

FROM POLICY TO PRACTICE: ADDRESSING INSTITUTIONAL GAPS AND IMPLEMENTATION FAILURES IN E-WASTE MANAGEMENT IN NIGERIAN UNIVERSITY LIBRARIES

Caroline A. Okoro, PhD (CLN)

Michael Okpara University of Agriculture Umudike,
Abia State, Nigeria.

and

Victor Wagwu, PhD (CLN).

Dame Patience Goodluck Jonathan Automated Library,
Ignatius Ajuru University of Education Rumuorlumeni,
Port-Harcourt, Rivers State, Nigeria.

Abstract

The rapid integration of information and communication technologies (ICTs) into Nigerian university libraries has enhanced information access and service delivery but has also intensified the generation of electronic waste (e-waste). Despite the existence of national regulatory frameworks such as those provided by the National Environmental Standards and Regulations Enforcement Agency (NESREA) and Extended Producer Responsibility (EPR) policies, e-waste management in university libraries remains largely ineffective. This paper examines the persistent gap between policy formulation and practical implementation in e-waste management within Nigerian university libraries. Adopting an opinion-based analytical approach, the study argues that the core challenge is not policy absence but weak institutionalization and implementation failure at the library level. The paper conceptualizes e-waste as both an environmental concern and a governance issue, emphasizing the institutional responsibilities of libraries in ICT life-cycle management. Findings reveal that deficiencies such as the absence of internal e-waste policies, weak asset life-cycle systems, limited accountability structures, inadequate infrastructure, and low prioritization of sustainability significantly undermine effective e-waste management. The study further highlights poor coordination between libraries and environmental or recycling agencies as a major constraint. It concludes that sustainable e-waste management requires a shift from policy existence to policy enforcement through institutional reforms, strengthened operational systems, and capacity development. The paper contributes to Library and Information

Science (LIS) discourse by re-framing e-waste as an institutional governance challenge and advocating for integrated sustainability practices within academic libraries.

Keywords: e-waste, university libraries, ICT lifecycle, policy implementation, sustainability, Nigeria

Introduction

The rapid adoption of Information and Communication Technologies (ICTs) is revolutionizing university libraries around the world, and Nigeria stands at a pivotal crossroads. Once anchored in print, Nigerian university libraries are now evolving into dynamic digital hubs equipped with electronic databases, automated catalogues, and virtual services that promise unprecedented access to knowledge. However, this digital renaissance carries a significant challenge: an explosion of electronic waste (e-waste).

E-waste refers to electrical and electronic equipment that has reached the end of its useful life or has become obsolete due to technological advancement (UNEP, 2019). Within university libraries, this includes computers, printers, servers, scanners, and storage devices that must be regularly replaced to maintain service efficiency. Although these technologies enhance performance, their continuous upgrade cycle results in the accumulation of discarded equipment. More importantly, e-waste contains hazardous substances such as lead, mercury, and cadmium, which pose serious environmental and health risks when improperly managed (Okoro & Umeabali, 2015). As libraries discard aging computers and obsolete servers, they unwittingly contribute to a growing

environmental crisis that, if unaddressed, undermines the very sustainability that digital innovation promises. This makes e-waste management not merely a technical issue but a critical component of institutional responsibility and environmental governance.

The challenge of e-waste management is more severe in developing countries such as Nigeria, where institutional capacity, regulatory enforcement, and waste management infrastructure remain limited. In many university libraries, ICT expansion has not been matched with corresponding disposal systems or sustainability frameworks. As a result, obsolete equipment is often stored indefinitely or discarded through informal channels that bypass environmental safeguards (Akor & Udensi, 2013; Ezeani & Igwesi, 2016). These practices reflect deeper structural weaknesses in institutional planning rather than isolated operational lapses, raising concerns about the sustainability of ICT-driven library development.

Although national awareness of e-waste issues has increased, much of the existing discourse in Nigeria has focused on regulatory frameworks and informal recycling systems, particularly under agencies such as the National Environmental Standards and Regulations Enforcement Agency (NESREA, 2011). However, less attention has been given to how these policies are translated into operational practices within specific institutional settings such as university libraries. This gap is significant because librarians are central actors in e-waste

generation, yet their role in policy implementation remains limited. This disconnect between policy formulation and institutional practice suggests the need to critically examine how environmental directives are operationalized at the library level (Ogunniyi et al., 2020).

From a broader perspective, the persistence of e-waste challenges in university libraries indicates that policy existence alone is insufficient to ensure sustainable outcomes. What is often missing is the institutional framework required to translate national policies into practical operational procedures. In many cases, libraries lack clear guidelines for ICT lifecycle management, resulting in weak accountability and inconsistent handling of obsolete equipment (Akanbi & Adewoye, 2021). This gap highlights the need to shift attention from policy availability to policy functionality within institutional contexts.

Beyond environmental concerns, e-waste should also be understood as an indicator of institutional efficiency and administrative effectiveness. University libraries are expected to demonstrate responsible resource management as part of their broader educational mandate. However, the absence of structured mechanisms for managing ICT obsolescence suggests weaknesses in planning, budgeting, and governance. This study therefore argues that e-waste management must be re-conceptualized not only as an environmental issue but

also as a measure of institutional accountability and organizational performance (Issa & Daura, 2020).

Against this background, this study contends that bridging the gap between policy and practice requires deliberate institutional reforms supported by effective implementation systems. Sustainable e-waste management can only be achieved when regulatory frameworks are internalized through clear operational guidelines, staff capacity development, and robust accountability structures. Given that university libraries are integral components of higher education institutions, the sustainable management of ICT resources is essential for ensuring the continuous provision of quality information services that support teaching, learning, and research. By focusing on university libraries, this study contributes to emerging discussions on ICT lifecycle management, environmentally sound disposal, recycling, and institutional accountability, thereby advancing efforts toward responsible consumption and production within the broader sustainability agenda.

RE-FRAMING THE PROBLEM: E-WASTE BEYOND ENVIRONMENTAL CONCERN

While e-waste is often framed within environmental and public health discourse, this perspective overlooks a crucial dimension of the problem. The e-waste challenge confronting Nigerian university libraries extends beyond issues of pollution control and health risks to encompass broader concerns relating to institutional governance and administrative responsibility. Although existing

studies have largely focused on recycling practices, hazardous waste disposal, and environmental regulation (Nnorom & Osibanjo, 2008; UNEP, 2019), these concerns remain valid but provide only a partial understanding of e-waste within academic environments. However, this study argues that e-waste should also be viewed as a reflection of deeper institutional weaknesses, particularly in governance, strategic planning, and accountability.

Governance structures in many Nigerian university libraries exhibit significant deficiencies that undermine effective e-waste management. Leadership responsibilities and accountability frameworks relating to ICT asset management are often poorly defined or entirely absent, resulting in fragmented decision-making processes. In the absence of clearly assigned roles, oversight of ICT procurement, utilization, replacement, and disposal becomes inconsistent and largely reactive. Without structured governance frameworks, library administrators lack clear pathways for ensuring that electronic resources are managed responsibly throughout their useful lifespan.

The increasing dependence of university libraries on ICT infrastructure further intensifies the urgency of addressing these governance challenges. Cox et al. (2019) assert that computers, servers, networking equipment, scanners, and other digital technologies now constitute the backbone of modern library service delivery. However, the rapid pace of technological advancement frequently renders these devices obsolete. The resulting accumulation of electronic waste

reflects not only environmental concerns but also institutional failures in strategic planning and lifecycle management. The inability to anticipate technological obsolescence and develop systematic replacement strategies represents a broader failure of organizational foresight.

Closely related to these governance weaknesses is the absence of structured ICT lifecycle management systems within university libraries. In many Nigerian institutions, formal procedures for tracking ICT assets from acquisition to disposal are either inadequate or nonexistent (Abubakar, 2021; Adeyeye & Oladokun, 2023). Standardized practices governing procurement, maintenance, upgrading, decommissioning, and environmentally sound disposal are rarely institutionalized. Consequently, obsolete equipment is often retained indefinitely in library premises or university stores, or disposed of through informal channels. Such practices reveal not only deficiencies in environmental stewardship but also deeper shortcomings in institutional accountability and resource governance.

In addition, the tendency to frame e-waste primarily as an external environmental issue has contributed to the externalization of responsibility. In many instances, attention is directed toward government agencies, environmental regulators, or informal recycling sectors, while the role of university libraries as generators and managers of electronic waste receives limited scrutiny (Olatunji & Adebayo, 2021; Forti et al., 2020). Libraries should

therefore be regarded as active stakeholders with direct responsibility for sustainable ICT management, and not merely as passive victims of inadequate national systems. As key users and custodians of technological resources within higher education institutions, libraries and librarians must be recognized as critical actors in the development and implementation of effective e-waste management practices.

The Policy Paradox in Nigeria: Policy Existence Without Effective Practice

At this point, one is tempted to ask whether Nigeria has regulatory bodies that handle electronic waste challenges. The answer is yes. At the national level, agencies such as the National Environmental Standards and Regulations Enforcement Agency (NESREA) have developed guidelines for regulating the generation, handling, and disposal of electronic waste (NESREA, 2011; Federal Ministry of Environment, 2019). Similarly, the Extended Producer Responsibility (EPR) framework assigns responsibility to producers for the end-of-life management of electronic products, reflecting increasing institutional recognition of environmental sustainability concerns (Nnorom & Osibanjo, 2008; UNEP, 2019). Collectively, these initiatives suggest that Nigeria possesses a formal regulatory architecture designed to address the e-waste challenge.

However, the existence of policy does not necessarily translate into effective practice. Despite the presence of national frameworks, implementation within institutional contexts, university libraries remains inconsistent and

largely ineffective. Regulatory provisions frequently function more as statements of intent than as operational mechanisms capable of shaping day-to-day practices (Ogunniyi et al., 2020; Akanbi & Adewoye, 2021). This disconnect between policy formulation and institutional execution represents one of the most significant barriers to sustainable e-waste management in Nigerian university libraries.

A major limitation of the current regulatory environment is its lack of institutional specificity. Existing policies are generally broad in scope, addressing issues relating to manufacturing, importation, and industrial recycling systems (UNEP, 2019). Although these provisions are necessary, they provide limited guidance for university libraries, where ICT equipment is continuously acquired, upgraded, utilized, and eventually decommissioned. Consequently, essential operational processes such as inventory management, lifecycle tracking, asset decommissioning, and environmentally responsible disposal are often poorly defined or inconsistently implemented within library settings (Adeyeye & Oladokun, 2023). In the absence of institution-specific frameworks, libraries are left to interpret national directives independently, resulting in uneven and non-standardized practices.

The implementation challenge is further exacerbated by weak enforcement capacity. Regulatory agencies frequently operate under financial, logistical, and technical constraints that limit their ability to monitor compliance

effectively across institutions (Ogunniyi et al., 2020; UNEP, 2019). Within the higher education sector, environmental audits of ICT assets and disposal practices are rarely conducted, leaving university libraries with minimal external oversight regarding the management of electronic equipment throughout its lifecycle (Akanbi & Adewoye, 2021). As a result, institutional compliance often depends more on administrative discretion than on systematic regulatory enforcement.

Another important dimension of this paradox is the symbolic nature of policy compliance. Institutions may acknowledge the existence of environmental regulations without embedding them into routine administrative and operational processes. This reflects what may be described as policy awareness without operationalization. Although awareness of e-waste issues may exist among institutional stakeholders, structured systems for segregation, storage, recycling, and responsible disposal are frequently weak, fragmented, or entirely absent (Okoro & Umebali 2015; Issa & Daura, 2020 and Abubakar, 2021). Under such circumstances, compliance becomes superficial rather than functional, creating the appearance of regulatory adherence without corresponding behavioural or institutional change.

Overall, Nigeria's e-waste challenge is characterized not by the absence of policy but by weaknesses in implementation. Existing regulations are often inadequately enforced, insufficiently localized, and poorly integrated into

institutional practice. The result is a persistent governance gap in which electronic waste continues to accumulate without clear accountability mechanisms or systematic management structures (Forti et al., 2020; Baldé et al., 2017). This policy paradox ultimately reveals a deeper systemic misconception: the assumption that policy formulation alone is sufficient to drive institutional change. In reality, meaningful progress requires the translation of national policies into localized frameworks supported by effective implementation systems, monitoring mechanisms, and clearly defined accountability structures. It is within this context that the institutional realities of Nigerian university libraries must be examined.

Institutional Gaps in Nigerian University Libraries

The policy paradox discussed above is sustained, in part, by institutional deficiencies within Nigerian university libraries. Although national frameworks for e-waste management exist, their effectiveness depends largely on the capacity of individual institutions to translate regulatory directives into operational practice. In many university libraries, however, weak internal governance systems, limited institutional commitment, and the absence of clearly articulated procedures for sustainable ICT management undermine this process (Akanbi & Adewoye, 2021; Ogunniyi et al., 2020). Consequently, many libraries operate within what may be described as an internal policy vacuum,

where structured guidelines for managing the lifecycle of electronic resources are either absent or poorly implemented.

As a result, ICT resources are often managed in an unstructured and reactive manner. Standardized procedures governing procurement, asset tracking, maintenance, replacement, and end-of-life disposal are frequently lacking, resulting in inconsistent practices across institutions (Olatunji & Adebayo, 2021; Adeyeye & Oladokun, 2023). In many cases, electronic equipment is used until it becomes non-functional, after which it is either stored indefinitely or discarded through informal channels without proper documentation. Such practices contribute not only to the accumulation of e-waste but also to weakened institutional memory and diminished accountability in resource management.

A major institutional gap is the absence of formal e-waste management policies at the library level. While some universities may have general environmental or procurement guidelines, these rarely translate into operational frameworks specifically designed for managing electronic waste within library systems (Abubakar, 2021). Consequently, library personnel are often left without clear directives to guide decision-making relating to obsolete ICT equipment, resulting in discretionary practices and inconsistent implementation (Ezeani & Igwesi, 2016; Nnorom & Osibanjo, 2008). This lack of structured

guidance undermines efforts to institutionalize sustainability practices within library operations.

Closely related to this challenge is the weakness or complete absence of ICT lifecycle management systems. In well-structured institutional environments, ICT assets are managed through clearly defined stages, including acquisition planning, maintenance scheduling, usage monitoring, upgrading, and systematic decommissioning (Forti et al., 2020). In many Nigerian university libraries, however, these processes are only partially implemented or entirely absent. Consequently, equipment is often addressed only at the point of failure rather than being proactively managed throughout its lifecycle. The absence of lifecycle management frameworks therefore represents a significant institutional barrier to sustainable e-waste governance.

Institutional weaknesses are further reinforced by the lack of clearly designated responsibility for e-waste management. Unlike traditional library functions such as acquisitions, cataloguing, or digital services, responsibility for managing obsolete ICT equipment is rarely assigned to specific units or personnel (Issa & Daura, 2020). This diffusion of responsibility contributes to fragmented decision-making and weak accountability, making it difficult to enforce environmentally sound disposal practices or monitor compliance with institutional procedures. Given their direct involvement in the acquisition, utilization, maintenance, and disposal of ICT resources, librarians should be

recognized as critical stakeholders in institutional e-waste governance and actively involved in the implementation of relevant policies and practices.

Infrastructural constraints also significantly limit effective e-waste management. Even where awareness of the problem exists, many libraries lack appropriate facilities for the safe storage, segregation, and temporary holding of obsolete ICT equipment (UNEP, 2019). The absence of designated collection points and formal partnerships with certified recycling organizations further exacerbates the problem, forcing libraries to retain outdated equipment within already limited physical spaces. Beyond creating spatial inefficiencies, these practices increase environmental and occupational risks within library environments.

Beyond structural and infrastructural limitations, institutional culture also plays an important role in shaping e-waste outcomes. In many university libraries, organizational priorities are directed toward ICT acquisition, technological expansion, and service delivery, while issues relating to reuse, disposal, and sustainability receive comparatively little attention (Abubakar, 2021). This imbalance creates a situation in which investment in technological advancement is not accompanied by a corresponding commitment to end-of-life responsibility. Consequently, e-waste management is rarely integrated into strategic planning processes, budgetary allocations, or institutional performance indicators.

Collectively, these institutional gaps reflect a deeper structural challenge: the limited integration of sustainability principles into library governance and administration. E-waste continues to be perceived primarily as an external environmental issue rather than as an internal management responsibility requiring deliberate planning, accountability, and institutional commitment (Lawhon, 2013; Maphosa & Maphosa, 2020). This perception constrains innovation and inhibits the development of proactive, system-based approaches to sustainable ICT management within university libraries.

Addressing these deficiencies requires more than awareness of national regulations; it demands the establishment of internal governance frameworks, clearly defined responsibilities, functional ICT lifecycle management systems, adequate infrastructural support, and the active involvement of librarians in policy implementation processes. Without such institutional reforms, the implementation of national e-waste policies will continue to yield limited practical impact within university libraries (Adeyeye & Oladokun, 2023; Ogunniyi et al., 2020). Ultimately, university libraries must be repositioned not merely as service units, but as active governance actors capable of advancing sustainable e-waste management within higher education institutions.

Implementation Failures in E-Waste Management in Nigerian University Libraries

Even where e-waste management policies exist at both national and institutional levels, the major constraint in Nigerian university libraries lies in implementation failure. This weakness is reflected in ineffective enforcement mechanisms, weak accountability structures, inadequate monitoring systems, and limited institutional commitment to translating policy into practice (Ogunniyi et al., 2020; Akanbi & Adewoye, 2021). A key feature of this challenge is that many policies remain largely symbolic, existing as formal documents with minimal operational impact. In several institutions, regulatory intentions are not translated into measurable actions within library systems, creating a persistent disconnect between policy formulation and practical implementation outcomes (Abubakar, 2021; Adeyeye & Oladokun, 2023). Where internal guidelines exist, enforcement is often weak or inconsistent, and compliance is rarely supported by structured audits. Consequently, adherence to e-waste disposal procedures tends to be discretionary rather than mandatory (Olatunji & Adebayo, 2021).

The absence of robust monitoring and evaluation systems further exacerbates implementation gaps. Effective e-waste management requires continuous tracking of ICT assets throughout their lifecycle. From acquisition, usage, obsolescence, to final disposal. However, many university libraries lack functional inventory management systems capable of supporting such traceability (Forti et al., 2020). This weakens institutional oversight and significantly limits accountability in ICT asset disposal processes (Adeyeye & Oladokun, 2023).

Institutional priorities also contribute to implementation failure. In many cases, emphasis is placed on service delivery, digital transformation, and user satisfaction, while end-of-life management of ICT infrastructure receives minimal attention (Issa & Daura, 2020). This creates an institutional culture in which e-waste management is viewed as peripheral rather than integral to library operations. As a result, even when awareness exists, it is rarely translated into sustained operational action.

Resource constraints further undermine implementation capacity. Effective e-waste management requires adequate funding for storage facilities, logistics, and partnerships with certified recycling systems (UNEP, 2019). However, these components are rarely prioritized in library budgeting processes. Consequently, even well-formulated policies are rendered ineffective due to infrastructural and financial limitations (Nnorom & Osibanjo, 2008).

In addition, limited collaboration between university libraries and external stakeholders, such as environmental regulatory agencies and certified recycling firms, reduces the effectiveness of implementation frameworks. The absence of structured partnerships isolates libraries from broader e-waste management ecosystems that could otherwise support safe and compliant disposal practices (Chancerel & Rotter, 2020; UNEP, 2019).

Overall, these implementation failures reflect deeper governance weaknesses within university library systems. Scholars such as Ogunniyi et al.

(2020) and Adeyeye & Oladokun (2023) emphasize that weak accountability, inadequate monitoring, insufficient funding, and fragmented institutional coordination collectively hinder the operationalization of e-waste management policies. This underscores the critical reality that policy existence alone is insufficient to address the problem. This study argues that without effective implementation structures and strong institutional enforcement capacity, e-waste policies will continue to remain largely symbolic rather than operational in Nigerian university libraries.

Bridging the Gap: From Policy to Practice in E-Waste Management

This study argues that addressing these challenges requires more than the existence of regulatory frameworks; it demands deliberate institutional transformation supported by functional operational systems and sustained capacity development. The persistent challenges in e-waste management within Nigerian university libraries stem from weak policy localization, institutional deficiencies, and chronic implementation gaps (Ogunniyi et al., 2020; Akanbi & Adewoye, 2021). Policy effectiveness is therefore not inherent in its formulation but depends on its translation into institutional practice, as national frameworks achieve meaningful impact only when embedded within internal library systems through clearly defined operational procedures (Nnorom & Osibanjo, 2008; UNEP, 2019).

A critical position advanced in this study is that institution-specific e-waste management policies are essential for effective implementation. Such policies must align with national regulations while reflecting the operational realities of university libraries in Nigeria. They should clearly define procedures for ICT procurement, lifecycle planning, maintenance, decommissioning, storage, and environmentally responsible disposal (Adeyeye & Oladokun, 2023). The study further contends that structured ICT lifecycle management systems are indispensable for ensuring systematic tracking of ICT assets from acquisition to disposal. The absence of digital inventory systems, routine audits, maintenance schedules, and formal decommissioning protocols contributes significantly to the uncontrolled accumulation of e-waste and weak accountability in resource management (Forti et al., 2020; Olatunji & Adebayo, 2021).

From the perspective of this study, strengthening institutional accountability is also fundamental to improving implementation outcomes. According to Abubakar (2021), clearly defined roles and responsibilities must be assigned to specific units or personnel responsible for e-waste management, supported by monitoring frameworks, compliance mechanisms, and structured reporting systems that ensure enforcement of procedures. However, such systems cannot function effectively without adequate human capacity development. Library personnel must therefore be continuously trained in ICT lifecycle management, sustainability practices, and e-waste handling procedures to enhance implementation capacity (Lawhon, 2013; Abubakar, 2021).

Furthermore, this study maintains that effective e-waste management in university libraries requires robust multi-stakeholder collaboration. Partnerships with environmental regulatory agencies, certified recycling firms, ICT vendors, and sustainability-focused organizations are necessary to provide technical expertise and access to compliant disposal channels that are often unavailable within institutions (UNEP, 2019; Chancerel & Rotter, 2020). In addition, sustainability must be mainstreamed into library governance structures through strategic planning, budgeting processes, procurement policies, and professional standards to ensure long-term institutional commitment to responsible e-waste management (Adeyeye & Oladokun, 2023).

Therefore, bridging the gap between policy and practice requires coordinated institutional reform rather than fragmented interventions. Without integrated systems, functional accountability structures, and sustained capacity development, e-waste policies will continue to remain largely symbolic rather than operational within Nigerian university libraries. It is against this backdrop that the study situates its findings.

Recommendations

Based on the above literature, the following recommendations were made:

1. Universities should develop their own institution-specific e-waste management policies that align with national regulations but address the unique operations of libraries.

2. They must establish structured ICT lifecycle management systems, ensuring that all assets from procurement to disposal, are systematically tracked through digital inventory and routine audits.
3. Institutional accountability must be strengthened by assigning specific personnel or dedicated units to oversee e-waste, supported by monitoring and formal compliance checks.
4. Librarians should be actively involved in the formulation, implementation, monitoring, and evaluation of e-waste policies in Nigeria. Given their central role in the acquisition, utilization, maintenance, and disposal of ICT resources within university libraries, their practical experiences and professional insights are essential for developing context-specific and operationally effective e-waste management strategies.
5. Libraries should invest in ongoing training for staff, ensuring they are equipped with the skills needed to manage ICT lifecycles and adopt sustainable practices.
6. They should build partnerships with external stakeholders, such as environmental agencies, certified recyclers, and ICT vendors, to access expert support and safe disposal channels.
7. Finally, universities must integrate sustainability into their governance structures by embedding e-waste management in strategic planning, budgeting, and professional standards.

Conclusion

This opinion -based piece has shown that e-waste management in Nigerian university libraries is not merely a technical or environmental issue, but a reflection of deeper governance and institutional weaknesses. While national policies exist, their lack of localization and weak implementation within university libraries perpetuates ad hoc practices. Only by embedding policy into institutional frameworks can libraries ensure a sustainable, accountable approach to e-waste management.

References

- Abubakar, A. (2021). *Institutional capacity and sustainable ICT management in Nigerian universities*. Journal of Information Science and Technology, 9(2), 45–60.
- Akanbi, S. O., & Adewoye, J. O. (2021). Policy implementation challenges in environmental management in Nigerian higher education institutions. *Environmental Management Review*, 15(1), 33–48..
- Akor, P. U., & Udensi, J. (2013). E-waste management practices in developing countries: A Nigerian perspective. *African Journal of Environmental Studies*, 7(3), 112–120.
- Asemi, A., & Asemi, Z. (2021). Digital transformation in academic libraries: Trends and implications. *Library Hi Tech News*, 38(4), 12–18.
- Baldé, C. P., Forti, V., Gray, V., Kuehr, R., & Stegmann, P. (2017). *The global e-waste monitor 2017*. United Nations University (UNU), International Telecommunication Union (ITU), & International Solid Waste Association (ISWA). <https://globalewaste.org/>
- Chancerel, P., & Rotter, V. S. (2020). Electronic waste management systems and recycling efficiency. *Waste Management Research*, 38(4), 412–425.
- Cox, J., Collins, M., & Jubb, M. (2019). The evolving role of academic libraries in the digital age. *New Review of Academic Librarianship*, 25(2–4), 123–137.

- Ezeani, C. N., & Igwesi, U. (2016). ICT usage and e-waste challenges in Nigerian libraries. *Library Philosophy and Practice*, 1–15.
- Federal Ministry of Environment. (2019). *National environmental (electronic waste control) regulations*. Government of Nigeria <https://environment.gov.ng/>
- Forti, V., Baldé, C. P., Kuehr, R., & Bel, G. (2020). The global e-waste monitor 2020: Quantities, flows, and the circular economy potential. United Nations University (UNU), International Telecommunication Union (ITU), & International Solid Waste Association (ISWA). <https://globalewaste.org>
- Issa, A. O., & Daura, U. (2020). Sustainability practices in academic libraries in Nigeria. *Journal of Library and Information Science Research*, 8(1), 77–89.
- Lawhon, M. (2013). Policy implementation and environmental governance challenges in developing countries. *Environment and Planning C: Politics and Space*, 31(3), 493–509.
- NESREA. (2011). *National environmental (electrical/electronic sector) regulations*. National Environmental Standards and Regulations Enforcement Agency.
- Nnorom, I. C., & Osibanjo, O. (2008). Overview of electronic waste (e-waste) management practices in Nigeria. *Journal of Hazardous Materials*, 155(1–2), 512–525.
- Ogunniyi, M. B., Ojo, T. A., & Adekunle, A. (2020). Environmental policy implementation gap in Nigeria: A review. *Journal of Environmental Policy Studies*, 12(2), 89–105.
- Okoro, S. O., & Umeabali, P. C. (2015). Okoro, C. A. & Umeabali, C. O. (2015). Awareness and management of e-waste by librarians in University Libraries: An exploratory study. *The International Journal of Science and Technology*, 3 (10), 15-24
- Ogunniyi, M. B., Akinyemi, O., & Adeyemi, K. (2020). Policy implementation challenges in Nigerian public institutions. *Journal of Public Administration and Policy Research*, 12(4), 112–125.
- Olatunji, S. O., & Adebayo, T. A. (2021). ICT lifecycle management and environmental sustainability in universities. *International Journal of Information Management*, 57, 102–110.

Olatunji, O. S., & Adebayo, T. A. (2021). ICT lifecycle management in Nigerian university libraries. *Library Management*, 42(6/7), 412–426.

United Nations Environment Programme (UNEP) (2019). *The global e-waste monitor 2019*. United Nations Environment Programme. <https://www.unep.org/resources/report/global-e-waste-monitor-2019>

World Health Organization (WHO) (2021). *Children and digital dumpsites: E-waste exposure and health risks*. <https://www.who.int/>