educational institutions; sustainability

## Introduction

Considerable discussion around energy efficiency and protecting the entire ecosystem (building sustainability) abounds in the literature. In the real estate context, sustainable buildings are expected to provide economic benefits in rental or capital values to the lessors or the developers [1]. While there are standard features that influence values, the benefits of sustainable buildings to well-informed house seekers increase the level of interest leading to competition in the property market. Accordingly, competition in the property markets could lead to two possibilities, including (1) gazumping (a scenario whereby the seller increases the price of a property above the intended amount) and (2) rivalry among market participants [2].

Sustainable buildings offer a reduction in energy consumption and negative environmental impacts. On the other



hand, the inability to go “green” is one of the reasons for avoidable health-related challenges, higher expenditure on consumption and reduction in productivity [3]. However, despite the benefits of sustainable buildings, awareness in developing economies is still a significant concern. Unlike developed economies, where awareness of the benefits of green buildings is known, a large percentage of the population in developing countries still grapples with understanding the concept. Thus, although a large percentage of the population in developing countries is unaware of the benefits of sustainable buildings, the regions have been inadvertently practising the concept.

In Nigeria, as in several developing countries, the concept of sustainable building is unknowingly being practised all over the country by using an alternative to conventional building materials. Using local building materials is an age-long practice in the country, triggered by the poor economic status of a large percentage of the population. Mud buildings garnished with bamboo and grass roof members dominated the built environment in the rural and some parts of the urban areas in the country. Thus, several studies report that housing problems in Nigeria are qualitative and quantitative (see, for instance, [4, 5]). With a rising rate of the population without a commensurate increase in housing stock, several citizens are without a home. Thus, the high number of squatter settlements and insalubrious built environments result from a housing shortage and poor environmental quality.

Again, since a larger population of citizens in rural and some urban areas heavily rely on local building materials (mud brick and grass roofs) for their housing, there is a need to sensitize them on sustainability. Previous studies on the challenges of sustainable green buildings, including [3] in the United Kingdom; [6] in Malaysia; [7] in Australia; and [8] in Mozambique abound. There are also considerable studies on the challenges of sustainable buildings in Nigeria, including [9-13]. This study is intended to not only replicate previous contextual studies for generalized opinion to be formed but sample the views of the built environment professional from the education sector on the way forward.

One unique challenge of sustainable buildings found in previous studies in Nigeria and several other countries was the lack of awareness. This implies that a lack of awareness of the benefits of green building is the reason for the people’s low level of acceptability of the concept. Accordingly, several channels, strategies and methods could be used to sensitise the general public on the benefits of sustainable buildings. Among these is the role of the built environment professionals of the educational sector in creating awareness among the housing market participants and the general public. However, to our knowledge, the use of educational institutions in creating awareness of the benefits of building sustainability has not been previously studied, particularly from a pan-African perspective.

In the past, educational institutions have been used to create awareness on sundry issues. This includes, among others, environmental conservation and sustainable development in India [14]; establishment of environmental-related courses at the Universities in South Korea [15]; achievement of the United Nations Sustainable Development Goals (SDGs) [16]. Thus, a well-informed society on the benefits or detriments of a particular state of affairs would utilise the knowledge to enhance their life or discard the knowledge to reduce their life-span. However, from the foregoing, there exists a gap that shows a disconnect between the role of educational institutions and sustainable green buildings, hence, the need for this study. The following section discusses the literature review; section three dwelt on the methodology, analysis and discussion was treated in section four and finally, the concluding remarks in section five.

## Literature Review

Since human activities are increasingly becoming a significant concern to stakeholders because of their detrimental effects on the environment, interest in sustainability is growing. Sustainability is the development that satisfies the yearnings of people today without affecting the needs of people in the future. Therefore, a sustainable green building must satisfy the present and future needs of the people while achieving energy efficiency and reducing the impact on the built environment. Thus, as laudable as this is, some challenges inhibit the successes or achievements of having a building that satisfies the above objective. Nevertheless, the concept, which began in developed countries because of the desire to have a building different from conventional practice, is gradually being embraced in developing countries.

It must, however, be noted that even in developed countries, only some have embraced the concept. To promote acceptability and enforce compliance, policies/regulations required for acceptability within the built environment, including LEED and Energy Star in the United States of America, Green Star in Australia, BREEAM in the United Kingdom and Green Marck Scheme in Singapore, among others, were used [17]. Thus, retrofitting measure has been introduced to ensure that an existing building conforms to sustainability. This green building measure is needed, especially in developing countries like Nigeria, where several conventional buildings abound. While finance is a concern, acceptability by the people is a significant concern. For instance, what added premium will a developer or landlord receive from retrofitting an existing building or a new building project? Although a green building council exist in a few African countries, according to World Green Building Council, the rating of buildings in most developing countries is still at its lowest ebbs.

Relative to challenges of sustainable buildings, [9, 18] notes that the poor state of sustainability in the building environment is predicated on a lack of awareness of the benefit among building participants in Nigeria and Kuwait, respectively. The level of awareness of sustainable green building and its attendant benefits among the building participants is still an issue. The study by [11] was undertaken among the Nigerian construction industry participants and also found the level of awareness as an issue. The study also found that development finance and government apathy to sustainability are challenges that affect the engagement with the concept. Similarly, the study of [13], also in Nigeria, reported awareness as a significant concern. The study also reported that lack of understanding, insufficient governmental support, and lack of legislation and finance are issues that bedevilled adopting sustainable buildings.

Relatedly, findings in the study of [10] followed a similar pattern to previous studies that suggests a lack of finance, but added a lack of rating by the green building council and a lack of green building materials. Lack of awareness is likely a tacit cause of some of these challenges. Even though finance is an issue that is more pronounced in developing countries, awareness of the local building materials that are considered relatively cheaper and which have several green building components is a significant concern. Accordingly, the study of [7] reports that the challenge of sustainable building in developing countries included blending local materials with sustainable new building innovations. Thus, built environment participants must begin to savour the benefits of



**Figure 1.** A typical example of mud buildings in Tammah and Gunki, Nasarawa, Nigeria.

local building materials in promoting sustainability.

Earlier, [19] found that the challenge to sustainable building in developing countries included the absence of capacity of the construction sector, uncertain economic environment, poor data accuracy, poverty and lack of interest by the stakeholders in sustainability and poor research to the adoption of modern techniques. However, if the building/construction industry adopts the practice of sustainability through the introduction of modernism by way of retrofitting, the hitherto unsightly mud buildings (see Figure 1) but sustainable because of the thermal comfort it offers among others in the regions would become enviable sights.

This study is undertaken to add to the existing knowledge on the challenges bedevilling sustainable buildings in Nigeria. This study is different from the preceding reviewed studies in that views of built environment stakeholders from the academia (educational sector) were sought on how awareness of the favourable implication of sustainable buildings could best be used to promote sustainability. Additionally, incorporating the concept of a sustainable building into the institution's curriculum would, among others, be addressed.

## Methodology

The study used the literature search and interviews of built environment stakeholders to gather relevant data. Accordingly, the stakeholders included the built environment professional from the educational sector. These are staff members of the School of Environmental Studies or School of the Built Environment, Federal Polytechnic, Nasarawa. The school is responsible for the training of students in the act of construction, land management and industrial design, among others.

The school comprises seven academic departments, including Architecture Technology, Art and Industrial Design, Building Technology, Estate Management and Valuation, Quantity Surveying, Survey and Geoinformatics and Urban and Regional Planning. The study utilized a representation of the academic staff members of the school. Thus, the Heads of Departments of each of these seven (7) Departments were sampled for this investigation.

The sampled population were served with an open-ended questionnaire so that participants could freely discuss views on the challenges of sustainable green buildings in Nigeria. Since one major challenge of sustainable buildings is awareness, the roles of educational institutions, especially the built professionals, were asked. Thus, out of the seven (7) administered questionnaires, only five (5) filled and returned the questionnaire. The returned questionnaires were coded as SES01, SES02, SES03, SES04 and SES05 to represent each of the participants, and their views formed the empirical evidence of this study.

## Results and Discussion

Sustainable green building is a complete deviation and improvement from conventional construction practices. Nigeria, like in other developing countries, has a high concentration of mud buildings and bamboo roof members with a tach (grass) roof (see Figure 1). Although studies such as [7, 19] advocated for implementing new technology to improve the state of buildings made with local materials, this has yet to be done. Relative to thermal comfort, houses built with mud brick, bamboo and tach roof offers greater persuasion to the occupiers than the non-sustainable conventional buildings. Unlike conventional building that requires huge finance for retrofitting, conforming the mud buildings to the modern standard requires limited financial resources.

Table 1 shows the results of previous studies undertaken in Nigeria. The results revealed a lack of awareness among stakeholders is the bane of sustainability. Findings also show that finance to build a sustainable building is another challenge in Nigeria. Sustainability can only be achieved if the relevant stakeholders (landlords, developers and occupiers) know the enormous benefits of green building. Lack of legislation, green rating and incentive to encourage the developer to incorporate green features into their developmental projects or retrofit existing ones are other challenges found in previous studies in Nigeria.

However, the next part of this analysis contains empirical evidence of the views of the built environment professionals. From their responses, the least experienced professional has a total of 18 years of experience in the built environment profession, while the most experienced professional has presented a total of 30 years of experience in the built environment. This implies that they are all experienced and qualified to respond to the questions about sustainability in green buildings. Thus, the following responses were made when asked to know their opinions on the challenges facing sustainable green buildings in Nigeria. Participant SES001

**Table 1.** Sustainable building challenges in Nigeria

Author	Year	Challenge
Alabi	2012	Awareness
Aghimien et al.	2018	Awareness, finance
Olatunde & Olabode	2021	Awareness, lack of understanding, insufficient governmental support, lack of legislation and finance
Dalibi et al.	2017	Finance, lack of green building materials, lack of rating.
Koko & Bello	2020	Finance, lack of incentives, lack of governmental support

The cost of installation of alternative energy is high. Nigerian government policy on sustainability is poor. People will want to see the benefit of a sustainable green building before they imbibe the practice.

Accordingly, research participant SES002 states.

Inadequate knowledge and lack of technical knowledge are challenges to sustainable buildings in Nigeria. Additionally, the high cost of retrofitting and understanding the green building features, among others, are challenging to sustainable green building in Nigeria.

Research participant SES003 responded as follows.

Ignorance, enabling environment occasioned by lack of infrastructure, fashion as Nigeria believed in a modern product than the traditional and poor level of research and development.

Participant SES004 said

Climate change is the major challenge facing sustainable green building worldwide, including Nigeria. In Nigeria, the challenges to sustainable buildings are a cultural barrier, social resistance and the perceived high cost of incorporating green building features. Additionally, the participant notes that there is a lack of government incentive that promotes green construction and limited knowledge of its benefit.

Furthermore, research participant SES005 responded that

The major twin challenge is the high cost of incorporating green features into the buildings and the poor management of these features.

Thus, the responses made by the research participants support an earlier position that lack of awareness is one major challenge of sustainable buildings in Nigeria. The results also show that cultural barriers, social resistance, high cost of incorporating green into buildings are challenges facing sustainable green buildings in Nigeria. Again, technical expertise and government indifference towards green building in Nigeria are other limitations to going “green” in Nigeria. The results reveal that there is still much to be done to embrace the concept of green buildings in Nigeria.

The objective of this study is two-fold, including (1) to evaluate the challenges of sustainable green buildings; (2) to suggest from an academic point of view the ways green buildings would be better appreciated in Nigeria. Consequently, the next section of this analysis concentrates on the second aspect, which is the roles of academic institutions in pointing the way forward. Accordingly, when the research participants were asked how the concept of sustainable buildings could better be appreciated, the following were their responses.

Research participant SES001 suggests that

The Nigerian government must ensure compliance with the regulations on sustainable green buildings. It should also subsidize and make “green” buildings available. The government should also set a target date, say



ten years, for developers and property owners to, even if it is 50%, incorporate green features in building designs or retrofit.

Participant SES002 suggests that

Government should make a prototype green building to create awareness. Identify green features and how people will adopt them. Additionally, the government should encourage the use of local building materials because of their highly green building contents and provide an incentive to encourage greater participation by the people.

Also, research participant SES003 added another dimension to it

Through return on investment, embodied energy measurement and climate change mitigation.

Furthermore, research participant SES004 added that

Consistent education to create awareness and government support is needed.

Again, research participant SES005 suggests that

There is a need to promote research on green buildings. Increase awareness for acceptability and wholly adopt green buildings in Nigeria

Again, the results show the need for government involvement through regulations and the provision of incentives to encourage greater participation. The studies of [20, 21] report that the governments of Australia and China give incentives to encourage greater participation of stakeholders in incorporating green features into buildings. Again, if a premium is added for green building features [1, 17], it would encourage greater participation by property developers and owners. The consensus of research participants in this study, like in previous studies, is the need to create awareness. Expectedly, the research question was, “what role should education institutions play in creating awareness of sustainable buildings?”

Accordingly, this part addressed the responses of research participants. Thus, the research participant SES001 reports that

...seminars and workshops that would bring property developers, landlords, opinion leaders, and the people’s representatives should be organized.

Research participant SES002 said

Incorporate green buildings and their features into the educational curriculum. This could be done through teaching and practical demonstration on buildings within the school for students to better appreciate it. In addition, develop green and sustainable features for property developers.

Participant SES003 also suggests

··the need inculcates green and sustainable architectural design concepts.

The roles of educational institutions towards creating awareness, as reported by research participant SES004 suggest

··create awareness through the incorporation of sustainable green building concepts in the curriculum, encourage and support research in the area.

Additionally, research participant SES005 reports

··the need to promote research in sustainable green buildings and increase acceptance and adoption of green buildings.

Furthermore, the research subjects were asked to comment on specific roles their respective departments would be willing to play in sensitizing the public, including property developers, to the benefits of sustainable green buildings. Accordingly, their responses were individually summarised hereinunder

Research participant SES001 said the department will

encourage the public/property developers to engage the services of professional builders who will incorporate green features into their buildings.

Participant SES002, on the other hand, reports that the department will

in addition to creating awareness and incorporating green building concepts in the curriculum, the department will advise on incorporating green features from the design and construction stages of the buildings.

Research participant SES003 will ensure that through

··green and sustainable architectural design concept and ensuring this is followed from inception to completion stages of the building.

Additionally, research participant SES004

·· sensitizing the general public using students and staff members on the benefits of incorporating green features into new development and retrofitting the existing structures. Also, there is a need for organizing conferences with support from the management of the Polytechnic.

Research participant SES005

··educating the general public on internal and external aesthetic decoration and using creative designs to suit urban settlement.



Again, as previously reported, the consensus is incorporating the green concept into the curriculum of educational institutions. Thus, the need to holistically improve the curriculum of Polytechnics and Universities and ensure that both the theoretical and practical components are taught so that upcoming building professionals would appreciate the concept more. Furthermore, the need to understudy what the departments are doing on green technology became apparent. To this end, the research participants were asked to know the extent to which these green concepts are taught, especially the degree to which the green concept is in their syllabus. The argument is thus that since the green concept is not altogether new, to which degree has the syllabus of the built environment school been able to capture it?

Research participant SES001 reports that

the National Diploma II and Higher National Diploma II students are being skeletally trained in a module “ethical procedure in building production” and “green concept” in their professional practice and procedure course.

Research participant SES002, on the other hand, said

“the department has been skeletally teaching and carrying out research in sustainable green buildings. Also, the department has been attending symposiums and seminars on sustainable development though there is a need for much to be done in the area.

Interestingly, research participant SES003 reports that

“since the curriculum review in 2020, sustainable architecture has been included as a course.

Similarly, research participant SES004 stated that

“in the new curriculum, though yet to be implemented by the department, the concept of sustainable green construction as a course has been introduced to prepare the students with knowledge of green buildings adequately.

While research participant SES005, on the other hand, states that

“landscaping and ceramic wares are used to teach the concept of sustainability.

The results show that some of the departments within the school of environmental studies (built environment) have the concept of sustainable construction and sustainable architecture included in their revised curriculum. While this is a welcome development, the desire to have this introduced across all departments in the school is the way to go green. Again, it is gratifying to know that skeletally some of the departments are teaching their students and attending seminars and symposiums relative to sustainable green buildings.

The last part of the analysis centres on solutions to Nigeria’s challenges of sustainable buildings. Although the

respondents have said much about sustainable buildings, there was the need to have a final word from each. Accordingly, the research participants individually report as follows

Research participants SES001

...although governmental policies appear weak in sustainability, a pronouncement should be made for the general public to adhere to.

Participant SES002

...advice that policies on sustainable building should be implemented. The government should give incentives to boost green building technology adoption.

Furthermore, participant SES003 states that

...rating buildings to ensure conformity with green building standards must take the lead; thus, building owners that adhere to the standards should be rewarded. Government should take the lead in demonstrating the benefits of sustainable Buildings.

Also, research participant SES004 said that

... Nigerians must be ready to embrace new technology in building materials' design, construction and use.

Finally, research participant SES005

...price regulation for green building materials to become affordable by the people.

From the results, the consensus was that government must play a pivotal role in ensuring that all adopt sustainable buildings in Nigeria.

## Concluding Remarks

Property developers, owners, and occupiers in Nigeria need to know more about sustainable building benefits. This is because of low awareness and the need for governmental efforts to encourage sustainability. Remaining passive on the current state of conventional buildings or continuing with the conventional building styles will affect sustainability within the built environment. The study's objective was to evaluate the readiness of the built environment professionals in the Nigerian educational institution to create awareness of the benefits of sustainability.

While this study appreciates the use of new technology to retrofit the state of mud buildings and existing conventional buildings in Nigeria, awareness is a requirement. Findings have shown that besides the critical role that government must play, public awareness is still a growing concern, and finance is also a challenge. However,

the study shows that educational institutions, especially the Federal Polytechnic Nasarawa, are interested in creating awareness through seminars and outreaches, among others. Additionally, the educational institution is ready to ensure teaching and learning in the area of sustainable green buildings to students.

Future research should focus on other educational institutions to generalise findings. Also, future research should concentrate on evaluating the financial readiness of educational stakeholders to provide outreaches for sensitisation of the public to the benefits of sustainable buildings.

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