



THE IMPACT OF BUILDING CONSTRUCTION INDUSTRY ON ENVIRONMENTAL SUSTAINABILITY IN ABUJA

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ABSTRACT

The construction industry is a key driver of economic growth. However, operations from the construction industry contribute greatly to environmental damage and unsustainable exploitation of depleted natural resources. The construction industry has thus recognized environmental sustainability as a critical paradigm, primarily due to the necessity to strike a balance between ecological preservation and growing urbanization. The construction industry is essential to the expansion of Abuja, the capital of Nigeria, and it offers chances and problems for sustainable development. The impact of environmental sustainability on Abuja's construction industry is examined in this study, with particular attention paid to green building techniques, legal frameworks, technological developments, economic ramifications, and societal advantages. This study emphasizes the significance of incorporating environmental factors into urban development strategies to ensure a resilient and prosperous future for Abuja by analyzing the state and possibilities of sustainable construction. The study identified air pollution, Noise pollution and climate change as the high ranked environmental impact of building construction on environmental sustainability while depletion of Natural resources, temperature control and water pollution all ranked low. On factors mitigating environmental sustainability Lack of regulation enforcement, corruption and lack of awareness all ranked high. While, Insecurity, environmental degradation, and political instability all ranked low.

Keywords: Environmental sustainability, Construction industry, Abuja, Green building, Regulatory frameworks

INTRODUCTION

Abuja, Nigeria's capital city, relies heavily on the building industry for economic development. The construction sector has been a major engine of Abuja's rapid growth, providing the structures, infrastructure, and housing required to support the city's growing population. However, this rapid growth raises environmental concerns, such as resource depletion, waste generation, and ecological damage. Addressing these concerns with sustainable techniques has become crucial. Sustainability has been practiced since the 1970s (Al Saleh & Taleb, 2010), but with a preservationist perspective. Sustainability concept embraces three tenets: economic, social, and environmental (Silvius et al, 2013).

However, in order to meet development needs, the construction industry requires a significant amount of natural resources, mainly fresh water, lumber, sand, and limestone (Omole & Ndambuki, 2014)

In the 1980s, Abuja took over as Nigeria's capital city, succeeding Lagos. Abuja is Nigeria's capital city and eighth-most populous city. It is a planned city located in the Federal Capital Territory (FCT) in the heart of the country, built primarily in the 1980s on a master design by International Planning Associates (Balogun & Balogun, 2001). The city was intended to serve as the nation's administrative and political hub, replacing Lagos, which was regarded congested and unsuitable (Abubakar, 2014). Consequently, the construction industry has played an important part in determining Abuja's evolution, with large-scale infrastructural projects, residential developments, and commercial buildings reshaping the city's landscape (Oruonye et al., 2021).

Due to the government's attempts to develop the city and house the city's expanding population, Abuja's construction sector is characterized by a high amount of activities (Haruna

et al., 2020). As a result, the industry significantly boosts GDP in the country, creates jobs, and encourages economic activity. Due to its strategic location in the center of Nigeria and its reputation as the country's capital, Abuja has become a popular target for both domestic and foreign building investment (Abubakar, 2014). An important part of Abuja's economy, the construction sector is said to employ over 500,000 people and contributes over 10% of the city's GDP (AICCIMA, 2022). However, the environmental consequences of this massive construction activity have become more obvious. Concerns have been expressed concerning the long-term sustainability of Abuja's built environment due to issues such as natural resource depletion, the development of significant construction waste, greenhouse gas emissions, and air, water, and soil contamination. There is a growing realization that the building industry must adopt more ecologically friendly techniques to support the city's broader sustainability goals. This study seeks to evaluate the environmental impact of building construction activities on environmental sustainability as well as factors mitigating against environmental sustainability in Nigeria by reviewing literature to determine the impact of building construction activities on environmental sustainability, and factors mitigating against environmental sustainability. A survey to determine the effect and rank the impact in order to create awareness that will improve sustainable practices in building construction sites environmental sustainability in Nigeria at large

Environmental Sustainability

An Overview

Environmental sustainability refers to methods that guarantee the conscientious utilization of generations to fulfill their own

demands. This idea places a strong emphasis on natural resources to fulfill existing requirements while maintaining the capacity of future on reducing pollution, preserving ecosystems, and advancing social and economic well-being. Sustainable development seeks to strike a balance between social justice, environmental preservation, and economic prosperity. Sustainable development and sustainable construction are interchangeable terms. According to (Enshassi & Mayer, 2005), sustainable development is a development that satisfies current human needs without jeopardizing the ability of future generations to satisfy their own needs. According to (Osso et al., 1996), sustainability is the ability to continue sustaining humankind and natural resources into the next century. In addition, sustainability is a multifaceted system that seeks to improve everyone's quality of life by improving the lives of those who are less fortunate, fostering strong interpersonal relationships by emphasizing cooperation and social benefit, and implementing economic reforms that are fueled by these natural resources (Hoökara, 2007). With the goal of combining economic, environmental, and social considerations to achieve what is practically achievable, the term "sustainable development" has been widely debated and accepted in a number of spheres of life (Ametepéy et al, 2015). On the other hand, Environmental sustainability is the idea of leaving the planet in a better state than when one has found it, as well as the preservation of ecological balance and natural systems (Sev, 2009). There are numerous direct and indirect links between the building sector and other aspects of sustainable development (Enshassi & Mayer, 2005). Davies & Davies, (2017) claimed that significant adjustments in building construction have resulted from sustainable development. Despite its growth, Nigeria's building sector has long struggled with environmental issues. Conventional methods have frequently led to unnecessary waste, deforestation, and high energy use.

Environmental Sustainability in Abuja's Construction Sector

Abuja's construction sector fosters economic development by creating jobs, investing in infrastructure, and urbanizing. It attracts both domestic and foreign investment, which boosts the city's economic reputation. However, this growth frequently comes at the cost of environmental sustainability, which threatens the sustainability of the city's development.

Greenhouse Gas Emissions

The construction industry contributes significantly to greenhouse gas emissions, both through the energy-intensive production of building materials and the use of fossil fuels in construction equipment and processes. The global building sector has a significant environmental and social impact. Construction and usage of the built environment account for 39% of global greenhouse gas emissions, therefore lowering carbon emissions in construction will have a significant global impact (Crawford, 2022). Many experts are looking into the impact of technological advancements on the construction industry's carbon footprint. They believe construction enterprises may become carbon neutral by cutting material emissions, employing innovative technology, and utilizing renewable energy sources (Kruti 2024).

Resource Depletion

Natural resources, such as sand, gravel, stone, wood, and other raw materials, are heavily consumed by the construction industry. As per the findings of Laiblova et al., (2019), there is a global trend in the construction sector to regularly consume more raw materials, which leads to the shortage of

natural resources and subsequent environmental effects. The embodied energy of cement is around 7.8 MJ/Kg, while that of steel is approximately 32 MJ/Kg (Kare & Lomite, 2009). Cement is the material that produces the most carbon dioxide, and the manufacture and delivery of building supplies produce a significant amount of carbon dioxide (Hossain & Marsik, 2019). The demand for these vital building materials from local and regional suppliers has increased as development activity in Abuja is on the high. Particularly sand mining has grown to be a significant environmental problem due to unsustainable exploitation that harms coastal regions and river ecosystems (Adekola & Lamond, 2018). In addition to endangering the building industry's long-term survival, the loss of these natural resources has larger ecological ramifications.

Biodiversity Loss

The variety of life in all its manifestations, including the diversity of species, ecosystems, and genetic variants within species, is referred to as biodiversity (Díaz et al., 2006). Construction is considered the least sustainable sector in the world, accounting for over half of all non-renewable resource consumption. It is essential for human welfare, environmental resilience, and the general health of our world. Alshuwaikhat (2005) states that habitat degradation and fragmentation are two main ways the building sector can have a detrimental effect on biodiversity. Natural vegetation is frequently cleared and animal corridors are disrupted when land is developed for residential, commercial, or industrial purposes. According to Lundholm (2006), the amount of energy and materials required to maintain the built environment has a negative effect on natural ecosystems. The built environment, with its dramatically altered landscapes and quick human-caused changes to local ecosystems, is widely recognized as a primary driver of biodiversity change (Nielsen et al., 2014). It's also critical to remember that human activity in the built environment does contribute to biodiversity loss, which has an impact on the ecosystem's capacity to support life (Zari, 2014). Changes in land use and land cover are important anthropogenic drivers of biodiversity change (Seto et al., 2012).

Waste Generation

The building industry plays a vital role in many emerging countries. Currently, there are significant impediments and challenges related to the massive amount of construction Waste. In the building sector according to Ikau et al, (2016), waste is described as undesirable material. Formoso et al. (1999) defined waste as any cost-generating activity that does not add value to the product from the client's perspective. According to Koskela & Ballard (2003), waste in lean manufacturing refers to using more equipment, materials, labor, or capital than necessary for constructing output. Construction and demolition (C&D) waste generation is one of the most common sources of trash in the construction industry. This comprises elements including concrete, wood, metals, plastics, and drywall that are created during the construction, renovation, and demolition of buildings and infrastructure (Ajayi & Oyedele, 2017). A large part of construction waste winds up in landfills, adding to the misuse of these facilities. This not only depletes valuable land but also increases the risk of soil and water contamination due to leachate and methane emissions from organic materials (Poon et al, 2004).

Principles of Environmental Sustainability in Construction and Sustainable Construction Practices in Abuja

Nigeria's capital, Abuja, serves as a hub for the development of its infrastructure. There have been a lot of construction projects throughout the city, ranging from big commercial projects to residential buildings. Energy-efficient designs, waste management techniques, and the use of locally produced materials are examples of sustainable construction practices in Abuja. However, the implementation of these techniques varies depending on the project, as it is affected by several aspects like stakeholder commitment, cost, and legal constraints.

MATERIALS AND METHODS

The method utilized for this study ensured a detailed and extensive search from literatures connecting to study.

The sample frame for this study comprised of built environment professional such as Quantity surveyors, Architects, Builders, Structural Engineers, Mechanical and Electrical engineers, with about a Three hundred and Eighty Five (385) questionnaires administered to the respondents by means of random sampling a total of which about Two hundred were completed and returned, representing about 51.95 percent. returned completed in a usable format,

Data was then analyzed using Statistical packages for social sciences (SPSS) and Microsoft Excel and are presented and discussed as below.

Table 1: Percentage of Questionnaires Returned and Not Returned

Questionnaire	Number	Percentage
Distributed	385	100
Completed and returned	200	51.95
Not Returned	185	48.05

Source: Authors Field Survey (2017)

Percentage of Questionnaires distributed and returned as shown in Table 1 shows the response rate of respondents in the study. Out of a total of 385 questionnaires distributed, only 200 (51.95%) were completed and returned, while the remaining 185 (48.05%) were not returned. However, going

by Moser and Kalton in Olajide (2014) assertion that the outcome of an investigation should be regarded as being biased and of little importance if the questionnaire returned is less than 30-40%, the number of questionnaires completed and returned were therefore considered adequate for analysis.

Table 2: Academic Qualification of respondents of 200 returned Questionnaires

Academic Qualification	Number	Percentage
HND	77	38.5
B.Sc/B.Tech	75	37.5
M.Sc/ M.Tech	48	24
Ph.D	0	0

Source: Authors Field Survey (2024)

The academic qualification of respondents as shown Table 2 Provides information relating to respondents for the study. It shows that, 38.5% of the respondents had HND, 37.5% of the respondents had B.sc/B.Tech, while 24% and 0% had M.Sc/

M.Tech and PHD respectively. This shows that respondents have the relevant academic qualification to respond to the questionnaire.

Table 3: Years of working experience

Services rendered	Number	Percentage
Less than 5 years	20	10
6 to 10 years	36	18
11 to 15 years	45	22.5
16 to 20 years	18	9
21 to 25 years	30	15
More than 20 years	51	25.5

Source: Authors Field Survey (2024)

The working experience of respondents as shown in Table 3 Shows that respondents have varying degree of experience as 9% of the respondents had 16-20 years of experience, 22.5% had 11-15years of experience, 15% had more than 20 years of

experience, while 18% and 10% had 6-10years of experience and less than 5 years of experience respectively. It implies that respondent have acquired enough working experience to give relevant response to the questionnaire.

Table 4: Services rendered by respondents

Services rendered	Number	Percentage
Project Managers	27	13.5
Architects	30	15
Quantity Surveyors	37	18.5
Engineers	48	24
Builders	58	29

Source: Authors Field Survey (2024)

Based on the services rendered as shown in Table 4 above the respondents 15% of the respondents were Architects, 18.5% were Quantity Surveyors, while 24% and 13.5% were engaged in Engineering services and project management

respectively. The remaining 29% of the respondents were builders

RESULTS AND DISCUSSION

Level of Awareness of Respondents on Impact of Construction Activities on Environmental sustainability.

Table 5: Level of Awareness

Level of Awareness	Respondents	Percentages
Very aware	22	11
Aware	40	20
Somewhat Aware	102	51
Unaware	36	18
Very Unaware	0	0
Total	200	100

The level of awareness of respondents as shown in Table 5 suggests that to effectively control the impact of construction activities on environmental sustainability, the level of awareness of professionals in construction industry on environmental sustainability must be adequate, from the survey, 22 respondents (11%) are very much aware, 40 respondents representing 20%, are aware, 102 respondents representing 51% were somewhat aware, while, 36

respondents making 18% of respondent are unaware. The level of Awareness negates Ibrahim (2021) who asserts that there is a high level of awareness of construction sustainability among construction professionals.

In adhering to environmental sustainability in construction the level awareness of the construction professionals must be high as a contrast to the average awareness shown in the table above.

Table 6: Environmental Impact

Environmental Impact	Mean Score	Rank
Waste Creation	4.55	4
Air Pollution	4.75	1
Water Pollution	4.01	6
Noise Pollution	4.65	2
Temperature Control	4.00	7
Climate Change	4.61	3
Depletion of Natural Resources	4.23	8
Impedes flow of Traffic	4.51	5
Biodiversity and Ecosystem Effect	4.38	6

As shown in Table 6, A five (5) point likert scale represented as 1=Strongly Disagree, 2=Disagree, 3= Neither Agree or Disagree, 4=Agree, 5=Strongly Agree. The mean score was taken from these responses and used to rank the environmental impact of construction activities. The results show that the Air pollution, water pollution and climate change and waste creation rank high on first to fourth

respectively. While, Distortion of traffic, water pollution, Biodiversity effect, Temperature effect and depletion of natural resources all ranked low. Confirming environmental impacts of sustainable construction according Dosumu & Aigbavboa (2021), however, when the impacts are assessed based on benefits derived the order is reversed.

Table 7: Challenges Mitigating against Environmental Sustainability in Nigeria

Challenges Mitigating against Environmental Sustainability in Nigeria	Mean Score	Rank
Environmental Degradation	3.89	6
Lack of awareness	4.00	3
Corruption	4.50	2
Poverty	4.01	4
Political Instability	3.97	5
Lack of Regulation Enforcement	4.61	1
Insecurity	3.30	7

The results in Table 7 were used to rank the challenges of environmental sustainability based on the mean scores obtained from the responses of the respondents in accordance to Ndubuisi-Okolo et al (2020). Lack of regulation enforcement, corruption and lack of awareness proves to be the major challenges to environmental sustainability in Nigeria, while, political instability, environmental degradation and insecurity ranks low as challenges mitigating against environmental sustainability in Nigeria.

CONCLUSION

Based on Literature and data discussed above it can be concluded that the level of awareness of construction professionals on impact of construction on environmental sustainability proves to be average. Consequently, the major challenges mitigating against achieving environmental sustainability in construction are lack of regulation enforcement, corruption, lack of awareness and poverty.

It is therefore recommended that measures of controlling the impact of construction activities on environmental

sustainability be improved upon. These include enforcement of construction regulations, a strict observance against corrupt practices of officials involved in construction and construction regulators, and improvement in awareness creation of sustainable environmental construction activities.

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