



Pedagogical Policies and Environmental Sustainability Measures in Open and Distance Learning Systems

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Abstract

Environmental sustainability has become a defining priority for higher education institutions globally, yet its integration within Open and Distance Learning (ODL) systems - particularly in African contexts - remains poorly documented. This study investigates how sustainability is embedded within the pedagogical policies and institutional practices of the National Open University of Nigeria (NOUN). Drawing on both quantitative data and qualitative insights from 20 Centre Directors across Nigeria, the research employs a mixed-methods approach to explore perceptions, challenges, and policy implementation gaps. Quantitative data were analysed using SPSS Version 29, while interview responses were thematically coded. Results indicate that while NOUN demonstrates high conceptual alignment with global sustainability ideals - especially in digital learning, stakeholder collaboration, and resource conservation - practical implementation is hindered by infrastructural limitations, inconsistent policy enforcement, and insufficient stakeholder awareness. Directors emphasised the need for robust institutional frameworks, faculty training, and collaborative strategies to enhance sustainability in ODL delivery. The study proposes a policy-practice alignment model that integrates curriculum reform, digital innovation, and participatory governance. Findings offer both theoretical and practical insights into operationalising sustainability in digitally mediated education systems, contributing to ESD discourse in the Global South and informing strategic planning for ODL institutions.



Keywords: Environmental sustainability; Open and Distance Learning (ODL); Pedagogical policy; Stakeholder perception; NOUN (National Open University of Nigeria)

Introduction

The global imperative for environmental sustainability has intensified pressure on institutions to rethink traditional models of governance, infrastructure, and education. As societies confront escalating ecological crises - from climate change to resource depletion - higher education is increasingly being positioned as a transformative force for cultivating sustainable behaviours and systems (UNESCO, 2020). Within this paradigm, the education sector is not only expected to transmit knowledge but also to model and mainstream practices that promote ecological responsibility, social equity, and economic viability. Open and Distance Learning (ODL) occupies a unique space in this transformation. By design, ODL minimises the physical footprint of education through reduced commuting, paper usage, and infrastructural demands, thereby making it an ostensibly sustainable mode of delivery (COL, 2018). However, the assumption of ODL as inherently sustainable requires critical interrogation. Environmental sustainability in education is not achieved by modality alone but through deliberate institutional policies, pedagogical strategies, technological investments, and stakeholder engagement (Adnan & Ahyan, 2024; Pretorius et al., 2016). The shift from potential to practice hinges on how sustainability principles are embedded into the operational and pedagogical core of ODL institutions.

In Nigeria, the National Open University of Nigeria (NOUN) stands as the flagship institution for ODL, serving a dispersed and diverse student population across multiple geopolitical zones. As one of the vanguard institutions in distance education on the African continent, NOUN has the potential to serve as a benchmark for aligning environmental sustainability with institutional and pedagogical planning. Yet, evidence on the extent to which sustainability is integrated into its curriculum, administrative frameworks, and stakeholder practices remains limited. There is a knowledge gap in how ODL institutions in developing contexts, particularly those operating

within infrastructurally constrained environments, interpret and enact sustainability in their day-to-day operations. Existing literature has extensively theorised the role of education in promoting sustainable development (Burns, 2015; Ridei et al., 2021). Frameworks such as Education for Sustainable Development (ESD) and Universal Design for Learning (UDL) emphasise inclusivity, transdisciplinarity, and ecological awareness as essential to curriculum design and institutional policy (Fovet, 2017; Chisingui & Costa, 2020). However, most empirical studies focus on traditional, campus-based universities in high-income countries, leaving a gap in contextual knowledge about ODL institutions in the Global South. Furthermore, sustainability research tends to concentrate on curriculum content and student outcomes, often neglecting the structural, policy, and administrative dimensions that either enable or constrain sustainable practice within the ODL ecosystem.

This study responds to that gap by examining how environmental sustainability is operationalised through pedagogical policies and institutional practices at NOUN. Specifically, it investigates whether sustainability is structurally embedded in the university's academic and administrative systems, how key institutional actors perceive sustainability mandates, and what barriers or opportunities exist for fostering a more sustainable ODL model. The research is guided by four core objectives: (1) to examine the integration of pedagogical policies and sustainability measures within NOUN's ODL system; (2) to evaluate the perceptions and awareness of key stakeholders on sustainability practices; (3) to identify challenges limiting effective implementation of sustainability frameworks; and (4) to propose a conceptual model for embedding sustainability into distance learning. These objectives are approached through a mixed-method design, incorporating survey data and qualitative interviews with Centre Directors - administrative leaders responsible for coordinating ODL delivery across NOUN's study centres.

Pedagogical Policies and Sustainability in Higher Education

Higher education institutions are increasingly integrating sustainability into pedagogical policies through open educational practices (OEP),

which blend digital and physical learning environments to promote equity, creativity, and flexibility. This approach fosters adaptive learning ecosystems essential for long-term sustainable development in education (Adhya et al., 2024). While open frameworks advance accessibility, systemic transformation requires more than structural tools. The Universal Design for Learning (UDL) reinforces this by advocating inclusive pedagogical reforms that inherently link access to sustainability. Its application in higher education settings reconfigures instructional approaches to accommodate diverse learners while addressing broader ecological imperatives (Fovet, 2017). In practice, such inclusivity represents both a policy priority and a sustainability necessity. Persistent institutional barriers, however, limit the full integration of sustainability education. Universities often operate within rigid disciplinary frameworks and prioritise traditional evaluation systems, hindering transdisciplinary collaboration and innovation (Moore, 2004). These challenges underscore the need for policy frameworks that support holistic thinking and cross-departmental partnerships. In teacher education, sustainability is being embedded through curriculum reform at the postgraduate level. This restructuring is intended to enhance professional competencies aligned with environmental policy implementation and lifelong learning goals (Ridei et al., 2021). European institutions provide notable models where competence-based curricula and interdisciplinary collaboration have been central to Education for Sustainable Development (ESD), prioritising transformative learning over rote knowledge (Sadovets, 2023).

Sustainability Practices in Open and Distance Learning (ODL)

ODL has emerged as a pivotal mechanism for achieving inclusive and sustainable education by extending access to diverse learner populations, including those with disabilities. Although its reach is commendable, the absence of accessible technologies and limitations in hands-on training continue to challenge its full sustainability potential (Ncube & Hlatywayo, 2014). The foundation of sustainable ODL lies in strategic alignment across policy, instructional design, technological platforms, and learner support. Ensuring these elements are synchronised fosters educational quality while minimising resource

waste (Ansari, 2010). Sustainability also demands ethical and institutional accountability. As Garg (2012) suggests, ODL systems must go beyond structural efficiency to promote learner sensitivity, social responsibility, and innovative teaching approaches that reflect environmental consciousness. Digital assessment strategies have been widely adopted to address both quality assurance and ecological concerns. Tools like computer-based testing and robust question banks streamline evaluation processes and significantly reduce paper use in large-scale learning environments (Okonkwo, 2010). The experience of India's IGNOU demonstrates how a balanced strategy integrating marketing, financial sustainability, and pedagogical integrity can support ODL under pressure (Tripathi & Mukerji, 2011). Pretorius et al. (2015) argue that while online delivery holds ecological benefits, it still faces practical bottlenecks such as poor internet infrastructure and learner disengagement.

Challenges in Implementing Sustainability Measures in ODL

Implementing sustainability measures in ODL systems is frequently hindered by systemic and infrastructural challenges, particularly in developing contexts. A lack of adequate funding, limited digital infrastructure, and insufficient educator training are key barriers that prevent institutions from effectively operationalising sustainability initiatives (Joshi et al., 2023). The absence of coherent national policies further exacerbates these challenges. In many parts of the Global South, ODL frameworks lack legal backing and regulatory clarity, resulting in fragmented implementation and inconsistent quality assurance mechanisms (Simuforosa & Wiseman, 2014). Without enforceable policies, institutions operate in silos, undermining long-term planning and sustainability outcomes. Resistance to sustainable practices is often rooted in poor stakeholder awareness. Many educators and learners remain unfamiliar with green initiatives, which slows the adoption of technologies and pedagogies designed to minimise environmental impact (Okonkwo, 2012). This awareness gap reveals the need for targeted sensitisation and professional development strategies within ODL systems. Ali (2011) notes that while many global ODL institutions have embraced sustainability tools, institutions like NOUN still face persistent infrastructural

deficits and underprepared faculty, reflecting the disconnect between global aspirations and local realities. Even with policy support, financial instability remains a major threat to sustainability implementation.

Frameworks for Enhancing Sustainability in Distance Education

Sustainability in distance education depends heavily on the flexibility and responsiveness of curriculum design. Adaptive frameworks that integrate environmental education with digital tools and locally relevant content have been shown to enhance both ecological awareness and contextual engagement in ODL settings (Pretorius et al., 2016). Such designs are vital for meeting the diverse needs of learners, particularly in socio-economically varied regions. Effective sustainability in ODL also requires strong institutional partnerships. Collaboration among universities, industries, and local communities ensures that educational offerings align with market demands and social development priorities, creating a more robust and responsive educational ecosystem (Kadada & Mutambanengwe, 2015). Strategic planning plays a foundational role. Tripathi and Mukerji (2011) highlight the importance of linking quality assurance, innovative marketing, and fiscal sustainability in a unified framework. Their work on the IGNOU model illustrates how these elements reinforce each other to sustain ODL programs in competitive and resource-sensitive environments. Blended learning offers a practical solution for institutions transitioning toward digital pedagogy. Platforms combining asynchronous content, webinars, and collaborative projects help reduce environmental strain while maintaining pedagogical richness (Ng et al., 2013). Embedding real-world experiences within learning frameworks further strengthens sustainability education. Work-integrated learning (WIL) enhances student participation and translates theoretical sustainability principles into tangible practice (Wilson & Pretorius, 2017).

Sustainable Pedagogical Practices in Open and Distance Learning (SUS-PED ODL Model)

The **SUS-PED ODL Model** offers a conceptual lens for understanding how educational institutions, particularly in the Global South, can integrate sustainability into pedagogical practices through open and distance learning systems. The model organises its components into five interrelated levels: inputs, processes, barriers, outputs, and outcomes. These dimensions function as a continuum, guiding institutions from foundational policy development to the realisation of sustainable educational impacts.

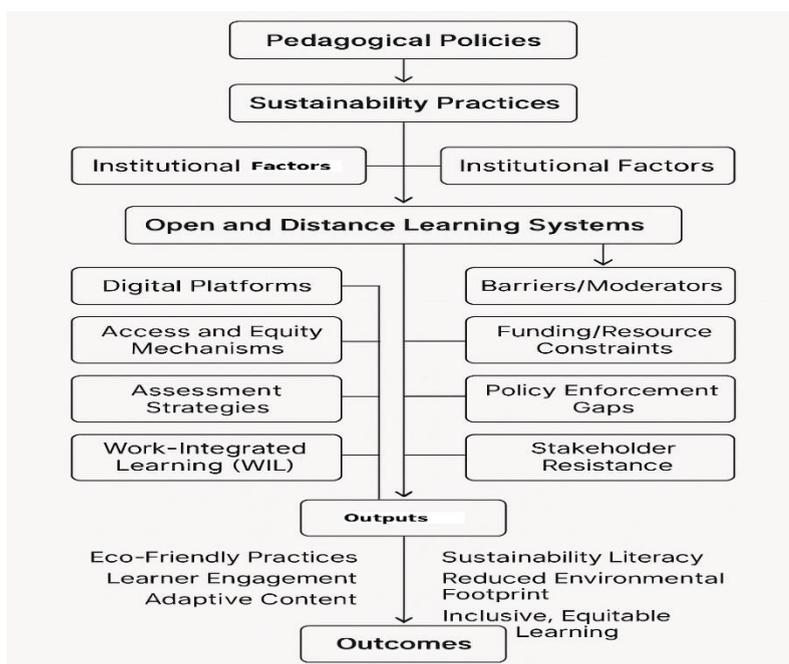


Figure 1: SUS-PED ODL Model.

Source: Author

The SUS-PED ODL Model identifies the inputs, processes, barriers, outputs, and outcomes necessary for embedding sustainability in distance education. Foundational inputs include policy frameworks that promote ecological responsibility, curriculum design integrating

sustainability themes, and professional development for educators (Adhya et al., 2024; Ridei et al., 2021). Institutional readiness and partnerships with stakeholders are equally critical for systemic integration (Kadada & Mutambanengwe, 2015). Processes such as adaptive curriculum design, digitalisation, and blended learning foster sustainable pedagogy. Embedding real-world applications and ethical teaching enhances learner engagement and critical ecological awareness (Pretorius et al., 2016; Ng et al., 2013; Adnan & Ahyan, 2024; Wilson & Pretorius, 2017; Garg, 2012).

However, barriers such as weak policy enforcement, limited infrastructure, and stakeholder resistance often impede progress (Simuforosa & Wiseman, 2014; Joshi et al., 2023; Tripathi & Mukerji, 2011; Okonkwo, 2012). Despite this, institutions that overcome these challenges demonstrate outcomes like greener technologies, curriculum reform, and increased inclusivity (Pretorius et al., 2015; COL, 2018; Sadovets, 2023; Flores, 2023; Ncube & Hlatywayo, 2014). Ultimately, long-term outcomes include sustainability literacy, operational resilience, and contributions to the SDGs (Burns, 2015; Faridi & Ouseph, 2014; COL, 2020; Filho, 1994).

Methods

This study employed a **descriptive survey design** with a **mixed-methods approach** to explore the integration of environmental sustainability practices within the Open and Distance Learning (ODL) system at the National Open University of Nigeria (NOUN). The quantitative aspect focused on measuring stakeholder perceptions using structured items, while the qualitative component explored deeper insights through open-ended interview questions. This design was selected to allow both breadth and depth of understanding regarding sustainability integration in pedagogy and institutional processes.

The target population consisted of **Centre Directors** of NOUN located across various geopolitical zones in Nigeria. A **total of 20 directors** participated in the study, selected based on their strategic role in managing ODL operations and their informed perspectives on policy

implementation and academic administration. The sample reflects a cross-section of directors from multiple academic departments and locations, thereby ensuring a diverse representation.

A **self-developed questionnaire** titled *Survey on Environmental Sustainability Practices in ODL* was used for data collection. The instrument comprised three major sections:

- **Section A: Demographics** – captured gender, age range, educational level, department, and geopolitical zone.
- **Section B: Perceptions on Sustainability** – included ten Likert-scale items (Strongly Disagree to Strongly Agree) covering themes such as policy impact, digital sustainability, cost barriers, and stakeholder collaboration.
- **Section C: Interview Section** – consisted of five open-ended questions designed to elicit qualitative insights into sustainability challenges, policy enforcement, digital learning benefits, and stakeholder contributions.

The survey tool was refined for clarity, content relevance, and alignment with study objectives.

The data collection process was conducted virtually using **digital platforms** such as WhatsApp, which allowed for convenient and timely administration of the instrument. Given the respondents dispersed locations and digital literacy levels, *WhatsApp* provided a flexible medium for both structured and open responses. The link to the questionnaire was distributed directly to participants, and follow-up reminders were issued to enhance response rates.

The quantitative data were analysed using **IBM SPSS Statistics Version 29**. Descriptive statistics (mean, standard deviation, and frequency distributions) were used to summarise responses. Further, thematic grouping of items was aligned with four core objectives of the study. Each thematic cluster was interpreted based on its mean score and distribution pattern. The qualitative data from Section C were subjected to **thematic analysis**. Responses were coded manually using respondent identifiers (e.g., R1–R20) and clustered under four emergent themes derived from the study objectives:

- Institutional Policy and Pedagogical Integration
- Stakeholder Awareness and Perception
- Structural and Operational Barriers
- Collaborative Frameworks for Advancing Sustainability

This mixed-method triangulation approach enabled the integration of statistical trends with narrative insights, thus enriching the interpretation of findings. The figure below illustrates the key variables in each objective that were analysed.

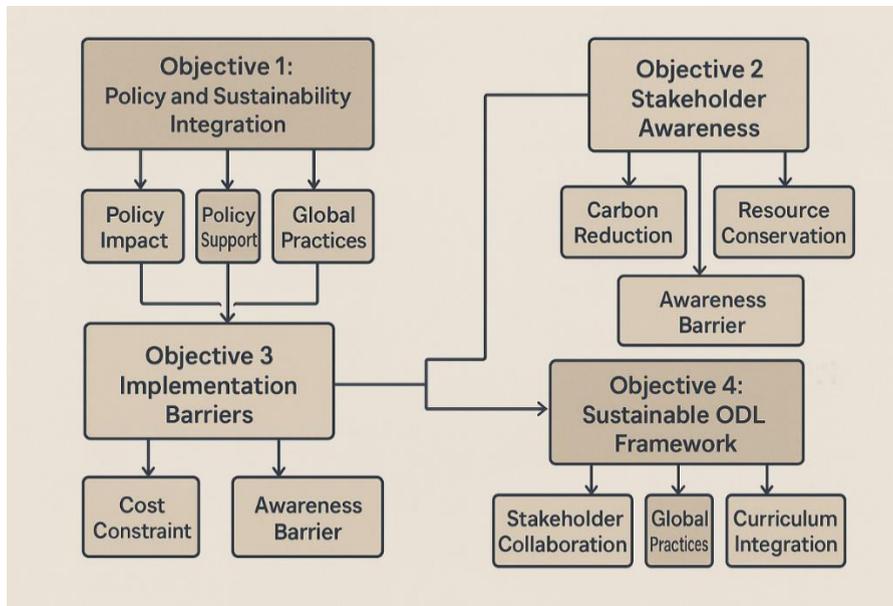


Figure 2: Objectives and Variables illustration

Source: Author

Ethical Considerations

Participants were informed of the voluntary nature of the study, and responses were treated with strict confidentiality. The digital format ensured anonymity, and no personal identifiers were collected. Ethical approval was secured through informal consent obtained via digital communication prior to data collection.

Results and Analysis

Descriptive Analysis of Demographics

This section presents detailed demographic analysis of the study. Table 1 below summarises the demographic details with simple counts and percentages.

Table 1: Demographic Data Summary

Category	Subcategory	Count (N = 20)	Percentage (100%)
Gender	Female	11	55.0
	Male	9	45.0
	36-55	11	55.0
	56-65	6	30.0
	65-up	3	15.0
Education Level/Position	Professor	12	60.0
	Postgraduate education (Master's, Ph.D.)	7	35.0
	Higher education (Diploma, Bachelor's degree)	1	5.0
Unit/Department	Education	13	65.0
	Agric/Animal Science and Fisheries	1	5.0
	Management Sciences	3	15.0
	Law	1	5.0
	DLSS	1	5.0
	Directorate of Research Administration	1	5.0
Geopolitical Zone	North Central	12	60.0
	South East	5	25.0
	South West	2	10.0
	South South	1	5.0

Note. This demographic data summary presents category and subcategory alongside its corresponding count and percentage. The total number of respondents is 20.

Descriptive Statistics

	N	Mean	Std. Deviation
Gender	20	1.55	.510
Age range	20	2.05	.605
Education level/Position	20	2.55	.605
Unit/Department	20	4.70	3.358
Geopolitical_Zone	20	1.60	.883
Valid N (listwise)	20		

Gender

The mean value for gender is **1.55** with a standard deviation of **0.510**. Given the coding (1 = Male, 2 = Female), this indicates a **slightly higher representation of female participants**. A near-midpoint mean confirms relatively balanced gender distribution, though females appear marginally more represented.

Age Range

The mean age range is **2.05** with a standard deviation of **0.605**. With coding structured as 1 = 36–55, 2 = 56–65, and 3 = 65-up, this result shows that **most respondents fall within the 56–65 age bracket**. The standard deviation, being moderate, suggests that there is some spread, but a large portion of participants are relatively concentrated within this middle category.

Education Level/Position

The mean for education level is **2.55** with a standard deviation of **0.605**. This coding was applied as: 1 = Higher education (Diploma/Bachelor's), 2 = Postgraduate education (Master's/Ph.D.), 3 = Professor. A mean leaning toward 3 indicates that a **substantial number of participants are senior academics or professors**, with fewer respondents in the lower academic qualification brackets. The

moderate spread suggests participants are fairly distributed between postgraduate and professor ranks.

Unit/Department

The mean score here is **4.70** with a relatively large standard deviation of **3.358**, which is expected because department/unit coding is nominal and was coded into multiple categories (e.g., 1–11). The high standard deviation reflects the wide spread of responses across departments, meaning that participants came from a diverse range of faculties and administrative units.

Geopolitical Zone

The geopolitical zone has a mean of **1.60** and a standard deviation of **0.883**. With coding as 1 = North-Central, 2 = South-East, 3 = South-West, and 4 = South-South, the mean shows that **most participants are from the North Central zone**, followed by some from the South East. The deviation indicates a modest level of diversity in geographical representation, though North-Central appears to be the dominant region.

Descriptive Statistical Analysis of the Study Variables

Descriptive Statistics

	N	Mean	Std.Deviation
<i>Carbon Reduction</i>	20	3.20	.616
<i>Resource</i>	20	3.35	.745
<i>Conservation</i>			
<i>Policy Impact</i>	20	3.15	.587
<i>Digital</i>	20	3.45	.510
<i>Sustainability</i>			
<i>Global Practices</i>	20	3.70	.470
<i>Awareness Barrier</i>	20	3.25	.444
<i>Cost Constraint</i>	20	3.10	.641
<i>Policy Support</i>	20	3.55	.510
<i>Stakeholder</i>	20	3.70	.470
<i>Collaboration</i>			
<i>Curriculum</i>	20	3.30	.571
<i>Integration</i>			
<i>Valid N (listwise)</i>	20		

Thematic Analysis of the Descriptive Statistical Results and Interview Findings

Institutional Policy and Pedagogical Integration

This theme addresses the integration of pedagogical policies and sustainability within ODL systems. High mean scores for Global Practices (3.70) and Policy Support (3.55) indicate strong endorsement of international sustainability benchmarks and policy alignment. However, Curriculum Integration (3.30) and Policy Impact (3.15) suggest limited practical application and uneven curriculum reform. While stakeholders support sustainability in principle, gaps persist in implementation and effectiveness. The findings underscore the need for strategic curriculum redesign, stronger enforcement mechanisms, and institutional reforms to ensure that sustainability policies in ODL move beyond intent and yield meaningful, measurable change in educational delivery.

Interview Findings 1

These responses discuss curriculum reform, policy awareness, institutional infrastructure, and strategic partnerships:

“By adopting globally accepted best practices” (R10)

“Providing policies that encourage environmental conservation” (R7)

“Creation of sufficient awareness and implementation of policies” (R20)

“Through raising awareness and collaboration” (R15)

“Wide range campaign and creating awareness” (R16)

“Improve funding and provision of adequate resources and infrastructures” (R17)

Interview responses highlight the need for actionable sustainability policies in ODL. While frameworks exist, respondents stressed gaps in implementation, policy awareness, and resource provision. Effective reforms, they argued, require global best practices, structured communication, and institutional planning backed by clear policies, funding, and measurable outcomes.

Stakeholder Awareness and Perception of Sustainability Practices

This theme explores stakeholder awareness of ODL's ecological benefits, aligning with Objective 2. Digital Sustainability (3.45) and Resource Conservation (3.35) scored high, reflecting support for digital learning and paper reduction. However, lower scores for Carbon Reduction (3.20) and Awareness Barrier (3.25) suggest limited understanding of ODL's environmental impact. While stakeholders recognise key sustainability elements, gaps remain in awareness and application. These findings point to the need for targeted interventions such as professional development, awareness campaigns, and curriculum-based sustainability workshops. Strengthening stakeholder engagement is essential for embedding sustainability more deeply within ODL systems and improving policy understanding and practice.

Interview Findings 2

These responses focus on how individuals perceive environmental sustainability and their awareness:

“It has created awareness and enlightenment” (R8)

“Through environmental education” (R4)

“Through orientation for students on environment” (R18)

“It brings quality education to the doorstep of the people...” (R1)

“Reduced paper consumption, decreased travel...” (R5)

“Digital learning is less dependent on use of fossil fuels” (R6)

Respondents acknowledged ODL's sustainability potential through reduced travel, paper use, and fossil fuel dependence. While some, like R1, R5, and R18, highlighted its ecological value and awareness benefits, others revealed uneven understanding. These insights suggest the need for structured orientation to enhance stakeholder appreciation of ODL's environmental impact.

Structural and Operational Barriers to Sustainability

This theme, aligned with Objective 3, highlights key challenges in ODL sustainability. Awareness Barrier (3.25) was rated higher than Cost Constraint (3.10), suggesting that lack of policy familiarity outweighs financial limitations. Findings indicate that communication gaps and low institutional capacity pose greater threats, necessitating policy alignment, staff training, and awareness-building.

Interview Findings 3

Responses here point to funding issues, ICT gaps, and structural constraints:

“Poor power supply in some cases; insufficient devices...” (R1)

“Poor service and Internet connection” (R3)

“Lack of adequate ICT tools” (R12)

“Attrition” (R7)

“Funding to embark on environmental conservation infrastructures” (R6)

“Lack of institutional collaboration with stakeholders” (R9)

“Policy issues” (R10)

“Poverty – poor funding” (R13)

“Infrastructures” (R17)

Respondents highlighted major barriers to ODL sustainability, including poor infrastructure, limited ICT tools, funding gaps, and unclear policies. R1, R3, and R12 cited internet and power issues, while R9 and R10 emphasized weak institutional collaboration. These challenges demand integrated planning, improved communication, and strategic resource allocation.

Collaborative Frameworks for Advancing Sustainability

This theme addresses Objective 4 by examining how sustainability in ODL can be strengthened through collaboration and strategic frameworks. Stakeholder Collaboration and Global Practices both scored 3.70, indicating strong support for participatory governance and international alignment. Curriculum Integration (3.30) reflects moderate implementation of sustainability content. Together, these variables highlight the need for a multidimensional framework - such as the SUS-PED ODL model - that connects policy, pedagogy, and global benchmarks. Respondents' emphasised collaboration among administrators, faculty, and external actors as essential. While perceptions are positive, institutional alignment and stakeholder engagement must improve to fully embed sustainability in distance education systems.

Interview Findings 4

This includes responses related to stakeholder synergy, rules, collaboration, and behavioural compliance:

“Students and faculty can contribute to making ODL more environmentally sustainable if robust synergy and flexible approach is adopted” (R9)

“Through collaboration and prioritising a sense of ownership” (R15)

“Organise activities in celebrating annual environmental sustainable day” (R16)

“By abiding to rules and regulations on environment” (R18)

“By implementing the policy” (R20)

“Adhering to sustainability rules” (R12)

“Ensuring environmental friendly practices” (R7)

“Minimising printing, faculty should design online learning with sustainability in mind” (R5)

The final theme highlights collaboration, policy enforcement, and shared responsibility as vital for sustainability in ODL. Respondents’ emphasised synergy among stakeholders (R9), adherence to institutional rules (R12, R18, R20), and participatory strategies such as campaigns and ownership-building (R15, R16). Curriculum-level changes like reducing printing and designing eco-conscious courses (R5, R7) were also recommended. These views underscore that sustainability requires institutional alignment, behavioural change, and policy support. Interview responses across all themes reveal stakeholders’ awareness of sustainability goals and the barriers to implementation. Despite infrastructural and financial constraints, participants identified actionable solutions such as awareness programs, reform, and collaboration.

Discussion

This study investigated how pedagogical policies and environmental sustainability practices are perceived and implemented within the ODL system of the National Open University of Nigeria (NOUN). Using a mixed-method approach with inputs from 20 Study Centre Directors across Nigeria, the findings present compelling insights on the

integration of sustainability principles within institutional frameworks. The discussion is organised around four key themes corresponding to the study objectives.

The results indicate that NOUN has made visible efforts to align with global sustainability expectations. The high mean scores recorded for *Global Practices* (3.70) and *Policy Support* (3.55) reflect broad consensus among directors that the institution values sustainability and seeks to embed it in practice. However, a relatively lower mean for *Policy Impact* (3.15) suggests a disconnection between policy formulation and its actual translation into sustainable practices. This gap highlights the implementation dilemma frequently noted in sustainability literature (Chisingui & Costa, 2020; Simuforosa & Wiseman, 2014). While policies exist, they are often not institutionalised or systematically evaluated, which undermines their practical value. Interview responses corroborate this view, with Directors calling for clearer awareness campaigns (R16), more consistent enforcement (R20), and adequate infrastructural support (R17). The alignment with the SUS-PED ODL Model becomes relevant here, as it advocates for strong inputs and policy activation mechanisms to trigger systemic integration.

The findings also suggest that stakeholders are moderately aware of the ecological benefits of ODL. The mean scores for *Digital Sustainability* (3.45) and *Resource Conservation* (3.35) reveal that directors acknowledge the shift from traditional paper-based methods to more sustainable digital platforms. Respondents highlighted reductions in travel, lower carbon footprints, and increased digital literacy as benefits of ODL (R1, R5, R6). This aligns with evidence from the Commonwealth of Learning (2018) that students in distance education exhibit significantly smaller carbon footprints. However, the *Carbon Reduction* score (3.20) and *Awareness Barrier* score (3.25) suggest that while the advantages of digital learning are conceptually acknowledged, deeper ecological consciousness is still evolving. Some Directors expressed concerns about knowledge gaps among staff and learners, pointing to a lack of training and exposure. This is consistent with Okonkwo (2012), who noted that low stakeholder awareness slows down the adoption of green educational technologies. The

implication is that training and sensitisation initiatives should not only target learners but also administrative and academic staff who are central to curriculum design and delivery.

Despite the generally positive outlook on sustainability, the study revealed significant barriers, especially around infrastructure and operational capacity. The lowest-scoring item was *Cost Constraint* (3.10), reflecting perceptions that while cost is a concern, it may not be the principal challenge. Instead, Directors' emphasised issues such as unstable electricity (R1), limited internet access (R3), insufficient digital tools (R12), and general institutional fragility (R13, R17). These challenges reflect the wider context of Nigerian higher education, where budgetary constraints, bureaucratic inefficiencies, and outdated infrastructure persist. The results echo previous findings by Joshi et al. (2023) and Faridi & Ouseph (2014), who emphasised that digital transitions in ODL systems often face severe infrastructural limitations. Notably, some directors questioned the inclusivity of current ODL models, especially in relation to learners with disabilities (R6), pointing to sustainability gaps not only in environmental terms but also in accessibility and equity. Therefore, sustainable ODL cannot be separated from broader institutional reforms and financial planning. Investment in smart infrastructure, solar energy alternatives, and inclusive digital tools will be essential to overcome these limitations.

The highest agreement was recorded for *Stakeholder Collaboration* (3.70), showing strong belief in the power of collective action to drive institutional sustainability. Respondents emphasised the need for synergy between learners, staff, and management (R9, R15), and recommended environmental awareness programs, sustainable course designs, and stakeholder empowerment strategies (R16, R20). This supports Burns' (2015) argument that transformative sustainability education is deeply relational and must be co-created with those it seeks to serve. Directors also stressed behavioural compliance - adhering to environmental rules, minimising printing, and promoting green consciousness in all areas of academic delivery. These insights reinforce the SUS-PED ODL Model's proposition that sustainable impact is the result of effective outputs and outcomes grounded in collaborative processes. The findings suggest that NOUN's long-term

sustainability success depends not only on institutional mandates but also on the participatory engagement of all actors.

Conclusion

This study examined how environmental sustainability is integrated into the pedagogical and institutional frameworks of the National Open University of Nigeria (NOUN). Insights from twenty Study Centre Directors revealed strong support for global best practices, digital learning, and stakeholder collaboration. However, persistent gaps in infrastructure, awareness, and policy implementation hinder full sustainability. Challenges such as poor internet access, inadequate sensitisation, and enforcement weaknesses continue to limit progress. Nevertheless, a clear appetite for collaborative engagement and curriculum reform emerged. Sustainable ODL at NOUN requires not only digital tools but also adaptive policies, capacity development, and inclusive practices to translate intent into tangible outcomes.

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