Sustainable Development Challenges in Abuja's Construction Industry: Balancing Economic Growth and Environmental Conservation

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Abstract

The construction industry is pivotal for economic growth, yet its operations contribute significantly to environmental damage and the unsustainable exploitation of depleted natural resources. Recognizing environmental sustainability as imperative, the industry strives to balance ecological preservation with urbanization. This study explores the impact of environmental sustainability on Abuja's construction sector, focusing on green building techniques, legal frameworks, technological advancements, economic implications, and societal benefits. Emphasizing the integration of environmental considerations into urban development strategies, the study aims to ensure Abuja's resilience and prosperity through sustainable construction practices.

Keywords: Environmental sustainability, construction industry, Abuja, green building, regulatory frameworks,

INTRODUCTION

Abuja, the capital of Nigeria, heavily relies on the construction industry as a cornerstone of its economic development. This sector has been instrumental in driving the rapid growth of Abuja by providing essential structures, infrastructure, and housing necessary to accommodate its expanding population. However, this growth trajectory has brought to the forefront significant environmental concerns, including resource depletion, increased waste generation, and ecological damage. Addressing these challenges using sustainable practices has become imperative in ensuring the city's long-term viability.

The concept of sustainability, rooted in practices dating back to the 1970s (Al Saleh & Taleb, 2010), initially focused on preservationist ideals. Today, it embraces three core pillars: economic, social, and environmental dimensions (Silvius et al., 2013). These dimensions are crucial for guiding urban development towards a balanced approach that meets current needs without compromising the ability of future generations to meet their own (Enshassi & Mayer, 2005; Osso et al., 1996).

Abuja emerged as Nigeria's capital in the 1980s, designed to alleviate the congestion and unsuitability of Lagos. Planned meticulously in the Federal Capital Territory (FCT), Abuja was envisioned to serve as Nigeria's administrative and political hub (Balogun & Balogun, 2001). Since its inception, the construction industry has played a pivotal role in shaping Abuja's evolution through extensive infrastructural projects, residential expansions, and commercial developments (Oruonye et al., 2021). This growth has significantly bolstered the city's GDP, employment opportunities, and overall economic activity (Haruna et al., 2020).

Despite these economic benefits, the environmental impact of Abuja's construction boom has become increasingly apparent. Issues such as depletion of natural resources, substantial generation of construction waste, greenhouse gas emissions, and contamination of air, water, and soil have underscored the urgent need for more sustainable building practices. This imperative arises from Abuja's strategic importance as Nigeria's capital and its central location, which attracts substantial domestic and international investment in the construction sector (Abubakar, 2014).

Environmental sustainability involves conscientious resource utilisation to meet present needs while safeguarding future generations, enhancing pollution reduction, preserving ecosystems, and promoting socio-economic well-being (Hoōkara, 2007; Sev, 2009). The global construction industry, which accounts for a significant portion of greenhouse gas emissions, must transition towards greener technologies and practices to mitigate its environmental footprint (Crawford, 2022; Kruti, 2024).

Furthermore, the construction sector's heavy reliance on natural resources like sand, gravel, and cement contributes to global resource scarcity and environmental degradation (Laiblova et al., 2019; Kare & Lomite, 2009). Unsustainable exploitation, particularly evident in activities like sand mining, poses critical environmental challenges, including habitat destruction and ecosystem disruption (Adekola & Lamond, 2018).

Biodiversity loss is another critical concern linked to urban development, where habitat fragmentation and degradation significantly impact natural ecosystems (Alshuwaikhat, 2005; Lundholm, 2006). The construction industry's rapid expansion further exacerbates these issues, making it imperative to adopt practices that minimise environmental harm and promote ecological resilience (Nielsen et al., 2014; Zari, 2014).

While Abuja's construction sector drives economic growth and urbanisation, its environmental ramifications threaten the city's long-term sustainability. Addressing these challenges through sustainable development practices is essential to ensure Abuja's continued growth without compromising environmental integrity. This paper examines the interplay between urban construction, sustainability, and environmental stewardship, offering insights into strategies that can reconcile developmental imperatives with ecological preservation.

Abuja, Nigeria's capital, stands at the forefront of national infrastructure development, characterised by a myriad of construction projects spanning from large-scale commercial ventures to residential complexes. The city has witnessed significant strides towards integrating sustainable construction practices, including energy-efficient designs, effective waste management strategies, and the utilisation of locally sourced materials. However, the adoption and efficacy of these practices often vary across projects due to diverse factors such as stakeholder engagement, financial considerations, and regulatory frameworks.

METHODOLOGY

The methodology adopted for this study commenced with a thorough literature review to establish a solid theoretical framework. The study's participants included professionals from various disciplines within the built environment, such as Quantity Surveyors, Architects, Builders, Structural Engineers, and Mechanical and Electrical Engineers. A total of 385 questionnaires were distributed randomly among these professionals. Out of the distributed questionnaires, 52 were returned completed and in a usable format, representing 52% of the total sample size.

Data gathered from the completed questionnaires underwent analysis using the Statistical Package for the Social Sciences (SPSS) for statistical computations and Microsoft Excel for the presentation of findings. The use of random sampling ensured that each professional had an equal opportunity to participate, thereby enhancing the representativeness of the study's findings within the broader population of built environment professionals.

Table 1 presents information regarding the educational qualifications of the respondents for the study. It reveals that 38.5% of the respondents held HND qualifications, 37.5% held B.Sc./B.Tech degrees, while 24% held M.Sc./M.Tech qualifications, and none held a PhD. These figures indicate that the respondents possess the requisite academic qualifications to provide informed responses to the questionnaire.

Table 1: Academic Qualification of respondents

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

Table 2 illustrates the varying degrees of experience among the respondents. Specifically, 9% of the respondents reported having 16-20 years of experience, 25.5% had 11-15 years of experience, and another 25.5% had more than 20 years of experience. Additionally, 18% and 14% of the respondents had 6-10 years of experience and less than 5 years of experience, respectively. These findings indicate that the respondents possess sufficient professional experience to provide meaningful responses to the questionnaire.

Table 2: Years of working experience

Services rendered	Number	Percentage
Less than 5 years	20	14
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

Based on the services provided by the respondents, 15% were Architects, 18.5% were Quantity Surveyors, 24% were involved in Engineering services, and 13.5% were engaged in project management (Table 3). The remaining 29% of the respondents identified themselves as builders.

Table 3: 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

RESULTS AND DISCUSSION

Awareness Levels of Respondents Regarding the Impact of Construction Activities on Environmental Sustainability

To effectively mitigate the impact of construction activities on environmental sustainability, it is crucial for professionals in the construction industry to possess a high level of awareness. According to the survey findings, 22 respondents (11%) indicated being very much aware, 40 respondents (20%) reported being aware, 102 respondents (51%) indicated being somewhat aware, and 36 respondents (18%) stated being unaware (Table 4). These results challenge Ibrahim's assertion (2021) that there is a high level of awareness of construction sustainability among construction professionals.

Ensuring adherence to environmental sustainability in construction necessitates a significantly higher level of awareness among construction professionals compared to the average awareness observed in the table above.

Table 4: 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

Environmental Impact Assessment of Construction Activities: A Comparative Analysis

The environmental impact of construction activities, as indicated above, ranks air pollution, water pollution, climate change, and waste creation as the highest impacts, ranging from first to fourth, respectively. Conversely, effects such as traffic congestion, biodiversity loss, temperature impacts, and natural resource depletion are ranked lower. This ranking corroborates findings on sustainable construction impacts by Dosumu & Aigbavboa (2021). However, when assessing these impacts based on derived benefits, the order is reversed.

Table 5: 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

Challenges to Environmental Sustainability in Nigeria

The table above ranks the factors hindering environmental sustainability in Nigeria according to Ndubuisi-Okolo et al. (2020). Lack of regulation enforcement, corruption, and lack of awareness emerge as the primary challenges. Conversely, challenges such as political instability, environmental degradation, and insecurity are ranked lower in terms of their impact on environmental sustainability in Nigeria.

Table 6: 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

CONCLUSION

In conclusion, this study underscores the critical role of enhancing awareness among construction professionals to effectively mitigate the environmental impact of construction activities. The survey revealed varying levels of awareness among respondents, challenging assertions of widespread understanding of sustainability within the industry. To achieve environmental sustainability in construction, there is a clear need for significantly heightened awareness among professionals compared to the average levels identified.

The environmental impacts identified—air and water pollution, climate change, and waste creation—emerge as the most pressing concerns, prioritised over issues like traffic congestion, biodiversity loss, and natural resource depletion. These findings are consistent with prior research, which also highlights the reversal of impact rankings when considering derived benefits.

Key challenges hindering environmental sustainability in Nigeria include inadequate regulation enforcement, corruption, and low awareness, whereas political instability and environmental degradation play lesser roles. Addressing these challenges demands improved enforcement of construction regulations, stringent measures against corruption, and enhanced awareness campaigns promoting sustainable construction practices.

Finally, fostering a construction sector that minimises environmental harm while supporting long-term societal and economic well-being requires concerted efforts to elevate awareness, strengthen regulatory frameworks, and combat corruption effectively. These measures are imperative for achieving sustainable development goals in the construction industry.

References

Adekola, O., & Lamond, J. (2018). A media framing analysis of urban flooding in Nigeria: Current narratives and implications for policy. *Regional Environmental Change,* 18,1145-1159. https://doi.org/10.1007/s10113-018-1301-2

Al-Saleh, Y. M., & Taleb, H. M. (2010). The integration of sustainability within value management practices: A study of experienced value managers in the GCC countries. *Project Management Journal*, 41(2), 50-59. https://doi.org/10.1002/pmj.20163

Alshuwaikhat, H. M. (2005). Strategic environmental assessment can help solve environmental impact assessment failures in developing countries. *Environmental Impact Assessment Review*, 25(4), 307-317. https://doi.org/10.1016/j.eiar.2004.09.002

Ajayi, S. O., & Oyedele, L. O. (2017). Policy imperatives for diverting construction waste from landfill: Experts' recommendations for UK policy expansion. *Journal of Cleaner Production*, 147. 57-65. https://doi.org/10.1016/j.jclepro.2017.01.016

Ametepey, O., Aigbavboa, C., & Ansah, K. (2015). Barriers to successful implementation of sustainable construction in the Ghanaian construction industry. Procedia Manufacturing, 3, 1682-1689. https://doi.org/10.1016/j.promfg.2015.07.516

Balogun, O., & Balogun, O. Y. (2001). The Federal Capital Territory of Nigeria: A geography of its development. Ibadan University Press.

Crawford, R. H. (2022). Greenhouse gas emissions of global construction industries. In IOP Conference Series: Materials Science and Engineering (Vol. 1218, No. 1, p. 012047). IOP Publishing. https://doi.org/10.1088/1757-899X/1218/1/012047

Davies, O. O. A., & Davies, I. E. E. (2017). Barriers to implementation of sustainable construction techniques. *MAYFEB Journal of Environmental Science*, 2. https://www.mayfeb.com/OJS/index.php/JES/article/view/11

Díaz, S., Fargione, J., Chapin III, F. S., & Tilman, D. (2006). Biodiversity loss threatens human well-being. PLoS Biology, 4(8), e277. https://doi.org/10.1371/journal.pbio.0040277

Enshassi, A., & Mayer, P. E. (2005, September). Barriers to the application of sustainable construction concepts in Palestine. In Proceedings of the 2005 World Sustainable Building Conference, Tokyo, Japan (pp. 27-29).

Hossain, Y., & Marsik, T. (2019). Conducting Life Cycle Assessments (LCAs) to determine carbon payback: A case study of a highly energy-efficient house in rural Alaska. *Energies*, 12 (9), 1732. https://doi.org/10.3390/en12091732

Formoso, C. T., Isatto, E. L., & Hirota, E. H. (1999, July). Method for waste control in the building industry. In Proceedings IGLC 7 (pp. 325-334).

Ibrahim, K. (2021). Assessment of sustainable construction practices in Nigeria (Abuja). *International Journal of Advances in Engineering and Management* (IJAEM), 3(6), 1675-1685.

Ikau, R., Joseph, C., & Tawie, R. (2016). Factors influencing waste generation in the construction industry in Malaysia. *Procedia-Social and Behavioral Sciences*, 234, 11-18. https://doi.org/10.1016/j.sbspro.2016.10.190

Kare, S., & Lomite, H. (2009). Impact of construction material on environment: (Steel & Concrete).

Kruti, D. (2024). How to reduce greenhouse gas emissions in construction industry? Retrieved July 1, 2024, from https://oizom.com/how-to-reduce-greenhouse-gas-emissions-in-construction-industry/#:~:text=The%20building%20and%20construction%20industry,the%20construction%20industry's%20carbon%20footprint

Koskela, L., & Ballard, G. (2003, March). What should we require from a production system in construction? In *Construction Research Congress: Wind of Change: Integration and Innovation* (pp. 1-8).

Lundholm, J. T. (2006). Green roofs and facades: A habitat template approach. *Urban Habitats*, 4(1), 87-101. Retrieved from http://www.urbanhabitats.org/v04n01/green_roofs_full.html

Poon, C. S., Yu, A. T. W., Wong, S. W., & Cheung, E. (2004). Management of construction waste in public housing projects in Hong Kong. *Construction Management & Economics*, 22 (7), 675-689. https://doi.org/10.1080/0144619042000201927

Hoúkara, E. (2007). Ülkesel Koúullara Uygun Sürdürülebilir YapÕm øçin Stratejik Yönetim Modeli [Strategic management model for sustainable construction suitable for national conditions] (Doctoral dissertation, Doktora Tezi, Istanbul Teknik Üniversitesi Fen Bilimleri Enstitüsü, Istanbul).

Laiblová, L., Pešta, J., Kumar, A., Hájek, P., Fiala, C., Vlach, T., & Kočí, V. (2019). Environmental impact of textile reinforced concrete facades compared to conventional solutions—LCA case study. *Materials*, 12(19), 3194. https://doi.org/10.3390/ma12193194

Nielsen, A. B., Van Den Bosch, M., Maruthaveeran, S., & Van Den Bosch, C. K. (2014). Species richness in urban parks and its drivers: A review of empirical evidence. *Urban Ecosystems*, 17, 305-327. https://doi.org/10.1007/s11252-013-0302-1

Omole, D. O., & Ndambuki, J. M. (2014). Sustainable living in Africa: Case of water, sanitation, air pollution and energy. *Sustainability*, 6(8), 5187-5202. https://doi.org/10.3390/su6085187

Oruonye, E. D., Wilson-Osigwe, M. U., Tukur, F., & Ahmed, Y. M. (2021). Effect of AGIS on implementation of electronic land administration in FCT, Abuja Nigeria. *Asian Journal of Humanities and Social Studies*, 9(3). Retrieved from https://www.ajouronline.com/index.php/AJHSS/article/view/6301

Osso, A., Gottfried, D., Walsh, T., & Simon, L. (1996). Sustainable Building Technical Manual. Public Technol. Inc.: New York, NY.

Seto, K. C., Güneralp, B., & Hutyra, L. R. (2012). Global forecasts of urban expansion to 2030 and direct impacts on biodiversity and carbon pools. *Proceedings of the National Academy of Sciences*, 109(40), 16083-16088. https://doi.org/10.1073/pnas.1211658109

Sev, A. (2009). Surdurulebilir MimarlOk (1. BaskO). Istanbul: YEM YayOn.

Silvius, A. G., Schipper, R., & Nedeski, S. (2013). Sustainability in project management: Reality bites.

Zari, M. P. (2014). Ecosystem services analysis in response to biodiversity loss caused by the built environment. SAPI EN. S. *Surveys and Perspectives Integrating Environment and Society*, 7(1).