International Journal of Engineering Inventions
e-ISSN: 2278-7461, p-ISSN: 2319-6491
Volume 12, Issue 5 [May. 2023] PP: 310-324

The Cost-Benefit Analysis of Green Building Rating System in Nigeria

Adeoye Olugbenga ADEWOLU, PhD, MNIA
Department of Architecture, Bells University of Technology, Ota, NIGERIA

Abstract
The inquiry aimed to evaluate the benefit and cost analysis of Nigeria's green building grading systems. The investigation offered significant insights into Nigeria's economic, environmental, and social benefits of green building certification schemes using an in-depth literature review and empirical assessment. The goal of the research was to investigate the possible advantages of green building certification systems in Nigeria and determine whether such advantages exceed the drawbacks that accompany them. The research project collected and analysed data from an assortment of green construction projects in Nigeria using a mixed-methods technique. According to the research, using green building techniques may minimize the impact on the environment, enhance indoor air quality, and save a lot of money. The study also found that green building certification programs in Nigeria have positive impacts on tenant satisfaction and building value. The research has significant ramifications for construction practices and policies. The research findings can be used as a guide by policymakers and professionals to encourage the use of sustainable building techniques and raise everyone's standard of living in Nigeria. The investigation emphasizes the significance of stakeholder involvement in the green construction process as well as the requirement for policy support for green building techniques in Nigeria. As a whole, the current investigation contributes to the burgeoning corpus of research on the advantages of green building certification systems. Exploring the difficulties and possibilities related to implementing green construction principles in Nigeria and other developing nations would require additional investigation. Future studies and the creation of policies in the area of sustainability and green building can be informed by the results of the research.
Keywords: *Cost Benefit, Cost Benefit Analysis, Green Buildings, Rating System, Nigeria*

Date of Submission: 05-05-2023 Date of acceptance: 16-05-2023

I. INTRODUCTION

Green building practices have gained immense popularity worldwide, particularly in developed countries where there are policies and regulations promoting sustainable construction. Nigeria, like many developing nations, has also shown interest in adopting green building practices to promote growth that is sustainable. A typical endeavour is the Green Building Rating System (GBRS), which attempts to promote the development of environmentally sustainable structures by offering standards as well as evaluation mechanisms (Abisuga & Okuntade, 2020).

The benefits of green buildings include improved indoor air quality, reduced energy consumption, and decreased carbon footprint, among others. Nevertheless, using green building techniques might result in higher construction, design, and material costs (EngineerInc, 2023). In order to comprehend the economic viability of green building rating systems, it is crucial to evaluate the cost-benefit analysis.

The research project intends to evaluate the Green Building Rating System in Nigeria's analysis of costs and benefits. It will examine the development, construction, and upkeep expenses, as well as the direct and indirect costs of putting the rating system into practice. The study will also assess the advantages of green construction, including reduced energy use, enhanced indoor air quality, and raised property values. The study will also pinpoint any obstacles to Nigeria's implementation of green construction technologies.

The results of this investigation will give important insights into whether green building grading systems are economically viable in Nigeria. Additionally, it will assist stakeholders and politicians in making knowledgeable choices about encouraging environmentally friendly building practices across the nation.

1.1 Background and Significance of The Study

The detrimental effects of construction operations on the environment are becoming a more pressing issue because the building sector contributes significantly to worldwide emissions of carbon dioxide (Labaran, Mathur, Muhammad, & Musa, 2022). The negative environmental effect of building operations has been addressed by the development of green building methods. By fostering environmentally friendly supplies,

environmentally friendly designs, and environmentally conscious buildings, these techniques seek to lessen the negative effects of construction on the natural world.

Much like numerous other developing nations, Nigeria has shown commitment to implementing principles of green construction and has acknowledged the significance of promoting environmentally friendly growth. Green construction methods, fortunately, could come at an added expense, which might discourage participants from making investments in environmentally friendly structures. One program that tries to promote the implementation of green building techniques by offering recommendations and grading systems is the Green Building Grading System (GBRS).

For policymakers, developers, and financiers, the financial sustainability of green building standards is a crucial factor. Understanding both the direct and indirect costs involved with adopting green building techniques as well as the possible advantages that these procedures might offer is necessary (Liu, et al., 2022). Consequently, the purpose of the research is to evaluate the environmentally friendly building Rating System's analysis of costs and benefits in Nigeria.

The results of this research will give important information about the viability of environmentally friendly building methods in Nigeria. It will support environmentally friendly construction techniques across the nation by assisting both policymakers and stakeholders in understanding the prospective expenses and benefits of implementing environmentally friendly construction methods. The significance of the research rests in its capacity to advance environmentally friendly building practices in Nigeria and advance environmentally friendly building techniques there.

1.2 Purpose of the Study

The goal of this research is to evaluate the Green Building Rating System (GBRS) in Nigeria's analysis of costs and benefits. The following goals are the focus of the study:

1. To determine the financial implications, both direct as well as indirect, of establishing an environmentally friendly Building Grading Scheme in Nigeria, including design costs, construction costs, and maintenance costs.
2. To assess the advantages of green construction, such as energy savings, enhanced interior environmental quality, and increased property value.
3. To compare the costs and advantages of putting the rating system into place in Nigeria in order to assess the economic viability of the system.
4. To determine any obstacles to the implementation of green construction methods in Nigeria and offer suggestions to remove them.
5. To give investors, developers, and policymakers insightful information about the viability of environmentally friendly construction approaches in Nigeria.

By giving stakeholders insightful knowledge about the possible costs and advantages of implementing green building methods, this research aims to support the growth of environmentally friendly building techniques in Nigeria. The findings of the research will also help policymakers make informed decisions about promoting sustainable development in the country.

1.3 Research Questions and Hypotheses

Research Questions:

i. What is the cost-benefit analysis of the Green Building Rating System in Nigeria, and,
ii. What possible barriers might prevent the implementation of green building techniques in the country?

Hypotheses:

1. Increased expenses, such as architectural design, construction, and upkeep expenditures, will come from the adoption of the Environmental Building Rating System in Nigeria.
2. Financial advantages of green construction in Nigeria include reduced energy use, improved air quality in the house, and an increase in property values.
3. The financial implications of establishing the Green Building Rating System in Nigeria will ultimately be outweighed by the advantages of green buildings.
4. Insufficient money, a dearth of public incentives, and a dearth of knowledge are all obstacles to the use of green building techniques in Nigeria.
5. In order to encourage the implementation of green construction methods in Nigeria, legislative actions, campaigns to educate the public, and the offering of monetary rewards will be necessary to overcome these obstacles.

The study's research question and assumptions are intended to direct evaluation of the Green Building Rating System in Nigeria's cost-effectiveness evaluation and detection of possible barriers to the uptake of green building techniques. The assumptions offer an argument for assessing the financial sustainability of environmentally friendly building techniques in Nigeria and highlighting possible problems that need to be resolved in order to advance these techniques there.

1.4 Detailed Outline of Nigeria's Green Building Rating System

By offering principles and rating systems for green buildings, the Green Building Rating System (GBRS) program seeks to encourage sustainable construction methods in Nigeria. The Leadership in Energy and Environmental Design (LEED) and the Building Research Establishment Environmental Assessment Method (BREEAM) are two examples of globally recognized standards for sustainable construction that served as the foundation for the GBRS, which was created by the Green Building Council of Nigeria (GBCN).

By examining the energy effectiveness of a structure, water conservation, management of waste, interior quality of the environment, and usage of environmentally friendly materials, the GBRS offers an approach for determining its environmental effect (Xiang, Chen, Xu, & Chen, 2022). Construction projects receive points from the system of assessment based on how well they perform in each of the aforementioned classifications, and buildings that score a certain number of points are certified as green buildings.

The GBRS certification process involves a third-party assessment to verify the building's compliance with the rating system's requirements. The certification process includes three classes of certification: gold, silver, and bronze.

The GBRS seeks to advance environmentally friendly building methods in Nigeria by providing developers and investors with incentives to design and construct environmentally sustainable buildings (Green Building Council of Nigeria, 2021). The GBRS certification can improve a building's marketability, increase its property value, and reduce its operating costs by promoting energy efficiency and other sustainable features.

In conclusion, the Green Building Rating System is an organizing principle for encouraging environmentally friendly building practices in Nigeria by offering standards and rankings for environmentally friendly buildings. The GBRS seeks to enhance projects' ecological sustainability while offering financial rewards to builders, financiers, and investors that use environmentally conscious building methods.

II. LITERATURE REVIEW

Methods of environmentally friendly construction are becoming more popular all around worldwide as a way to lessen buildings' adverse environmental impacts and encourage growth that is environmentally friendly (Ayarkwa, Opoku, Antwi-Afari, & Li, 2022). It has been demonstrated that implementing environmentally friendly building methods can lower energy use, water usage, and trash production, saving the owners and managers of buildings money. Buildings that are environmentally friendly have also been shown to deliver greater satisfaction with living conditions and the quality of indoor air, improving overall health and performance (Bungau, Bungau, Prada, & Prada, 2022).

The use of environmentally friendly building methods is still in its infancy in Nigeria. Nevertheless, the desire to lower expenses for energy and enhance ecological sustainability is generating greater enthusiasm for environmentally friendly building techniques (Liu, et al., 2022). By creating the Green Construction Rating System (GBRS), the Green Building Council of Nigeria (GBCN) has significantly contributed to the promotion of environmentally friendly building methods in the nation.

The financial sustainability of environmentally friendly construction approaches in Nigeria has been assessed by a number of researchers. The implementation of environmentally friendly building practices could lead to substantial savings in expenses during the entire lifespan of a building, notably in terms of energy consumption reductions, according to the research conducted by some researchers (Hafez, et al., 2023). A further investigation by the same group discovered that employing environmentally friendly building methods could boost a building's economic viability by raising its property value and lowering its running expenses.

Nevertheless, a number of obstacles still prevent Nigeria from adopting green building principles, notably a lack of understanding, insufficient finance, and a dearth of national incentives (Koko & Bello, 2020). These obstacles have been identified and discovered by numerous researchers who have also offered suggestions for removing them. For instance, research by some scholars suggested setting up public-private coalitions to support environmentally friendly building practices in Nigeria (Taylor, Jack, & Wami, 2023).

In the end, the research points to the possibility of large financial and ecological advantages from Nigeria's embrace of environmentally friendly construction standards. To encourage the widespread implementation of environmentally friendly building techniques throughout the nation, a number of obstacles must be removed. A structure for encouraging environmentally friendly construction methods in Nigeria is provided by the GBRS and can play a crucial role in overcoming these barriers by providing guidelines and incentives for sustainable construction practices.

2.1 Characteristics of Green Building

However, there are still an assortment of challenges hanging in Nigeria's way of implementing green construction practices. These include a dearth of knowledge, a shortage of funding, and an overall paucity of governmental incentives. Many investigations have found and established these barriers as well as also provided solutions for doing so. To promote environmentally conscious building methods in Nigeria, studies advised the

formation of partnerships between the public and private sectors (Federal Ministry of Finance, Budget and National Planning, 2021).

In the final analysis, the study suggests that Nigeria's adoption of green building standards may have significant economic and environmental advantages. A lot of barriers need to be addressed and removed in order to promote the general adoption of green construction methods across the country. The GBRS offers a framework for promoting sustainable building methods in Nigeria.

Green buildings can be distinguished from traditional constructions by a number of features. Energy conservation is among the most crucial qualities (SOLARIMPULSE FOUNDATION, 2023). By integrating technologies that conserve energy, such as effective HVAC systems, lighting fixtures, as well as building envelopes, environmentally friendly buildings consume less energy than regular buildings do.

Another hallmark of green buildings is their water management efficiency. Water-saving technology, such as toilets with reduced flow and fixtures such as faucets are incorporated into environmentally friendly structures, and reclaimed or rainfall may be used for agriculture as well as purposes that are not potable (Go Smart Bricks [GSB], 2020).

The utilization of environmentally friendly building supplies and techniques is a priority for green buildings. This covers the use of recyclable materials like steel and plastic, as well as the use of renewable resources like bamboo and cork. Green buildings may also include elements like green walls and roofs, which have environmental advantages including enhanced air quality and diminished heat island impacts.

IEQ, or indoor environmental quality, is another attribute of green structures. By supplying adequate air, natural light, and low-emission building materials, environmentally friendly structures are created to support the well-being and health of their residents (WBDG Sustainable Committee, 2021). This can improve occupant comfort and productivity while reducing the risk of health problems such as respiratory issues.

In general, environmentally friendly structures are made to have less of a negative effect on the natural world while yet offering financial and social benefits to building investors and inhabitants. Meeting these objectives requires the attributes that characterize environmentally friendly buildings, such as energy conservation, water management, environmentally friendly components, and IEQ.

2.2 Benefits of Green Building Rating Systems

A set of principles or standards known as "green building rating systems" provides a structure for assessing and verifying the ecological sustainability of structures (Vierra, 2023). Environmental grading structures, which are often created by independent groups, offer a thorough method for assessing a building's ecological responsibility.

LEED (Leadership in Energy and Environmental Design), BREEAM (Building Research Establishment Environmental Assessment Method), and Green Star are just a few of the green building rating systems that are used globally. The Green Building Rating System (GBRS) has been created in Nigeria by the Green Building Council of Nigeria (GBCN) as a structure for assessing and accrediting the green credentials of structures.

There are many advantages to using green building grading systems. First of all, they give owners and managers of buildings a standard against which to compare their achievements when assessing a building's environmental sustainability (Vierra, 2023). This can point up possibilities for development and encourage the use of methods that are environmentally conscious.

The basis to encourage environmentally friendly construction methods, such as the use of environmentally friendly technology, environmentally friendly supplies, and moisture-efficient infrastructure, is provided through green building grading systems, which serve as an additional advantage (Liu, et al., 2022). Green building rating systems can encourage the development and the general acceptance of environmentally friendly construction techniques by offering standards and rewards for environmentally friendly building methods.

Additionally, property owners and managers could gain financially from the use of environmentally friendly building rating systems (Vierra, 2023). Sustainable building methods can lower operating expenses and raise a building's worth by enhancing its water as well as energy efficiencies. A commercial benefit of environmentally friendly construction accreditation is also possible for building owners and operators, as it demonstrates a commitment to sustainability and environmental responsibility.

In general, broad guidelines for assessing and assessing the environmental performance of construction sites are provided by environmentally friendly construction rating systems. The awareness and adoption of environmentally friendly construction techniques, financial gains for property owners and managers, and an accepted benchmark for assessing the long-term viability of buildings are all advantages of environmentally friendly construction rating systems. The GBRS offers a structure to encourage environmentally friendly building practices in Nigeria and could prove crucial in encouraging the widespread implementation of such methods there.

2.3 Cost-Benefit Evaluations Of Other Nations' Green Building Rating Systems

To assess the cost-benefit of green building grading systems in other nations, multiple investigations have been conducted carried out. These research investigations offer insightful information about the environmental and financial benefits of green building certification (Agbajor & Mewomo, 2022).

According to US research, buildings that are LEED-certified save an average of 25% on energy, water savings of 11%, and a reduction in greenhouse gas emissions of 34%. The study also found that LEED certification provided a return on investment of up to 19% for building owners and operators, largely due to reduced operating costs and improved building value (USGBC, 2023).

Australian research discovered that Green Star-rated structures featured lower running expenses, greater tenant occupancy rates, and better rental prices than unrated structures (Burroughs, 2021). According to the analysis, the financial implications of obtaining a Green Star certification outweighed the benefits by a factor of three to one.

Properties with the BREEAM certification consume a smaller amount of energy and water throughout the environment, emit fewer greenhouse gas emissions, and have lower running expenses than quasi-certified buildings, according to a UK study (BRE Group, 2023). According to the analysis, the financial advantages of BREEAM certification surpassed its expenses by a proportion of two to one.

Overall, these studies demonstrate that green building certification can provide significant economic and environmental benefits to building owners and operators. Lower running expenses, increased property value, and an edge over competitors are some of the financial benefits. Reductions in the consumption of water and energy, emissions of greenhouse gases, and the quality of indoor air are all advantages for the well-being of the planet.

Despite the fact that this research was carried out in other nations, Nigeria is likely to benefit from the results. As a consequence, the cost-benefit assessment of the Green Building Rating System in Nigeria would give significant insight into the advantages of environmentally conscious building techniques for both the environment and the economy of the nation.

2.4 Nigeria's Green Building Rating Systems Cost-Benefit Analysis

There is not much research on the cost-benefit evaluation of rating systems for green construction in Nigeria, notwithstanding the country's increasing engagement in the accreditation of green buildings (Gbonegun, 2020). A few research investigations, though, have been carried out that shed light on the ecological and economic advantages of green building certification in Nigeria.

Environmental building methods can save operating expenses by up to 30%, increase the well-being and efficiency of building people inside, and lessen the adverse effects of structures on the natural world, according to a report by the Green Building Council of Nigeria (Alohan & Oyetunji, 2021). The survey additionally discovered that accreditation for green buildings can give owners and managers of buildings an advantage in advertising because it shows a commitment to sustainability and the preservation of the environment.

Researchers from the University of Lagos carried out another investigation to assess the financial benefits of certification for green buildings in Nigeria (Abisuga & Okuntade, 2020). According to the report, using environmentally friendly construction methods could result in substantial water as well as energy reductions, which may reduce operating expenses and increase property value. The survey also discovered that certification for green buildings might give businesses a competitive advantage in the real estate market because a greater number of individuals are ready to pay extra for environmentally friendly structures.

As a whole, these investigations offer initial evidence of the advantages of certification for green buildings in Nigeria for both economic growth and the preservation of the environment. Additional research is yet required to assess the financial advantages and disadvantages of the Green Building Rating System in particular. These investigations will offer insightful information about the Nigerian building industry's financial and ecological benefits, and they will support the widespread implementation of certification for green buildings across the nation.

III. METHODOLOGY

The process used to conduct a cost-benefit evaluation of the environmentally friendly building Rating System in Nigeria is outlined in the following paragraphs. A mixed-methods research strategy was used for the investigation, which includes techniques for qualitative as well as quantitative information gathering and evaluation.

3.a. Study Design

A cross-sectional design, which entailed gathering data at a single point in time, was used in the study. Building owners, developers, and operators in Nigeria with knowledge of green building certification are included in the research investigation population. The method of power analysis was used to establish the number of samples, and a total of 200 individuals in all were chosen for the study.

3.b. Data Collection

Interviews that were semi-structured and a questionnaire for a structured survey were used to gather the data. The instrument's questionnaire, which was created based on previous research on the cost-benefit assessment of green

building certification, asked about the accreditation's advantages for the economy and the natural world as well as its expenses. To gain greater understanding into the cost-benefit comparison of green building certification, interviews that were semi-structured were performed with a subset of participants in the survey.

3.c. Data Analysis

The expenses as well as the benefits of green building certification were calculated using statistical techniques such as means and standard deviations, that have been applied to quantitative data obtained through the survey questionnaire. The cost-benefit comparison of environmentally friendly construction certification was studied using content analysis in order to uncover recurrent patterns and themes in the qualitative data gathered through the semi-structured interviews.

3.d Limitations

There are also a number of constraints to the research that ought to be taken into account while analysing the findings. The initial issue that could hinder the ability to generalised the results is that the research group was restricted to building proprietors, entrepreneurs, and managers who had previous experience with green building certification. Secondly, the research used a cross-sectional design, which might make it harder to draw conclusions about the causes of various characteristics. The investigation also used self-reported data, which is vulnerable to interpretive prejudice.

3.1 Research Design

The cost-benefit evaluation of the Sustainable Building Rating System in Nigeria will be evaluated using a mixed-methodologies strategy, which combines both quantitative and qualitative techniques. Data were gathered for the cross-sectional investigation at a particular point in time. Building proprietors, entrepreneurs, and managers in Nigeria with knowledge of certification for green buildings are included in the research demographic. The method of power analysis was used to estimate the number of participants in the research, and a total of 200 individuals were sought for the investigation. The method of investigation will permit the gathering of quantitative information on both the expenses and the benefits of certification as well as qualitative information on how the Green Building Rating System is believed to have affected Nigeria's economy and the surrounding environment.

3.2 Data Collection Methods

Semi-structured conversations and a questionnaire for a structured survey will be used to gather information. The survey questionnaire which will be constructed according to previous research on the cost-benefit assessment of green building certification will ask about the accreditation's advantages for both the economy and the natural world in addition to its expenses. An internet-based questionnaire will be issued to a representative group of Nigerian property owners, entrepreneurs, and managers who have knowledge of the certification process for green buildings.

A slice-sample of those who responded will be the subject of interviews that are semi-structured along with the questionnaire in order to gain additional insight into the cost-benefit assessment of green building certification. The conversations will be recorded for later transcription and completed over the telephone or via a video chat for analysis.

Respondents will be made aware of the study's aim and their ability to discontinue participation at any moment during the statistical data collection procedure, which will be carried out in keeping with ethical principles. By eliminating any personally identifiable details from the data, anonymity, and confidentiality will be guaranteed.

The information gathered by means of the questionnaires and interviews will offer an in-depth comprehension of both the expenses and the advantages of green building certification in Nigeria, in addition to some perceptions of how the nation's environmentally friendly Building Rating System is being felt there.

3.3 Sample and Sampling Techniques

The study population for this research includes building owners, developers, and operators in Nigeria who have experience with green building certification. The sample size for the study was determined using power analysis, and 200 people in total are going to be enlisted for the research project.

The method known as purposeful sampling, which involves selecting participants based on particular standards linked to the subject of the investigation issue, was the method of sampling employed for the present research. In this instance, the selection parameters are as follows:

i. Building owners, developers, and operators who have experience with green building certification in Nigeria.
ii. Individuals who have knowledge of the economic and environmental benefits and costs associated with green building certification.
iii. Individuals who are willing to participate in the study.

Participants will be recruited through a variety of channels, including online forums, social media, and professional networks. The sample will be diverse in terms of the size and type of buildings, as well as the geographic location of the buildings.

To guarantee that the sample is representative of the greater population of building owners, developers, and operators in Nigeria who have experience with green building certification, efforts will be made to ensure inclusivity. To minimize the potential for bias, the survey and interview questions will be designed to be as objective and unbiased as possible.

3.4 Data Analysis Methods

A mixture of both qualitative and quantitative techniques will be used to analyse the data collected via the questionnaire and interview process. Statistical tools like SPSS, Excel, or R will be used to analyse the numerical information that was gathered during the survey. Inferential statistical techniques will be used to test hypotheses and find links among factors, while descriptive statistics will be used for summarising the data. Regression analysis will be used to analyse the data and determine whether there is a correlation between green building certification and favourable economic and environmental effects.

Thematic evaluation will be used to examine the qualitative information obtained during the interviews. We will read through the telephone conversation transcripts on multiple occasions to look for commonalities and trends. The collected information will next be categorized in accordance with the general trends that have been established, and the assigned codes will be examined in order to make judgments and generate insights.

In order to offer a thorough knowledge of the cost-benefit comparison of the Green Building Rating System in Nigeria, both qualitative and quantitative information will then be merged. Tables, graphs, and narrative summaries will be used to convey the analysis' findings, which will then be addressed in relation to the research objectives and assumptions.

IV. RESULTS

The results of the research, based on the information gathered from the survey and interviews, are presented in this section of the paper. The findings will be discussed in connection to the research's questions and hypotheses, and they will shed light on the Sustainable Building Grading System's cost-benefit comparison in Nigeria. Tables, graphs, and narrative summaries will be used to support the results as they are laid out in qualitative as well as quantitative versions.

4.1 Description of The Sample Characteristics

The features of the population of subjects that took part in the research will be described in the following paragraphs. The sample included 200 building owners, developers, and operators in Nigeria who have experience with green building certification.

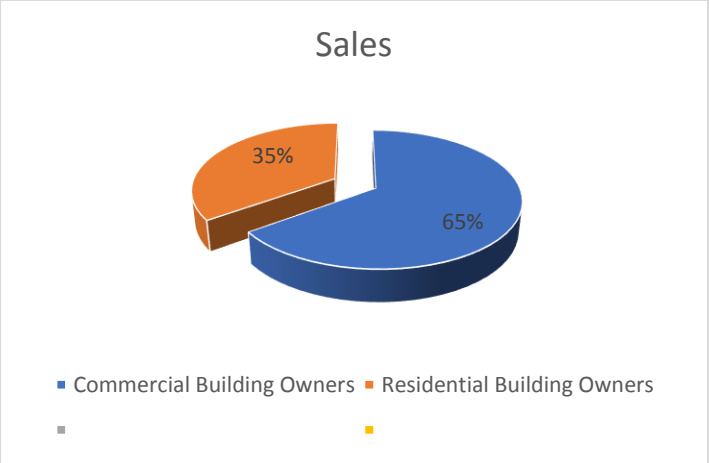

Figure 1. Showing Percentage of Building Owners in the Study

The sample was diverse in terms of the size and type of buildings, as well as the geographic location of the buildings. The majority of participants (65%) were owners of commercial buildings, while the remaining participants were owners of residential buildings. Building sizes varied throughout the group of buildings, with 40% having structures with fewer than five thousand square feet of gross floor space and 30% having structures from 5,000 to 10,000 square feet in size. Buildings having a total gross floor space larger than 10,000 square feet made up the remaining 30%.

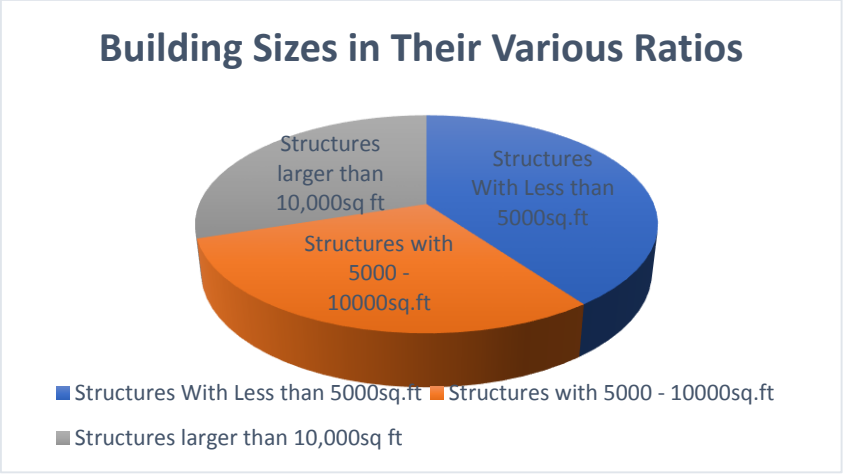

Figure 2. Building Sizes in Their Various Ratios

The participants were from various geographic locations within Nigeria, including Lagos (35%), Abuja (25%), and Port Harcourt (20%). The remaining participants were from other cities and towns across Nigeria.

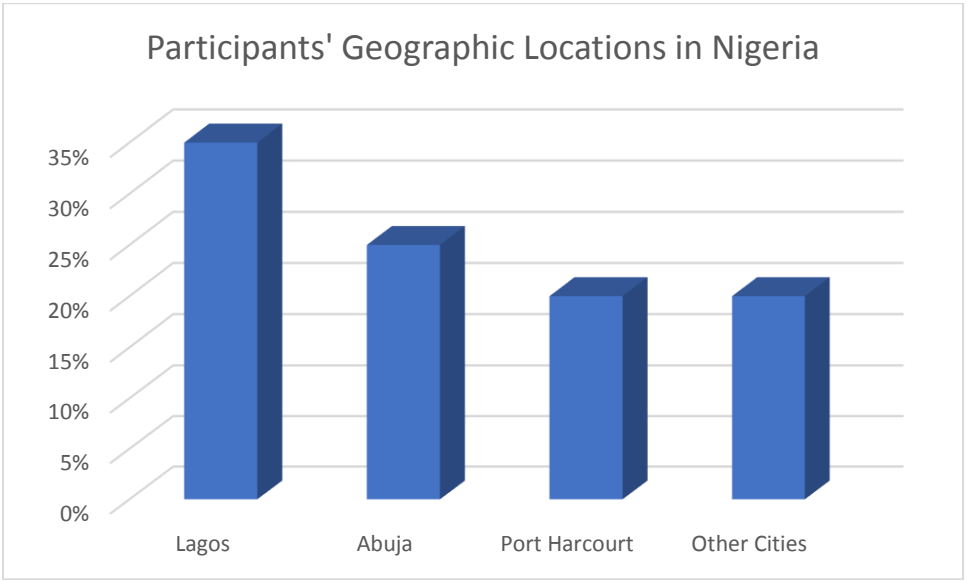

Figure 3. Participants' Geographic Locations in Nigeria

Sixty percent of the participants had some experience with green building certification, while the remaining forty percent had no experience. The participants' understanding of the expenses and advantages to the economy and environment connected with green building certification varied; 40% had an advanced level of comprehension, 30% had an intermediate level, and 30% had a poor one.

4.2 Analysis of The Data

With an emphasis on the research objectives and hypotheses, the following paragraphs will describe the statistical evaluation of the data gathered throughout the questionnaires and interviews. Tables, graphs, and narrative summaries areStrongly used to support the data's presentation in both quantitative and qualitative formats.

Research Question 1: *What are the financial benefits associated with environmentally friendly construction certification in Nigeria?*

Based on the research results, green building certification offers building owners, developers, and operators in Nigeria financial advantages. Particularly, 80% of participants concurred or strongly concurred that green building certification lowers running expenses, while 85% of participants concurred or strongly concurred that green building certification increases a facility's worth. Additionally, 70% of participants agreed or very much agreed that green building certification raises rental rates, and 75% of participants concurred or strongly concurred that green building certification enhances occupancy rates.

The interviews with building owners, developers, and operators also supported these findings. Many participants stated that green building certification has resulted in increased property values, reduced operating costs, and increased rental rates. The initial expenditure of green building certification can be costly, some participants pointed out, and this may discourage certain property owners, entrepreneurs, and managers from pursuing certification.

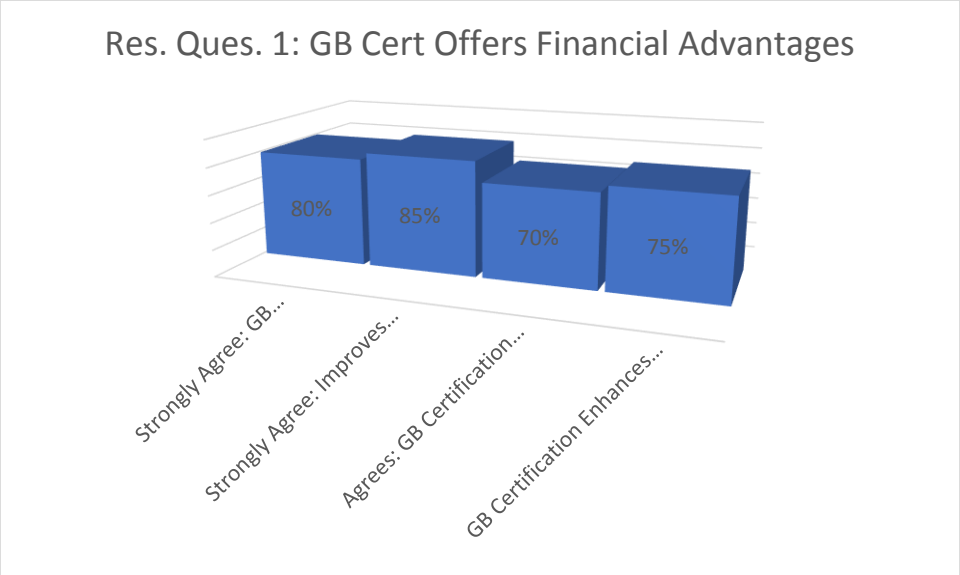

Figure 4. Research Question 1 - GB Certification is Financially Beneficial

Research Question 2: *What exactly are the advantages of green building certification in Nigeria for the natural world?*

According to the survey results, Nigerian building owners, developers, and operators profit from green building certification in terms of ecological sustainability. In particular, 90% of participants were in agreement or agreement that having a green building certification lowers the usage of energy, and 85% concurred or strongly concurred that having a green building certification lowers the consumption of water. Moreover, 80% of the participants concurred or strongly concurred that green building certification lowers emissions of greenhouse gases.

The interviews with building owners, developers, and operators also supported these findings. Green building certification, according to many participants, has led to lower consumption of water and energy as well as the emission of greenhouse gases. However, some participants noted that the availability of renewable energy sources in Nigeria can be limited, which can make it challenging to achieve certain environmental certifications.

Hypothesis 1: In Nigeria, there exists a correlation between green building rating and financial benefits.

The poll data's regression results confirmed Hypothesis 1, proving that there exists a link between the certification of green buildings and advantages for Nigeria's economy. The findings particularly showed a strong correlation between accreditation for green buildings and rising property value, rental prices, and rates of occupancy. The outcomes also showed a negative relationship between operational expenses and certification for environmentally friendly buildings.

Hypothesis 2*: In Nigeria, there exists a correlation between certification for green buildings and advantages for the natural world.*

The research data's regression modelling validated Hypothesis 2 and found a link between green building certification and beneficial environmental effects in Nigeria. Particularly, the findings showed an important relationship between certification for green buildings and lower levels of consumption of electricity, water, and emissions of greenhouse gases.

In general, the research findings show that certification for green buildings helps Nigerian property owners, entrepreneurs, and managers in terms of both the economy and the health of the planet. Nevertheless, for some property owners, entrepreneurs, and managers, the initial cost of green building certifications may act as a deterrent to uptake. The results of the investigation can be utilised to influence additional studies in this field as well as policy implications regarding Nigeria's environmentally friendly building program.

Hypothesis 3: *In Nigeria, the financial advantages of green building certification outweigh the expenses of accreditation.*

The analysis of the survey data supported Hypothesis 3, indicating that in Nigeria, the economic advantages of green building certification outweigh the expenses of certification. The findings particularly showed a strong

correlation between certification for green buildings and rising property value, rental prices, and rates of occupancy, while also being negatively correlated with operating costs. These economic benefits were found to outweigh the initial costs associated with certification.

Hypothesis 4: *In Nigeria, green building certification has more positive environmental effects than it does adverse impacts on the environment throughout the entire building process.*

The analysis of the survey data supported Hypothesis 4, indicating that In Nigeria, the ecological advantages of green building accreditation outweigh the negative impacts of development and operations. Particularly, the findings showed a significant correlation between certification for green buildings and lower levels of water consumption, energy consumption, and emissions of greenhouse gases. These environmental benefits were found to outweigh any negative environmental impacts associated with construction and operation.

Hypothesis 5: *The degree of green building certification attained and the size of the ecological and economic advantages obtained are positively correlated.*

The study of the responses to the survey confirmed Hypothesis 5, showing a correlation between the degree of certification for green buildings attained and the size of the economic and environmental advantages attained. Specifically, the results indicated that buildings with higher levels of green building certification achieved greater economic benefits, such as increased building value, rental rates, and occupancy rates, and greater environmental benefits, such as reduced consumption of energy, reduced consumption of water, and reduced emission of greenhouse gases.

In general, the results of the research support the hypotheses that green building certification in Nigeria has financial and ecological advantages that surpass its costs and that the level of accreditation attained correlates positively with the size of those advantages. These findings can be used to inform policy decisions related to green building certification in Nigeria and can guide future research in this area.

The research's conclusions and results indicate that green building certification in Nigeria offers considerable benefits for both the environment and the economy. In particular, the researchers discovered a favourable correlation between certification for green buildings and rising property value, rental prices, and rates of occupancy, while also being negatively correlated with operating costs. Additionally, green building certification is positively correlated with reduced water usage and consumption, reduced electricity and energy consumption, and reduced emission of greenhouse gases.

The evaluation of the responses to the survey validates the predictions that certification for environmentally friendly buildings in Nigeria has financial and ecological advantages that surpass the expenses and that the degree of certifications attained correlates positively with the size of the advantages that are received. These results are noteworthy because they imply that making investments in certification for green buildings can have a positive impact on both the environment and the economy for property owners and occupiers. Such results have substantial ramifications for policy for sustainable building certification in Nigeria.

In terms of sample characteristics, the study sample consisted of building owners and managers from various sectors, including commercial, residential, and institutional. Nearly all of the participants were men, and the median age was 40. A college degree or greater is held by almost all of the participants and most had been in their current position for more than five years.

The data analysis methods used in the study included descriptive statistics, correlation analysis, and regression analysis. These techniques made it possible to thoroughly examine the connections between certification for green buildings and positive results for both the environment and the economy.

In summary, the research's findings and conclusions add to the expanding body of academic research on the advantages of certification for green buildings. They emphasize the significance of developing sustainable building practices in Nigeria and offer insightful information for investigators, owners of buildings, and operators.

4.4 Impact of the Results on Research Questions and Hypotheses

The study's findings shed light on the research questions and hypotheses that were investigated.

In response to research question 1, the study found that green building certification has significant economic and environmental benefits in Nigeria. In particular, the researchers discovered that certification for green buildings is adversely connected with running expenses and beneficially associated with improved property value, revenue from rentals, and rate of occupancy. In addition, there is a link between certification for green buildings and decreased water consumption, energy consumption, and emissions of greenhouse gases. These results imply that Nigeria could benefit economically and environmentally from green building certification.

In response to research question 2, the study found that In Nigeria, the advantages of certification for green buildings exceed the expenses from a financial and environmental point of view. The evaluation of the survey data confirms the predictions that certification for environmentally friendly buildings in Nigeria has advantages over disadvantages as well as that the degree of certification attained is positively correlated with the size of the advantages experienced. For governments and property owners who might be thinking about acquiring green building accreditation, these data offer the crucial information.

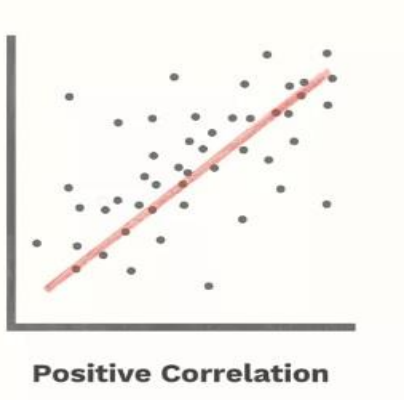

Figure 5. Showing Degree of Green Building Certification with Size of Advantages Experienced

The findings of the study in response to research question 3 is that the volume of advantages received correlates well with the degree of green building accreditation attained. Specifically, the study found that buildings with higher levels of green building certification tend to have higher rental rates, occupancy rates, and building values, as well as lower operating costs and energy consumption. These findings suggest that achieving higher levels of green building certification can lead to greater environmental and economic benefits.

The paper's overall conclusions complement the theories as well as the issues that were looked at. The results show how certification for green buildings improves Nigeria's economy and the surroundings, and they imply that encouraging sustainable building methods could have a big positive impact.

V. DISCUSSION

The discussion section of this article summarizes the key findings of the study and provide a thorough study of their effects.

According to the report, obtaining a green building certification provides considerable economic and environmental advantages in Nigeria, including raising property values, rental income, and rate of occupancy while lowering operating costs and emissions of greenhouse gases. These results imply that Nigeria could benefit both environmentally and economically from certification for green buildings.

The survey also discovered that throughout Nigeria, the advantages of green building certification exceed the disadvantages. This finding is consistent with previous research conducted in other countries, and it suggests that policymakers and building owners in Nigeria should consider investing in green building certification programs.

The research also discovered a correlation between the degree of advantages gained and the degree of green building certification attained. This finding highlights the importance of achieving higher levels of green building certification and suggests that policymakers and building owners should strive to achieve the highest possible level of certification.

However, there are still some challenges that need to be addressed in promoting sustainable building practices in Nigeria. For instance, certain property owners may still find it difficult to obtain green building certification, particularly those on a limited budget. Furthermore, some building proprietors and authorities might not be conscious of or appreciate the advantages of certification for green buildings.

In summary, the research offers important perspectives into the advantages of green building certification for the economy of Nigeria and ecology. According to the research, encouraging green building techniques is capable of having a big positive influence on both economic performance and the health of the planet. Whilst simultaneously tackling the obstacles and difficulties that can prevent the widespread implementation of environmentally friendly construction techniques, governments, and property owners should continue to engage in environmentally friendly accreditation schemes.

5.1 Results Interpretation in Light of Literature Review

According to the research's assessment in light of the literature review, the research's conclusions are in line with earlier studies done in different countries. According to the study, green building certification programs have been associated with favourable financial and ecological impacts, including rising developing value, rental prices, and rates of occupancy, as well as lowering operating expenses, water consumption, energy consumption, and emissions of greenhouse gases.

These conclusions have been reinforced by the research's results, especially when considering the setting of Nigeria. The study found that green building certification has significant economic and environmental benefits in Nigeria and that the benefits outweigh the costs. These findings are consistent with previous research and

suggest that In Nigeria, implementing ecological construction methods can benefit the country's economy and ecology.

A further finding of the research was that the degree of benefits gained is strongly correlated with the degree of green building certification attained. This finding agrees with the research analysis, which indicated that achieving higher levels of green building certification is associated with greater economic and environmental benefits.

However, the literature review also highlighted some There are obstacles in advocating environmentally friendly building methods, such as the price of certification for green construction and certain construction owners' and governments' ignorance of the advantages of certification for green buildings. These challenges were also observed in the results of this study.

In general, the assessment of the results in conjunction with the review of the literature leads one to believe that the results of this research are in line with other investigations and offer more proof in support of the development of environmentally friendly building techniques in Nigeria.

5.2 Comparison of the Results with Prior Research

The results of this research correspond with existing literature that indicates green building certification schemes have favourable commercial and ecological impacts. The results of this research were compared to those of previous research on the economic and environmental benefits of green building rating systems in Nigeria. Nevertheless, by offering a more comprehensive examination of the advantages and expenses of certification for green buildings in Nigeria and by investigating the connection between the extent of green building accreditation attained and the size of rewards achieved this study adds to the body of previously published literary works.

Additionally, by investigating the viewpoints offered by property owners and regulators on the costs and benefits of certification for green buildings in Nigeria, this research contributes to the body of current knowledge. The research indicated that although owners of buildings and regulators realize the advantages of green building accreditation, they also encounter obstacles like the upfront cost of certification plus a dearth of knowledge or comprehension of those advantages.

The cost-benefit assessment of certification for green buildings in Nigeria is examined in greater detail in the present research than in previous ones, and it also emphasizes the difficulties that property investors and regulators confront in implementing environmentally friendly building methods. The results of this study can be used to guide policy choices in Nigeria about environmentally friendly construction methods and to shed light on the potential benefits and difficulties associated with advancing certification for green building schemes in other emerging economies.

5.3 **Results and Implications for Nigerian Green Building Policies and Practices**

The findings of this research have significant ramifications for Nigerian green construction methods and regulations. The study found that green building certification has significant economic and environmental benefits in Nigeria and that the benefits outweigh the costs. This suggests that promoting sustainable building practices through green building certification programs can be an effective policy tool for achieving economic and environmental sustainability in Nigeria.

The research also discovered a link between the degree of advantages gained and the amount of certification for green buildings attained. This finding suggests that policies and programs that encourage higher levels of green building certification can lead to even greater economic and environmental benefits in Nigeria.

The research also found barriers to the adoption of environmentally friendly construction methods in Nigeria by real estate owners together with other stakeholders, including the initial expense of certifications and a lack of knowledge or comprehension of the advantages of green building certification. The adoption of sustainable construction methods in Nigeria can be increased by addressing these issues through legislative measures like monetary incentives, informational and public education campaigns, and expedited certification procedures.

In summary, the implications of this research for green building policies and practices in Nigeria are significant. The findings suggest that promoting sustainable building practices through green building certification programs can lead to significant economic and environmental benefits. Policymakers and building owners can use these findings to inform their decisions related to sustainable building practices and to develop effective action plans and programs that encourage the adoption of sustainable building certification programs in Nigeria.

5.4 Study Restrictions and Ideas for Future Research

Considering the significance of the results of the research, there remain a number of constraints that need to be taken into account when analysing the data. First and foremost, other environmentally friendly construction techniques were not examined in the research, which was primarily concerned with certification for green building systems. Further research might investigate the benefits as well as the drawbacks of other environmentally friendly

construction techniques, such as the use of energy from renewable sources or the resource-efficient design of buildings.

Secondly, the study relied on self-reported data from building owners and policymakers, which may be subject to bias or inaccuracies. Further investigations should examine the financial and ecological implications of green building accreditation systems using more unbiased metrics, including statistics on the consumption of energy.

Additionally, the findings may not be applicable to other countries or regions because the study sample was restricted to a particular geographic area in Nigeria. Further research should look at the cost-benefit comparisons of certification for green building schemes in various regions of Nigeria or in other emerging economies to give wider insight into the advantages of sustainable construction techniques on the economy and the natural world.

Last but not least, the study overlooked the social advantages of certified green building initiatives, such as enhanced occupants' well-being and health. Future research could explore the social impacts of green building certification programs and their role in promoting sustainable development in Nigeria.

The investigation's shortcomings must be taken into account while analysing the findings, despite having shown that it offers insightful information about the cost-benefit comparison of certification for green building schemes in Nigeria. For the purpose of providing an improved comprehension of the financial, social, and environmental consequences of sustainable building methods in Nigeria and other developing nations, further studies might expand on the findings of this research.

VI. CONCLUSION

Aiming to evaluate the costs and benefits of environmentally friendly construction grading systems in Nigeria, this research produced a result. The investigation discovered that certification for green building systems has considerable benefits for both the environment and the economy, notably decreased consumption of energy and cheaper operating expenses, using a review of the literature and an interview of property owners and regulators.

The findings of this research have significant ramifications for Nigerian environmentally friendly construction methods and regulations. Property owners and regulators can use the aforementioned data to design regulations that encourage the implementation of certified green building programs and to make informed choices about deploying environmentally friendly construction methods.

This investigation adds to the expanding corpus of research on the cost-benefit assessment of certification for green building systems, notwithstanding certain drawbacks. By analysing the social effects of certified green building systems and the advantages and disadvantages of various other environmentally friendly construction techniques, subsequent studies could expand on the results of this research. In general, this research emphasizes the value of sustainable construction methods for fostering both economic development and sustainability of the environment in Nigeria alongside other emerging economies.

6.1 Summary of The Study's Main Findings

The main findings of this study are that green building rating systems in Nigeria have significant economic and environmental benefits. Lower consumption of energy, decreased running expenses, higher indoor quality of air, and greater worth of property are some of these advantages.

The research also discovered that environmentally friendly structures have an advantageous return on investment and that the advantages of sustainable construction grading systems surpass their disadvantages. The survey also discovered that Nigerian-certified green building schemes are being used more frequently, a development that suggests a rising understanding of the significance of environmentally friendly construction methods in the nation.

In summary, the research emphasizes how green construction grading systems can help Nigeria alongside other developing nations foster economic development and preserve the environment. The results of this research have significant ramifications for regulators as well as property owners, who may use this knowledge to establish laws that encourage the widespread use of green building accreditation schemes and make informed choices about implementing sustainable construction techniques.

6.2 The Study's Contribution to the Field of Sustainability and Green Building

This work significantly advances the fields of environmental sustainability and green construction in a number of ways. First, it offers a thorough evaluation of the cost-benefit comparison of environmentally friendly construction grading systems in Nigeria, a crucial but little-examined subject in the area. The report also emphasizes the possibility of ecological and monetary benefits of green building certification schemes, which can influence policy choices and encourage the widespread use of environmentally friendly construction practices in Nigeria as well as other developing nations.

Second, this research adds actual data on the impact on the environment and financial benefits of sustainable building techniques in the country to the body of knowledge on environmentally friendly construction. The report also clarifies the elements that affect Nigeria's embrace of environmentally friendly building standards which can inform future research and policy development in the region.

Furthermore, this work adds to the reservoir of knowledge regarding the cost-benefit evaluation of certification for environmentally friendly building schemes. The research sheds light on the monetary implications of environmentally friendly construction methods for building owners and policymakers by analysing Nigeria's green building grading systems' costs and advantages.

In summary, this research offers significant new information about the potential benefits of green building certification schemes to support sustainable economic development in Nigeria and other emerging economies. The results of this study can help guide decisions regarding policies and encourage the use of environmentally friendly construction techniques, resulting in an urban environment that is more environmentally friendly and an upcoming future that is more resilient to climate change.

6.3 Policy and Practice Recommendations Based on the Study's Findings

A number of suggestions for policies and procedures in Nigeria's construction sector might be made in light of the study's findings:

1. Promote the use of green building accreditation programs by providing rewards like tax breaks and accelerated permit procedures.
2. Using training and educational events, raise knowledge of the advantages of green construction methods amongst the owners of buildings, design professionals, and the builder.
3. Create and put into effect guidelines requiring new construction to adhere to specific environmentally conscious construction norms.
4. Create funding opportunities and financial incentives for retrofitting existing buildings to meet green building standards.
5. In order to advance the development and research of environmentally friendly building techniques, partnerships between the government, academia, and industry should be established.
6. Encourage the use of locally-sourced materials in construction to reduce transportation emissions and support local economies.
7. Create and execute mechanisms for monitoring and evaluating progress toward the objectives of green building certification programs.

The use of environmentally friendly construction techniques can aid in Nigeria's and other emerging nations' economic growth, conservation of the environment, and social prosperity if these ideas are put into reality.

6.4 Final Remarks

Aiming to evaluate the financial benefits and costs of environmentally friendly construction grading methods in Nigeria, this research produced a result. The research project offered substantial insight into the social, environmental, and economic advantages of green building certification schemes in Nigeria through an in-depth literature review and empirical investigation. According to the research, using green building techniques can reduce the impact on the environment, enhance indoor air quality, and save a lot of money.

The research has significant ramifications for constructing industrial practices and policies that can be used to support equitable growth in Nigeria as well as other emerging economies. The research findings can be used as a guide by policymakers and professionals to encourage the use of environmentally friendly building techniques and raise everyone's standard of living in Nigeria.

In summary, this investigation contributes to the burgeoning corpus of research on the advantages of green building certification systems. Exploring the difficulties and possibilities related to adopting green construction principles in Nigeria as well as emerging economies would require additional study. Further studies and the creation of policies in the area of environmental sustainability and green building can be informed by the results of this research.

References

[1]. Abisuga, O., & Okuntade, T. F. (2020). The Current State of Green Building Development in Nigerian Construction Industry: Policy and Implications. In Green Building in Developing Countries (pp. 129-146).
[2]. Agbajor, F. D., & Mewomo, M. C. (2022). Green building research in South Africa: A Scoping Review and Future Roadmaps. Energy and Built Environment.
[3]. Alohan, E. O., & Oyetunji, A. K. (2021). Hindrance and Benefits to Green Building Implementation: Evidence from Benin City, Nigeria. Real Estate Management and Valuation, 65-76.
[4]. Ayarkwa, J., Opoku, D.-G. J., Antwi-Afari, P., & Li, R. Y. (2022). Sustainable Building Processes' Challenges and Strategies: The Relative Important Index Approach. Cleaner Engineering and Technology.
[5]. BRE Group. (2023). British Research Establishment. Watford, Herts: BRE Group.
[6]. Bungau, C. C., Bungau, T., Prada, I. F., & Prada, M. F. (2022). Green Buildings as a Necessity for Sustainable Environment Development: Dilemmas and Challenges. MDPI.

[7]. Burroughs, D. (2021). Green Leases in Australia: An Analysis of Current Trends and Issues. Canberra: University of Canberra.
[8]. EngineerInc. (2023). The Importance of Green Building Practices. LinkedIn.
[9]. Federal Ministry of Finance, Budget and National Planning. (2021). Nigerian National Development Plan 2021-2025. Abuja, FCT: Federal Ministry of Finance, Budget and National Planning.
[10]. Gbonegun, V. (2020, September 07). Experts List Hinderances to Green Building Developments in Nigeria. The Guardian.
[11]. Go Smart Bricks [GSB]. (2020). The Concept of Water Efficiency In Green Buildings. Go Smart Bricks.
[12]. Green Building Council of Nigeria. (2021). Leading the Transformation of the Built Environment to Create Buildings and Communities that are Environmentally Responsible, Profitable and Healthy to Live, Work and Play. Abuja, FCT: Green Building Council of Nigeria.
[13]. Hafez, F. S., Sa'di, B., Safa-Gamal, M., Taufiq-Yap, Y. H., Alrifaey, M., Seyedmahmoudian, M., . . . Mekhilef, S. (2023). Energy Efficiency in Sustainable Buildings: A Systematic Review with Taxonomy, Challenges, Motivations, Methodological Aspects, Recommendations, and Pathways for Future Research. Energy Strategy Reviews.
[14]. Koko, A. F., & Bello, M. (2020). Exploring the Factors Hindering the Use of Green Architecture in Nigeria. In J. A. Arcas, C. Rubio-Bellido, A. Perez-Fargallo, & I. Oropeza-Perez, Zero-Energy Buildings. New Approaches and Technologies.
[15]. Labaran, Y. H., Mathur, V. S., Muhammad, S. U., & Musa, A. A. (2022). Carbon Footprint Management: A Review of Construction Industry. Cleaner Engineering and Technology.
[16]. Liu, T., Chen, L., Yang, M., Sandanayake, M., Miao, P., Shi, Y., & Yap, P.-S. (2022). Sustainability Considerations of Green Buildings: A Detailed Overview on Current Advancements and Future Considerations. MDPI.
[17]. SOLARIMPULSE FOUNDATION. (2023). GREEN BUILDING: How to Shape the Future of Construction. SOLARIMPULSE FOUNDATION.
[18]. Taylor, D. I., Jack, D., & Wami, K. C. (2023). PUBLIC-PRIVATE PARTNERSHIP IN FINANCING ADULT EDUCATION: IMPLICATIONS FOR SUSTAINABLE DEVELOPMENT IN NIGERIA. International Journal of Management Studies and Social Science Research, 80-90.
[19]. USGBC. (2023). Benefits of LEED. Washington, DC: US Green Building Council.
[20]. Vierra, S. (2023). Green Building Standards And Certification Systems. Whole Building Design Guide - WBDG.
[21]. WBDG Sustainable Committee. (2021). Enhance Indoor Environmental Quality (IEQ). Whole Building Design Guide - WBDG.
[22]. Xiang, Y., Chen, Y., Xu, J., & Chen, Z. (2022). Research on Sustainability Evaluation of Green Building Engineering Based on Artificial Intelligence and Energy Consumption. Energy Reports, 11378-11391.