

## Green Campus Initiative: Integration of Sustainable Practices in Management of University Education in Nigeria

S.M. Dada<sup>1</sup>, E.J. Chukwuemeka<sup>2</sup>

<sup>1</sup>Department of Educational Management,  
Faculty of Education University of Abuja, Nigeria West Africa.

<sup>2</sup>Department of Educational Foundations,  
Faculty of Education, University of Abuja, Nigeria West Africa.

### Abstract

*This study, titled Green Campus Initiative (GCI): Integration of Sustainable Practice in the Management of University in Nigeria, investigated sustainable management practices, focusing on energy conservation, waste management, water efficiency, and green building practices in Nigerian Universities. The goal was to assess how the universities balance current operational needs with future sustainability, thereby promoting environmental stewardship and reducing carbon footprints to improve educational quality and contribute to global climate action. Using a descriptive survey design, data were gathered from the responses of 144 senior staff in 13 public universities spanning the 1st, 2nd, and 3rd generations across Nigeria's six geopolitical zones and the Federal.*

**Keywords:** Green Campus Initiative, Sustainable Practices Environmental Stewardship, Energy Conservation, Waste Management

### INTRODUCTION

As global development shifts towards sustainability, Higher Education Institutions (HEIs) are pivotal in promoting sustainable initiatives. Following the post-2015 Development Agenda, HEIs are expected to incorporate environmental sustainability in their management and engage communities on key sustainability concerns. The UN Environment's Environmental Education and Training Unit (EETU) has bolstered this movement through the Global Universities Partnership on Environment for Sustainability (GUPES), which encourages Green University Networks to foster eco-friendly practices. In Nigeria, some universities have integrated the Green University Programmes to create green environments supporting students' socio-economic well-being. However, challenges like inadequate infrastructure, inefficient resource management, and weak policy frameworks hamper these efforts. This paper examines the promotion of Green Campus Initiative through the integration of sustainable practices in the management of university education in Nigeria.

### Problem Statement

Despite increasing recognition of sustainable development in higher education, Nigerian universities face challenges in the integration of sustainable practices for academic friendly environmental stewardship and efficient resource management in meeting the present needs of the universities without compromising the future generation. Common issues include inadequate infrastructure, inefficient energy use, poor water and waste management, and a lack of green spaces. Weak policies, limited awareness, and insufficient capacity among stakeholders potentially hinder sustainable integration in the management of university education, these create barriers to providing a conducive teaching and learning environment.

The challenges contribute to environmental degradation, health risks for students and staff, resource inefficiency, high energy costs, limited climate adaptation capacity, and missed opportunities for research and community engagement. Without sustainable practices, the ability of universities to achieve quality education, impactful research, and contribute to climate action is at risk.

This paper sought to promote sustainable practices in Nigerian university management to mitigate climate impact, improve resource efficiency, and foster campus sustainability. The study aligns with Sustainable Development Goals 4 (Quality Education) and Goal 13 (Climate Action). Also, the focus is to provide evidence-based information that would support policy reforms on GCI for comprehensive integration of sustainable practices in the management of Nigeria universities in their mission to provide a sustainable learning environment that supports both quality education and climate resilience. Therefore, the purpose of the study was to investigate the integration sustainable practices in the management of university education in Nigeria.

### Research Questions

- i. What sustainable building practices are currently implemented in the management of Nigerian universities?
- ii. How are the sustainable energy efficiency practices integrated into the management of Nigerian universities?
- iii. What are the sustainable waste management practices adopted in Nigerian universities?
- iv. What is the sustainable water conservation sustainable practices adopted in the management Nigerian university?

### Hypothesis

**H<sub>01</sub>** There is no significant difference in the integration of sustainable management practices among first, second, and third-generation universities in Nigeria.

### Literature Review

In recent years, Higher Education Institutions (HEIs) have intensified efforts toward sustainability, particularly in the lead-up to the post-2015 Development Agenda. This trend is reflected in the adoption of low-carbon strategies, the integration of environmental sustainability across curricula, and greater engagement with communities and stakeholders on key sustainability issues. The United Nations Environment Programme's (UNEP) Environmental Education and Training Unit (EETU), through its flagship Global Universities Partnership on Environment for Sustainability (GUPES) program, has been pivotal in helping HEIs develop and implement national and regional Green University Networks (UNEP, 2022).

A Green University Network consists of HEIs that integrate environmental sustainability, low-carbon, and climate-resilient development strategies into education, campus operations, and student engagement. These networks are instrumental in promoting the mainstreaming of Greening

Universities toolkits, which cover Green Campus development, curriculum transformation, and community involvement. Such initiatives are emerging in countries including Kenya, Uganda, and Morocco, and are already operational in China (UNEP, 2022).

In Nigeria, the Green University Program has gained traction. Naturenews (2023) reports that several Nigerian universities, including the University of Lagos, Ahmadu Bello University (a first-generation University), Federal University of Technology, Minna and the University of Abuja (Second generation Universities), have made significant progress in establishing sustainable green campuses. These campuses aim to create environments where students can live and learn in harmony with nature, improving student health and promoting socio-economic well-being through sustainable practices (Ogunode et al., 2024b).

The goals of Green Campus initiatives focus on reducing carbon emissions and promoting eco-friendly practices within campus communities. These initiatives also recognize institutions that demonstrate long-term commitments to environmental improvements in areas such as energy efficiency, waste management, water conservation, transportation, and education (Isa et al., 2021). A Green Campus combines sustainable practices with education, fostering holistic approaches to addressing environmental, social, and economic challenges (Nahar, 2018).

Several scholars have underscored the benefits of Green Campus initiatives. Omar et al., (2010) points out that such initiative not only promote environmental sustainability but also enhance well-being by integrating economic viability, conservation, and social equity in campus operations. Green Campus initiatives reduce maintenance costs, increase productivity, and improve the skills and knowledge of students in sustainability (Sahoo, 2008). Additionally, universities enhance their social responsibility by encouraging environmental stewardship and resource conservation (Yuan et al., 2013).

Research has also demonstrated the positive effects of Green Campus initiatives on student engagement and university reputation. Al-Dmour (2023) observes that green-smart campus initiatives, which include energy efficiency, sustainable infrastructure, and waste and water management, significantly increase students' involvement and improve the university's image. Similarly, Liu et al., (2021) found that Green Campus initiatives positively influence student engagement, with university image mediating this relationship.

Despite the notable benefits, Nigerian universities face challenges in implementing Green Campus initiatives. According to Abenu et al., (2024), while some Nigerian HEIs have made progress in teaching environmental sustainability, challenges such as the absence of formal sustainability policies, inadequate funding, and limited institutional support hinder their efforts to integrate sustainability into campus operations.

Contrastingly, universities in developed countries like the United States, Canada, and Europe have achieved more substantial success in implementing Green Campus practices, particularly in areas such as waste recycling and sustainable transportation (Koc, 2014). However, initiatives that require larger investments, such as renewable energy production and wastewater recycling, remain less common in these regions.

Alshuwaikhat and Abubakar (2008) categorized the sustainability roles of HEIs into three main areas: environmental management, public participation and social responsibility, and sustainability teaching and research. Stephens et al., (2008) expanded on this by highlighting the role of HEIs as change agents for sustainability. They emphasized four critical areas: promoting sustainable practices on campus, teaching sustainability concepts, conducting research on sustainability challenges, and engaging in collaborative efforts to tackle these issues.

While research on sustainability in HEIs has grown significantly in developed nations, there is still limited research in Nigeria. Existing studies primarily focus on curriculum inclusion and sustainability practices within Nigerian HEIs (Akeel et al., 2018, Ogunode et al., 2019). Despite Nigeria's policies on climate change mitigation, including its Nationally Determined Contribution (NDC) under the Paris Agreement, little research has been conducted on the integration of Green Campus policies into the sustainable management of Nigerian universities (USAID, 2023).

Moreover, Boren, et al., (2010) reviewed the Big Ten universities' sustainability reports and found that nine of ten universities had adopted the Leadership in Energy and Environmental Design (LEED) policies, with six setting energy goals that significantly reduced their energy consumption. Similarly, Stephens, et al., (2008) noted that higher education institutions could promote societal sustainability transitions through sustainable campus practices, sustainability teaching, research on sustainability challenges, and collaborative efforts.

In summary, while Nigerian universities have started integrating sustainability practices, there is still much to be done. Further research is required to assess how well Green Campus initiatives have been integrated into the management and infrastructure of Nigerian universities. This paper aims to contribute to this gap by evaluating the adoption of Green Campus initiatives in the context of Nigerian university education, considering the challenges and opportunities present in the current climate policy landscape.

## **METHODOLOGY**

This study utilized descriptive survey design to examine the implementation of sustainable management practices across Nigerian universities. The target population included all 126 public universities in Nigeria. From this population, a sample of 144 senior staff members from departments and faculties was selected using a stratified random sampling technique. This approach ensured

adequate representation of universities from different regions. Specifically, the study included 13 universities from the first, second, and third generations, spanning Nigeria’s six geopolitical zones. First-generation universities were established between the 1960s and 1970, second-generation universities in the 1970s to 1980, and third-generation universities in the 1980s.

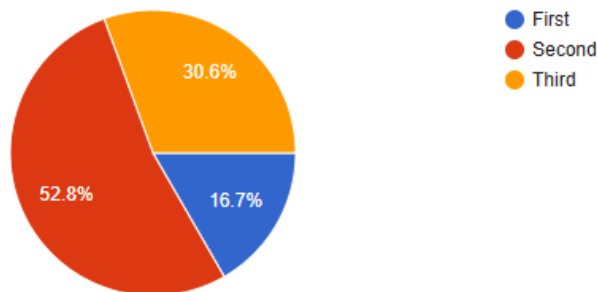


Figure 1. University Demographic by Generation

Data was collected using a structured questionnaire titled “Sustainable Management of University Education in Nigeria Questionnaire” (SMUEN-Q), administered via Google Forms. The 20-item questionnaire was designed to address the research questions. The instrument was on a four-point Likert scale (Strongly Agree = 4 points; Agree = 3; points; Disagree 2 points, and Strongly Disagree = 1 point) for responses. Experts validated the instrument for content and construct validity. Data analysis employed descriptive statistics, including frequencies, means, and percentages, ANOVA at  $p < .05$  level of significance was used to test the hypothesis of the study. A decision rule interpreted mean scores: scores below 2.50 indicated poor implementation, while scores of 2.50 or higher indicated moderate to good implementation.

## RESULTS

**Research Question One: What sustainable building practices are currently implemented in the management of Nigerian universities?**

Table 1: Sustainable building practices in Nigeria

S/N	The university adopts the following sustainable building practices	Mean
1.	The university incorporates eco-friendly materials and renewable resources in new constructions.	2.54
2.	Buildings on campus are designed to prioritize energy efficiency and natural lighting.	2.56
3.	Sustainable architectural designs are prioritized in university development and renovation projects.	2.61
4.	Green spaces are maintained to enhance environmental quality on the university campus.	2.89
5.	The university retrofits old buildings to improve energy efficiency and sustainability.	2.50
<b>Average Mean</b>		<b>2.62</b>

Source: Dada & Chukwuemeka Survey, 2024

Table one presents the data analysis on the implementation of sustainable building practices in Nigerian universities. The analysis revealed a moderate integration sustainable building practices as it recorded an average mean responses score of 2.62.

Details of the analysis indicate that the highest mean score of 2.89 was associated with the maintenance of green spaces on the university campuses. Similarly, prioritization of sustainable architectural designs in renovation and development projects had a means score of 2.61. Other aspects of sustainable building practice such as Buildings and prioritization of energy efficiency and natural lighting; and incorporation of eco-friendly materials and renewable resources in new constructions had mean scores of 2.54 and 2.56 respectively. Finally, retrofits old buildings to improve energy efficiency and sustainability had a least response scale of 2.50.

**Research Question Two: How are the sustainable energy efficiency practices integrated into the management of Nigerian universities?**

Table 2: Sustainable Energy Efficiency Practices

S/N	The university adopts the following energy efficiency practices	Mean Score
6.	Uses energy-efficient appliances and lighting (e.g., LED) throughout the campus.	2.53
7.	Renewable energy sources in the university management operations.	2.33
8.	Incorporates regular Energy audits to assess and improve energy efficiency.	2.28
9.	Establishes Policies to reduce electricity consumption, including the use of motion sensors and timers.	2.36
10.	Educates staff and students on energy-saving behaviours and promotes energy conservation.	2.53
<b>Average Mean</b>		<b>2.41</b>

*Source: Dada & Chukwuemeka Survey, 2024*

Table two presents the integration of sustainable energy efficiency practices into the operational management of Nigerian universities. Generally, the analysis indicates that the integration of the sustainable energy efficient practices into the management of the Nigerian universities was limited as this recorded an average mean score of 2.41.

However, details of the results show that the sustainable management practices of energy-efficient appliances and lighting (e.g., LED) throughout the campus and educating staff and students on energy-saving behaviours and promotes energy conservation has response mean score of 2.53 respectively. Further, the analysis revealed that establishment of policies to reducing electricity consumption including motion sensors and timers had a response mean score of 2.36. Also, the integration of renewable energy sources and incorporation of regular conduct of Energy audits to assess and improve energy efficiency were rated 2.33 and 2.28 respectively.

**Research Question Three: What are the sustainable waste management practices integrated in Nigerian universities?**

Table 3: Sustainable Waste Management

S/N	The university adopts the following waste management practices	Mean Score
11.	Establishes Recycling programmes for various waste materials.	2.06
12.	Waste segregation bins for recycling and proper disposal are available across campus.	2.33
13.	Systematic disposal of hazardous and electronic (e-waste) materials.	2.19
14.	Decomposing food waste from the cafeterias.	2.17
15.	Promotes the reduction of paper and plastic waste across all departments.	2.44
	<b>Average Mean</b>	<b>2.24</b>

*Source: Dada & Chukwuemeka Survey, 2024*

Table three presents the analysis of sustainable waste management systems in Nigerian universities. This reveals that the sustainable waste management practices is generally underdeveloped as it records an average mean score of 2.24.

Details of the result showed that the lowest mean score of 2.06 was recorded on the establishment of recycling programmes for various waste materials; decomposing food waste from the cafeterias as a sustainable practice in university management recorded a response mean score of 2.17. Whereas in the management strategy of Systematic disposal of hazardous and electronic (e-waste) materials and Waste segregation bins for recycling and proper disposal are available across campus recorded a mean response scale of 2.19 and 2.33 respectively, finally a response mean score of 2.44 was recorded for the practice of promoting the reduction of paper and plastic waste across all departments.

**Research Question Four: To what are the sustainable water conservation sustainable practices adopted in the management Nigerian university?**

Table 4: Water Conservation Management

S/N	The university adopts the following water conservation practices	Mean
16.	Installation of water-efficient fixtures across campus.	2.28
17.	Promotes water conservation practices among students and staff.	2.33
18.	Rainwater harvesting systems are in place and utilized for non-potable water needs.	1.97
19.	Addresses leaks and water wastage promptly through efficient management.	2.47
20.	Water recycling and reuse programs are implemented to reduce water wastage.	1.97
	<b>Grand Mean</b>	<b>2.21</b>

*Source: Survey Dada & Chukwuemeka, 2024*

Table four presents result of the analysis on the sustainable water conservation management practices within Nigerian universities. The results indicate that the adoption of the water conservation practices in the Nigeria university management is still low as this records an average means of 2.21. This suggests that water management initiatives are not yet widely adopted or fully integrated into the management practices of university campuses.

Details result revealed that the practice of addressing leaks and water wastage promptly through efficient management was slightly more on a positive note, as this recorded a mean score of 2.47

while the sustainable management practices of promoting water conservation practices among students and staff; and the installation of water-efficient fixtures across campus had mean score of 2.33 and 2.28 respectively. Finally, the practice of harvesting rainwater and utilized as non-potable water; recycling water and reuse programmes are implemented to reduce water wastage had means score of 1.97 respectively.

### Hypothesis

Ho There is no significant difference in the integration of sustainable management practices among first, second, and third-generation universities in Nigeria.

Table 5: One way ANOVA test of significant difference in the integration of sustainable practices

Means	Sum of Squares	df	Means of Square	F	Sig
Between groups	.416	2	.209		
Within groups	.515	9	.057	3.639	0.069
Total	.931	11			

*Source: Survey Dada & Chukwuemeka, 2024*

Table five presents the results of the one-way ANOVA, examining whether there is a significant difference in sustainable management practices across the three generations universities in Nigerian. The analysis yielded  $F(2, 9) = 3.639$ ,  $p = .069$ , indicating no statistically significant difference at the  $p < .05$  level in sustainable practice integration among university generations.

Consequently, the null hypothesis ( $H_0$ ) stating no significant difference in the integration of sustainable management practices among the three generation universities could not be rejected. Although the p-value of .069 is close to the significance threshold of 0.05, it remains insufficient to confirm a statistical difference. Thus, sustainable management practice integration does not vary significantly among first, second, and third-generation universities in Nigeria, according to this analysis.

### DISCUSSION

There are indications that the university management are striving to integrate sustainable building practices in the management through the prioritization of sustainable architectural designs in renovation and in the development of new projects; and prioritize energy efficiency and natural lighting in the management of Nigerian universities. Darko et al. (2017) who highlighted that sustainable building practice, including energy efficiency and passive solar design, are gaining traction globally as a key strategy for reducing energy consumption. However, much effort is required in the areas of retrofitting of old buildings to improve energy efficiency and sustainability in the university system in Nigeria to create a friendly environment. Research has shown that the integration of green spaces in university campuses contributes significantly to environmental quality. Wang et al. (2019) emphasize the importance of green infrastructure in enhancing urban environmental quality, which can be applied to university environments. Similarly, Adeoye and

Adewale (2020) highlighted the role of green spaces in promoting biodiversity and cooling the campus environment in Nigerian universities. A wide adoption of this practice will not only benefit the universities but also contribute to the global footprint of the earth warming. However, Ezema et al. (2016) reported that many Nigerian universities face difficulties maintaining green spaces due to neglect and poor planning.

The finding of the study has also indicated that the integration of sustainable energy efficiency practices into the operational management of Nigerian universities is limited. Particularly, the study has shown that there is no regular conduct of energy audit, which is essential for identifying inefficiencies and improving energy usage. Bamisile et al. (2021), emphasize that without regular energy audits, it is difficult for universities to identify inefficiencies in energy use, which ultimately hampers sustainability goals. Adegoke (2016) added that Nigerian universities are often constrained in implementing comprehensive energy audits due to financial limitations and lack of technical expertise. Furthermore, the study has also indicated that there is a weak adoption of alternative sustainable energy sources as an integral part of sustainable practices in the management of Nigerian universities. This may not be unconnected with the funding challenge to invest in the renewable energy to align with the growing global focus on renewable energy.

However, it is commendable to note that the study showed that much effort are being made in energy-efficient appliances, lighting, and educating staff and students on energy-saving behaviours.

Study by some universities, particularly private institutions; have made strides in adopting renewable energy sources such as solar panels. Aliyu et al. (2018) document success stories where some universities have integrated solar power into their energy mix, suggesting that the lack of renewable energy adoption is not universal across all Nigerian institutions.

The study has revealed that the adoption of sustainable waste management practices in Nigerian universities generally low. The universities appear to have not widely adopted the sustainable practices such developing recycling programmes for various waste materials, decomposing of food waste from the cafeterias which could be converted as manure for gardens. Adewuyi and Oyekola (2020) report that many Nigerian universities struggle with waste management, particularly with implementing recycling programs and composting. A study by Fakere et al. (2017) identifies a lack of infrastructure and awareness as major barriers to effective waste management on campuses. However, the findings of the study have indicated a significant effort of the universities in promoting reduction in paper and plastic waste and availability of waste bins across campuses

The finding of the study has indicated that the adoption of the sustainable water conservation practices in the management Nigeria universities is still low. Similarly, Enwerekowe et al. (2022) finding indicated that rainwater harvesting remains underutilized in Nigerian universities despite its potential for reducing potable water consumption. Many universities lack the infrastructure and strategic

planning to implement water conservation measures fully. Though the study recognized that the practice of addressing leaks and water wastages and efficient management was slightly more positive; the university could leverage on the abundant long raining season to harvest rainwater to be utilized for non-potable water needs thereby conserving the limited financial resources.

The study indicates that the integration of sustainable management practices in Nigerian universities shows that the integration of sustainable management practices did vary significantly across the three generational groups. Studies have observed that systemic factors, such as budget constraints, policy gaps, and limited institutional support for sustainability initiatives, largely affect all universities, regardless of age or generational status (Nkwede et al., 2020; Salisu et al., 2022). For instance, Salisu et al. (2022) explain that sustainability implementation in Nigerian universities is often hindered by financial and policy challenges that restrict the depth of sustainable practices integration across institutions. Furthermore, findings from Ahmed et al. (2024) demonstrated that while there is general awareness of sustainability goals, the absence of sufficient resources and organizational capacity to implement widespread change results in similar outcomes across institutions.

## **CONCLUSION**

Implementing the GCI through sustainable management practices in university education can enhance environmental stewardship and resource efficiency. Universities play a crucial role in advancing Nigeria's transition to a green economy. The universities' efforts in integrating sustainable building practices such as sustainable architectural designs, maintaining green spaces, and incorporating energy-efficient designs are commendable. However, gaps persist in areas like energy efficiency, waste, and water conservation. These challenges stem from limited finances, infrastructure deficits, planning, management technical capacities and policy issues, hindering full integration of sustainable practices and affecting educational quality and climate action. The success of the GCI will to a large extent depends on policymakers, university management, and stakeholders committed to sustainable change for present and future generations.

## **RECOMMENDATIONS**

Arising from the findings and the conclusion, the following recommendations are made:

1. Nigerian universities should sustain progress in sustainable building practices, especially in maintaining green spaces, retrofitting buildings, and adopting sustainable materials and designs.
2. To advance energy efficiency, universities should expand renewable energy use, conduct regular energy audits, enforce electricity-saving policies, and educate staff and students on energy-saving behaviours through institutional wide advocacy.

3. Nigerian universities should design a framework for comprehensive waste management systems, investing to improve recycling, hazardous and electronic waste handling, and food composting, with a focus on reducing paper and plastic waste.
4. The university should enhance water conservation efforts by implementing rainwater harvesting, water recycling, efficient fixtures and awareness programs for students and staff to foster campus-wide conservation.
5. The National Universities Commission (NUC) should initiate policy reforms and capacity-building efforts focused on GCI and sustainable management practices in Nigerian universities.

## ACKNOWLEDGMENTS

This paper is a product of survey research project conducted by the efforts of M.S. Dada and E. J. Chukwuemeka. We acknowledge the respondent that volunteered to provide valuable information on the study. We also acknowledge Niyi Jacob Ogunode for his contribution in in the literature review. Finally, our appreciation goes to the Vice Chancellor Professor Aisha Sani Maikudi for providing a platform for the TETFund sponsorship that inspired us to conduct this project.

## CONFLICT OF INTEREST

The authors declare no conflicts of interest.

## AUTHOR CONTRIBUTIONS

M.S. Dada as corresponding author, Conceptualized the paper, wrote and presented the original draft of the manuscript.

E.J. Chukwuemeka collected data, analysed data for the study, typeset and formatted the manuscript.

## REFERENCES

- Abenu, B., Alfa-Yusufu, A., & Ugochukwu, E. (2024). Challenges of green campus initiatives in Nigerian higher education institutions. *Journal of Environmental Sustainability*, 15(3), 45–60.
- Adegoke, T. (2016). Constraints in implementing energy audits in Nigerian universities: Financial and technical limitations. *Energy Management Review*, 8(2), 113-124.
- Adeoye, A., & Adewale, S. (2020). The role of green spaces in promoting biodiversity and cooling campus environments in Nigerian universities. *Environmental Sustainability Journal*, 15(3), 45-58.
- Adewuyi, T. O., & Oyekola, O. (2020). Challenges of waste management in Nigerian universities: Recycling and composting initiatives. *Waste Management & Research*, 38(6), 540-551. <https://doi.org/10.1177/0734242X20915510>.
- Ahmed, V., Bahroun, Z., & Anane, C. (2024). Exploring sustainability assessment practices in higher education: A comprehensive review through content and bibliometric analyses. *Sustainability*, 16(13), 5799. <https://doi.org/10.3390/su16135799>.

- Akeel, O., Bello, J., & Usman, A. (2018). Sustainability practices in Nigerian higher education institutions. *International Journal of Sustainability in Higher Education*, vol. 19(2) pp. 310–325.
- Al-Dmour, R. (2023). The impact of green-smart campus initiatives on student engagement and university image. *Sustainability in Higher Education*, 11 (4), 235–247. Available: <https://journals.sagepub.com/doi/10.1177/21582440231219591>.
- Aliyu, I. R., Idris, A. S., & Yahaya, M. M. (2018). Integrating solar power into Nigerian universities' energy mix: Case studies of successful implementations. *Journal of Renewable Energy*, 23(4), 211-225. <https://doi.org/10.1016/j.jre.2018.06.005>.
- Alshuwaikhat, H. M., & Abubakar, I. (2008). An integrated approach to achieving campus sustainability: Assessment of the current campus environmental management practices. *Journal of Cleaner Production*, 16(16), 1777–1785.
- Bamisile, O., Ogbonna, A., & Ifejika, C. (2021). The significance of energy audits for enhancing sustainability in Nigerian universities. *Journal of Sustainable Energy*, 32(5), 415-430.
- Boren, A., Flores, S., Gondalia, J., Haven, S., King, C., & McMullen, B. (2010). *Big Ten Sustainability Report: Best practices, trends, and challenges*. University of Michigan.
- Darko, A., Chan, A. P. C., & Ameyaw, E. E. (2017). Drivers for implementing green building technologies: An international survey. *Journal of Cleaner Production*, 145, 386-394. <https://doi.org/10.1016/j.jclepro.2017.01.043>.
- Enwerekowe, E., Etim, I., & Adejumo, T. (2022). *Challenges and opportunities for rainwater harvesting in Nigerian universities*. *Water Resources and Environmental Sustainability*, 28(2), 87-99.
- Ezema, I. C., Olotuah, A. O., & Fagbenle, O. I. (2016). Evaluation of sustainable practices in Nigerian university campuses: Green spaces and planning challenges. *International Journal of Environmental Studies*, 73(4), 587-605. <https://doi.org/10.1080/00207233.2016.1213151>.
- Fakere, A. A., Fadamiro, J. A., & Ogunleye, O. M. (2017). *Waste management practices in Nigerian university campuses: A case study of Obafemi Awolowo University*. *Environmental Management and Sustainable Development*, 6(1), 25-39. <https://doi.org/10.5296/emsd.v6i1.10462>.
- Isa, I., Musa, D., & Abubakar, S. (2021). The role of Green Campus initiatives in promoting environmental sustainability in Nigerian universities. *African Journal of Environmental Science*, 7(2), 85–99.
- Koc, E. (2014). Sustainability practices in higher education institutions in Europe. *Journal of Cleaner Production*, 78,(3) 148–159.
- Liu, X., Zheng, Z., & Yang, H. (2021). The role of Green Campus initiatives in student engagement and university image. *Environmental Education Research*, 27(5), 563–579.
- Nahar, M. (2018). Green Campus initiatives and sustainability practices: A case study. *Journal of Sustainable Development*, vol.12(4), pp. 45–58.
- Naturenews. (2023). *Nigerian campuses promote green environment for socio-economic well-being*. Nature News Online. Available: <https://www.naturenews.com>.
- Nkwede, J. O., Kalu, C., & Igwe, E. (2020). Nigerian universities and their sustainability challenges and way forward. *ResearchGate*. Retrieved from [https://www.researchgate.net/publication/350021995\\_Nigerian\\_Universities\\_and\\_their\\_Sustainability\\_Challenges\\_and\\_Way\\_Forward](https://www.researchgate.net/publication/350021995_Nigerian_Universities_and_their_Sustainability_Challenges_and_Way_Forward).
- Ogunode, N. J., Daniel, J., & Daniels, A. (2024b). Green university programs in Nigerian tertiary institutions. *Journal of African Studies in Education*, 18(1), 70–83.
- Omar, R., Hashim, A., & Aziz, H. (2010). *Sustainable Enhancing sustainability in higher education through Green Campus initiatives*. *University Review*, 6(2), 34–48.
- Salisu, M., Abdulkareem, A., & Bello, I. A. (2022). Sustainable management practices in Nigerian higher education institutions: A review. *Journal of Higher Education Studies*, 12(3), 45-58.
- Sahoo, S. (2008). The economic and environmental benefits of Green Campus initiatives. *Journal of Economic Perspectives*, 22(4), 134–148.

- Stephens, J. C., Hernandez, M. E., Román, M., Graham, A. C., & Scholz, R. W. (2008). Higher education as a change agent for sustainability in different cultures and contexts. *International Journal of Sustainability in Higher Education*, 9(3), 317–338.
- UN Environment Programme. (2022). *Environmental education and training: A review of the GUPES initiative*. United Nations Environment Programme.
- USAID. (2023). *Nigeria's climate policies: Progress and future prospects*. United States Agency for International Development. USAID.
- Wang, Y., Zhang, J., & Li, X. (2019). The role of green infrastructure in improving environmental quality in urban settings. *Journal of Environmental Science and Engineering*, 32(6), 1020-1035. <https://doi.org/10.1016/j.jes.2019.01.010>.
- Yuan, X., Zuo, J., & Huisingh, D. (2013). Green universities in China: What matters in sustainability initiatives? *Journal of Cleaner Production*, 61, 36–45.