AN EXAMINATION OF THE REGULATION OF ELECTRONIC WASTE MANAGEMENT IN NIGERIA

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Abstract

E-wastes are obsolete equipment that are dependent on electric currents or electromagnetic fields in order to work properly, including equipment for the generation, transfer and measurement of electric current. E-waste consists of many different materials, some of which contain a variety of toxic substances that can contaminate the environment and threaten human health. E-waste anywhere is a threat to the environment, with negative health consequences such as leaching toxins into the soil, air and ground water which later enter into crops, animals and human body systems, causing contamination and pollution. This paper aimed at examining the effectiveness of electronic waste management in Nigeria. We adopted the doctrinal methodology. We found out that there is no single modified statute or regulation governing electronic waste management in Nigeria. We therefore recommended that specific regulations should be enacted on e-waste management, enforcement of the rules should be strict and uncompromised and there

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should be proper sensitization on the management of electronic waste. Adequate regulation and enforcement of laws on electronic waste management could go a long way to curb the menace of indiscriminate disposal of e-waste.

Keywords: Electronic waste, Environment, Pollution, Management

1.0 Introduction

Electronic industry is currently the largest industry in the world.[1] Yearly, tons of electronic appliances are shipped overseas, unfortunately, once in disuse, they degenerate into complex waste, comprising of several harmful substances such as: heavy metals, acids, toxic chemicals and non-degradable plastics, many of which are dumped, burnt or exported to recyclers.[2] The duration of most electronic products have been largely reduced consequent upon innovations in electronics, appealing customer models, marketing and suitability issues.[3] Aside from the reduction in its durability, the utilization of electronics: televisions, computers, cell phones, video games, iPads, etc, has multiplied recently, which makes the electronic industry the fastest and largest growing enterprise in the world.[4] The rapid growth in the manufacture and disposal of E-waste is propelled by increased economic growth, population explosion and development.[5]

There is hardly any sector without electrical appliances as a result of the ease of its usage, and the quantity of used electronic products determine the quantity of e-waste generated. Meanwhile, e-waste can be either beneficial or detrimental to the environment depending on its

[1] S Sivaramanan, 'E-Waste Management, Disposal and Its Impacts on the Environment' (2013) (3) (5) *Universal Journal of Environmental Research and Technology* 531
[2] Ibid.
[3] P Kiddee *et al* 'Electronic Waste Management Approaches: An Overview' (2013) (33) *Elsevier* 1237
[4] M Oteng-Ababio 'Electronic Waste Management in Ghana: Issues and Practices' (2012) (1) *ALECEM* 1
[5] Ibid.

management.[6] Though electronic appliances are meant to ease the burden of man, the fact that they contain hazardous substances should not be neglected. The mismanagement of e-waste has affected virtually all aspects of our lives.[7] Unfortunately, the features in the make-up of e-waste make their disposal and recycling very hectic for the users.[8]

The indiscriminate disposal of e-waste in Nigeria breeds undesirable health consequences such as leaching toxins into the soil, air and ground water consequently affecting the flora and fauna.[9] The fact that e-waste is dangerous to the environment cannot be over emphasized, it is a high level of irresponsibility to make money from e-waste generation without considering the environment. The sanctity of the environment from e-waste now depends on the governments' ability to regulate its management.[10] In a nutshell, once a waste, always a waste unless recycled.[11] In this paper, we shall be discussing the sources of E-waste and consider the effectiveness of the regulations applicable to its management.

2. Conceptual Framework for the Regulation of Electronic Waste

2.1 Concept of Waste

Waste can be described as anything that has lost its value and is to be thrown away, or disposed.[12] It includes items which are meant to be disposed of or are intended to be disposed or required to be disposed of

[6] M Oteng-Ababio 'Electronic Waste Management in Ghana: Issues and Practices' (2012) (1) *ALECEM* 1
[7] D I Saravanamurthy 'E-Waste Management' (2018) (6) (2) *IJERT* 1
[8] Ibid
[9] E G Orie 'E-Waste Disposal in Nigeria: Challenges and Prospects' (2022) (3) *Journal of Environmental Law* 278
[10] B A Ideho, 'E-Waste Management: A Case Study of Lagos State, Nigeria' [2012] (2) *NSWAI* <https://nswai.org> accessed on 11 November 2024
[11] A K Usman, *Environmental Protection Law and Practice* (Malthouse Press Ltd 2017) 79
[12] G S Ogbodo 'Environmental Protection in Nigeria: Two Decades After the Koko Incident' (2009) (15) (1) *Annual Survey of International & Comparative Law* 1

by the provisions of the laws of the Federal Republic of Nigeria.[13] Wastes are substances or objects disposed of as useless, undesired or faulty.[14] According to Chukwuemeka, wastes are useless, unwanted and discarded materials.[15] Njoku views waste as a worthless substance which must be discarded.[16] From the above definitions, we can therefore infer that waste is anything that the owner has no need of, as a result of its loss in value or as a result of the invention or availability of a higher quality product.

2.2 Concept of Waste Management

Waste management is a process of properly discarding waste according to the laid down principles and standards.[17] It encompasses the statistics of sizes, make-up, terminus and point of disposal, frequent supervision and inspection of waste disposal activities.[18] It is an orderly control of the production, storage, gathering, movement, segregation, treating, retrieval and disposal of waste.[19] It is the process of orderly routing of waste through designated lanes for public health and environmental safety.[20] It deals with the collation, processing, re-use and dumping of

[13] B A Ideho, 'E-Waste Management: A Case Study of Lagos State, Nigeria' [2012] (2) *NSWAI* <https://nswai.org> accessed on 11 November 2024

[14] A B Oyediran, 'Waste Generating and Disposal in Nigeria: A Keynote Address", in Okali, D. et al (eds) *Perspectives in Environmental Management Proceedings of Nest Workshops 1991 to 1995* (Nest Publishers 1997) 95

[15] E Chukwuemeka *et al*, 'Management and Development Implications of Solid Waste Management in Nigeria' (2012) (4) *Asian Journal of Business Management* 352

[16] C Njoku and P Ngene, 'Waste and its Management in Nigeria: A Case Study of Abakaliki – Ebonyi State' (2014) (13) *Journal of the Science of Agricultural Food Technology* 1

[17] T Okonkwo, *The Law of Environmental Liability* (Afrique Environmental Development & Education 2010) 754.

[18] C U Anyanwu, *Oil Industry and the Nigerian Environment* [1992] (2) *IAIA* <HTTPS://Conferences.iaia.com> accessed on 11 November 24

[19] M Rodgers, *Fundamentals of Development Administration* (SK Publishers 2011) 1

[20] E Arene, *Dumping of Hazardous Wastes on African Coast* (Nigerian Institute of Legal Studies 1988) 22

waste in an acceptable way.[21] In a nutshell, it is an suitable response to waste.[22]

2.3 The Concept of Electronic Waste (E-Waste)

Electronic waste, also called e-garbage, e-waste, e-scrap is a term used to describe obsolete discarded surplus, not too useful, or non-functional electrical or electronic devices[23] which consists of a large variety of materials, some of which contain a range of toxic substances that can contaminate the environment and threaten human health if not appropriately managed.[24] It also comprises of useless electronic substances.[25] It can also be defined as the end of life electronic.[26] According to Ideho, e-waste includes all products using an electric power supply but no longer useful.[27] However, Miliute-Plepiane opined; whether the products rely on either electric current or electromagnetic fields to work,[28] once it is no longer useful, it is classified as e-waste, also, whether it is a part of the e-product that was discarded or the whole.[29] It is a complex waste stream because, it encompasses different kinds of substances, which could be hazardous to the environment unless it is properly handled.[30]

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[21] A P Azodo *et al*, 'Knowledge and Awareness Implication on E-Waste Management among Nigerian Collegiate' (2017) (21) (6) *JASEM* 1035

[22] E Pongracz *et al*, 'Evolving the Theory of Waste Management: defining key concepts' [2004] *WIT Press* <*www.witpress.com*> accessed on 31 August 2023

[23] E G Orie, 'E-Waste Disposal in Nigeria: Challenges and Prospects' (2022) (3) *Journal of Environmental Law* 278

[24] P Kiddee *et al,* 'Electronic Waste Management Approaches: An Overview' *(*2013) (33) *Elsevier* 1237

[25] S Kumar *et al*, 'Electronics-waste Management' International (2013) (4) (4) *Journal of Environmental Engineering and Management* 389

[26] K K Sahu and A Agrawal, 'Processing of Electrical Waste' *https://core.ac.uk* accessed on 12 October 23

[27] B A Ideho, 'E-Waste Management: A Case Study of Lagos State, Nigeria' [2012] (2) *NSWAI* <https://nswai.org> accessed on 11 November 2024

[28] J Miliute-Plepiene and L Youhanan, 'E-Waste and Raw Materials: From Environmental Issues to Business Models' [2019] <https://researchgate.net> accessed on 11 November 2024

[29] Ibid

[30] Ibid

3.0 Examination of the Regulation of E-waste Management in Nigeria

As it stands now, there is no single legal document on the regulation of electronic waste in Nigeria. However, there are some conventions and laws that provide for the regulation of wastes in general, these are:

i. *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, 1989.*

The Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal (hereinafter referred to as "the Basel Convention") came into force in 1989 consequent upon the toxic deposits in the third world countries. The Convention defines "wastes" as objects or substances which are discarded or are anticipated to be discarded or are expected to be discarded by the stipulations of the national law.[31] It also provides that parties shall ban the exportation of toxic wastes and other wastes if the importing State does not approve of the particular import in writing, in a situation that the importing state has not banned the importation of those wastes.[32] As a result of the increased knowledge of the consequences of hazardous wastes in the developed countries, which raised the cost of waste disposal, it was more convenient to dump this waste in a developing nation where the knowledge of its impact is low, hence, the need for this convention.[33]

ii. *Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes Within Africa, 1991.*

The Bamako Convention arose after the discovery that wealthy nations export toxic waste to Africa and because the Basel Convention failed to disallow the export of toxic waste to under-developed countries. The Bamako Convention similar in use of language and structure like the Basel Convention but is firmer in banning the importation of hazardous waste without any exemptions unlike the Basel Convention. This

[31] Basel Convention 1991, a 2(1)
[32] Basel Convention 1991, a 4(1)(a)
[33] B A Ideho, 'E-Waste Management: A Case Study of Lagos State, Nigeria' [2012] (2) *NSWAI* <https://nswai.org> accessed on 11 November 2024

Convention stipulates that all countries shall take adequate administrative and legal measures to protect the area under their jurisdiction against the dumping of toxic wastes by other countries. All Parties shall:

(a) forward as soon as possible, all information relating to such illegal hazardous waste import activity to the Secretariat who shall distribute the information to all Contracting Parties;
(b) co-operate to ensure that no imports of hazardous wastes from a non-Party enter a Party to this Convention. To this end, the Parties shall, at the Conference of the Contracting Parties, consider other enforcement mechanisms.[34]

Unfortunately, Nigeria ratified the Basel Convention in May 24, 2004; but has not ratified the Bamako Convention.

iii. *National Environmental Standards and Regulation Enforcement Agency (NESREA) Act*[35]
This Act established the National Environmental Standards and Regulations Enforcement Agency, and made it a Corporate body, being the Agency enforcing the provisions of the law.[36] The Act empowered the Agency with the role of protecting the environment in accordance with the provisions of the law.[37] It regulated the emission of toxic substances and other related criminal liabilities.[38] The Act also empowered the Agency to make regulations on different sectors of the environment.[39]

iv. *National Environmental (Sanitation and Wastes Control) Regulations, 2014*
The aim of this regulation is to stipulate the legal framework which adopts environment friendly methods for environmental sanitation and

[34] Bamako Convention 1991, a 4(1)
[35] *Cap F10, LFN 2004*
[36] 2004 NESREA Act, s 1(2)
[37] Ibid, s 2
[38] Ibid, s 27
[39] Ibid, s2

waste management.[40] It provides; 'No person is to discard, throw or drop any litter or any similar refuse anywhere except in designated litter bins.'[41] 'Without prejudice to the foregoing, any person whose activities generate waste shall ensure that the waste is handled by a person licensed to transport and dispose of the wastes in designated waste management facility.'[42] It also admonishes that any occupant in care, control, or management of a premise or business shall keep the sidewalks and drainage areas all around the building clean at all times,[43] ensure there is no sweeping out, or throwing of any litter into any drain, public place, private lands, vacant plot, streets, lanes, walkways, beaches or docks within 5 metres of the premises; and ensure there is no blockage of the streets, walkways, drains with building or construction materials such as sand, gravels or chippings, earth, stones, bricks or cement blocks, iron rods, etc.[44]

v. *National Policy on Environment, 1991*

The National Policy on Environment, 1991, explicitly states the responsibilities of appropriate agencies in the administration and management of hazardous and radioactive substances. An excerpt from the policy document states thus: '…appropriate governmental agencies shall therefore set up regional framework and standards for "dump watch" against trans-boundary movement of toxic hazardous and radioactive wastes and for the achievement of the environmentally sound management of hazardous substances.'

As can be deduced from the laws above, all the provisions on waste management are generalized, not minding the toxicity or the hazardous nature of electronic waste. Electronic wastes ought not to be disposed with agricultural wastes and some household wastes, unlike what we see around us on the daily basis. Consequently, adequate specific laws should be enacted for the protection of the environment from electronic

[40] *National Environmental (Sanitation and Wastes Control) Regulations 2009,* s 2
[41] Ibid, s 3(1)
[42] Ibid, s 4
[43] Ibid, s 3(k)
[44] Ibid, s 5

waste, in the alternative, the existing laws should be amended to accommodate the peculiar nature electronic waste management.

Nigeria's information and communication technology are presently undergoing advancement. Consequently, most e-product users depend on fairly used e-products from developed countries, mainly from Europe and North America.[45] The way and manner these electronic wastes are discarded can affect the environment if not properly managed.[46] The quantity e-waste accumulated recently amounts to a continuous challenge to public health.[47] Though, there are substances found in electronic waste that are still valuable, hence, the need for recycling, however, it takes a whole lot to acquire them, thereby discouraging recycling, especially where labour cost is high.[48]

The quantity and kind of electronic waste generated is usually commensurate with country's level of development. Ogbodo stated thus; the higher the development, the higher the electronic waste generated.[49] For example, urban cities generate more e-wastes that the local villages. In the same vein, Kiddee stated that as a result of the little quantity of e-waste generated in the third world countries owing to financial restraints, its impact is almost negligible.[50] But because environmental challenges do not respect boundaries, E-waste anywhere is a threat to the environment.

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[45] D I Saravanamurthy 'E-Waste Management' (2018) (6) (2) *IJERT* 1

[46] A P Azodo *et al*, 'Knowledge and Awareness Implication on E-Waste Management among Nigerian Collegiate' (2017) (21) (6) *JASEM* 1035

[47] S Kumar *et al*, 'Electronics-waste Management' (2013) (4) (4) *International Journal of Environmental Engineering and Management* 389

[48] J Miliute-Plepiene and L Youhanan, 'E-Waste and Raw Materials: From Environmental Issues to Business Models' [2019] <https://researchgate.net> accessed on 11 November 2024

[49] G S Ogbodo 'Environmental Protection in Nigeria: Two Decades After the Koko Incident' (2009) (15) (1) *Annual Survey of International & Comparative Law* 1.

[50] P Kiddee *et al* 'Electronic Waste Management Approaches: An Overview' (2013) (33) *Elsevier* 1237

Electronic waste is a huge problem to the environment, Orie classified it as next to the problem of climate change.[51] As a result of the dangerous nature of E-waste in the whole world at large, regulations should made to curb the menace.[52] The major e-waste problem in developing countries arise from the importation of e-waste and electronic goods from developed countries, because it is the older, less ecologically friendly equipment that is discarded from these Western countries (80% of all e-waste in developed countries) that is being exported.[53]

E-waste is a source of concern to the developed, developing and under developed countries.[54] At first, the issues of electronic waste was only associated with the developed countries, however, the developing and under developed countries who kept importing the e-products already used by the developed countries, thereby, relieving the developed countries the stress of disposing the waste, on the other hand, transferred the problem to the 3rd world countries. In addition to the fact stated above, e-products are innovated from time to time, thereby, arousing the interest of the users to upgrade their e-products from time to time, which leads to the abandonment and disposal of their 'outdated' e-products.[55] Therefore, as the users keep changing their e-products, they keep abandoning the earlier models, consequently, e-waste keep rising and management of the e-waste becomes a price to pay.[56]

Some of the e-products imported by the developing countries from the developed countries include large household appliances like refrigerators and washing machines; Information Technology (IT) and telecom like a personal computer (PC), monitor and laptop; and

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[51] E G Orie 'E-Waste Disposal in Nigeria: Challenges and Prospects' (2022) (3) *Journal of Environmental Law* 278
[52] Ibid
[53] P Kiddee *et al* 'Electronic Waste Management Approaches: An Overview' [2013] (33) *Elsevier* 1237
[54] Ibid
[55] Ibid
[56] M Oteng-Ababio 'Electronic Waste Management in Ghana: Issues and Practices' (2012) (1) *ALECEM* 1

consumer equipment like television sets, etc.[57] In Nigeria for example, there is no indigenous IT industry,[58] which implies that the IT sector is basically import oriented. Besides the e-waste which is locally generated by consumers in Nigeria, a large quota of the e-waste is either unintentionally or intentionally imported. Nigeria has a huge appetite for technology, but due to limited financial resources, infrastructure and indigenous IT industry, much of this growth is facilitated by import of 'second hand' or 'hand me down' equipment from rich developed countries whose consumers are all too happy to find buyers for them. Where such devices are beyond repair, they are taken apart and used as spare parts for other broken devices.

The population of Nigeria is put at 155 million[59] and by any estimation generates huge volume of e-waste and Lagos, as commercial capital of Nigeria is arguably one of the largest dumps for e-waste from the developed countries.[60] In 2011, NESREA barred six cargo ships loaded with toxic electronic waste from offloading in Nigeria.[61] By December 2009, Nigeria had about 73 million active mobile subscribers.[62] According to Ideho, nine out of every ten homes possess an obsolete electronic device such as an outdated computer, a refrigerator or a mobile phone. It is probably covered in dust, lying at the base of their cabinet or trash can and grimy from lack of use. Obsolete electronic devices or electronic waste (also referred to as e-waste) are becoming common sites everywhere, giving birth to what some experts are predicting to be the largest toxic waste problem of the 21st century.[63] Used electronic devices are refurbished, scraps while non-reusable parts

[57] Ibid
[58] B A Ideho, 'E-Waste Management: A Case Study Of Lagos State, Nigeria' [2012] (2) *NSWAI* <https://nswai.org> accessed on 11 November 2024
[59] E G Orie 'E-Waste Disposal in Nigeria: Challenges and Prospects' (2022) (3) *Journal of Environmental Law* 278
[60] Ibid
[61] Ibid
[62] Ibid
[63] B A Ideho, 'E-Waste Management: A Case Study of Lagos State, Nigeria' [2012] (2) *NSWAI* <https://nswai.org> accessed on 11 November 2024

are either discarded in the main waste dumpster, burnt in major trash cans or just left to lie around in the environment.[64]

Normally, the major greenhouse gases are carbon dioxide (CO_2), methane (CH_2), Nitrous Oxide (N_2O), chlorofluorocarbons (CFCs), and water vapor.[65] Under normal conditions, the level of carbon dioxide in the atmosphere remains constant, and trees absorb the same amount of carbon dioxide that people produce.[66] However, today, echoes altering events are heard all over the "planetary village."[67] Unfortunately, atmospheric pollution is no respecter of international boundaries, in fact it is the most trans-boundary of all pollution.[68] When air is polluted, there is no means of escape from it. Momentary hold of breath, as often done by people, is far from being escape from the reality of inhaling enough doses of the messy stuff. We have to breathe, even when we know that the air is deadly.[69]

E-waste consists of many different materials, some of which contain a variety of toxic substances that can contaminate the environment and threaten human health. If the end-of-life management is not meticulously managed, toxic chemicals such as heavy metals and POP's have and continue to contaminate the surrounding environment. This results in considerable accumulation of hazardous substances into the ecosystem and which can adversely impact human health.[70] E-waste also contains different substances, which make it either 'hazardous'[71]or

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[64] Ibid
[65] R S Axelrod *et al*, *The Global Environment Institutions, Law and Policy* (3rd ed CQ Press 2011) 127
[66] C A Omaka, *Municipal and International Environmental Law* (Lions Unique Concepts 2012) 261
[67] U W Nwosu, *Environmental Law: The Nigerian Situation* (2nd ed Swiftcom Computers 2006) 268
[68] C A Omaka, *Municipal and International Environmental Law* (Lions Unique Concepts 2012) 225
[69] Ibid
[70] P Kiddee *et al* 'Electronic Waste Management Approaches: An Overview' (2013) (33) *Elsevier* 1237
[71] M Oteng-Ababio 'Electronic Waste Management in Ghana: Issues and Practices' (2012) (1) *ALECEM* 1

'non-hazardous'. The presence of elements like lead, mercury, arsenic, cadmium and flame retardants beyond threshold quantities in e-waste classifies them as hazardous waste.[72] The material of most concern in e-waste is lead. It constitutes up to 6.3% of a typical PC.[73] Lead in computers is found in glass, panels, gasket, solders and in monitors and it causes damage to the central and peripheral nervous systems, blood, kidney and reproductive system in humans.[74] According to Axelrod, if left unchecked, climate changes produced by this warming could include disruptions in rainfall, temperature patterns, a global rise in sea level, and an increased frequency of severe weather events such as droughts, hurricanes and floods.[75]

It is quite unfortunate that there is no single modified statute or regulation governing electronic waste in Nigeria,[76] also, none for E-waste. While the 1991 National Policy on Environment is effective in itself, there are no direct laws prohibiting the importation of e-waste in the guise of "second hand" goods. Neither are there laws to determine the health or standard of the "second hand" goods being imported. In retrospect, the policy on trans-boundary movement of toxic waste has been side-lined once-too-many because obsolete electronic devices flock into the country under the guise of "second-hand" goods and "charity" donations. Even though e-waste falls under the category of hazardous waste, imported electronic devices are considered a valuable good only until it is determined to be e-waste. This makes it is quite difficult to ascertain the health of imported goods into the country while they are still off shore, only when they berth will their contents be examined by the port authorities.[77]

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[72] Ibid
[73] K K Sahu and A Agrawal, 'Processing of Electrical Waste' <*https://core.ac.uk*> accessed on 12 October 2023
[74] Ibid
[75] R S Axelrod *et al*, *The Global Environment Institutions, Law and Policy* (3rd ed CQ Press 2011) 111
[76] T Okonkwo, *The Law of Environmental Liability* (Afrique Environmental Development & Education 2010) 375
[77] B A Ideho, 'E-Waste Management: A Case Study of Lagos State, Nigeria' [2012] (2) *NSWAI* <https://nswai.org> accessed on 11 November 2024

In the same vein, there is inadequate legislation worldwide for effective management of such waste.[78] The rapid growth of e-waste and the ineffectiveness of legislation has been said to be the reason for inappropriate management strategies in both developed and developing countries, leading to profound impacts on the environment. E-waste handling is currently regulated under the Hazardous Waste Management and handling rules.[79] However, confronting the challenge of climate change will require a global transition to a low-carbon economy. Achieving this will require specific regulations; the mobilization of resources and creativity at all levels of social organization from the global level to the local level.[80] Environmental harm often does not manifest itself in quick and vivid terms like harm to the human person. It is not a "click on" and "off" thing. Often, environmental harm takes time to manifest. It mutates over time.[81]

Dumping of e-waste in any environment including Nigeria has negative health consequences such as leaching toxins into the soil, air and ground water which later enter into crops, animals and human body systems causing contamination and pollution.[82] E-waste disposal impact human health in two ways which include: food chain issues - contamination by toxic substances from disposal and primitive recycling processes that result in by-products entering the food chain and thus, transferring to humans; and direct impact on workers who labour in primitive recycling areas from their occupational exposure to toxic substances. The danger

[78] P Kiddee *et al* 'Electronic Waste Management Approaches: An Overview' [2013] (33) *Elsevier*1237
[79] S Kumar *et al*, 'Electronics-waste Management' (2013) (4) (4) International *Journal of Environmental Engineering and Management* 389
[80] R S Axelrod *et al*, *The Global Environment Institutions, Law and Policy* (3rd ed CQ Press 2011) 127
[81] A K Usman, *Environmental Protection Law and Practice* (Malthouse Press Ltd 2017) 184
[82] E G Orie 'E-Waste Disposal in Nigeria: Challenges and Prospects' (2022) (3) *Journal of Environmental Law* 278

of e-waste toxicity to human health, both in terms of chronic and acute conditions, has become a serious societal problem.[83]

4.0 Keys to Effective Electronic Waste Disposal

a. Adequate regulations on e-waste management: Currently, there is inadequate regime of criminal liability on e-waste management.[84] There is need for laws and regulations to be put in place in order to regulate e-waste management in Nigeria and in the globe entirely. In the same vein, it is confirmed that punishments and fines prescribed by our laws are close to nothing,[85] hence, there is need for adequate sanction for disobedience to these rules.

b. Enforcement: Nigeria like most 3rd world countries is not known for prompt and efficient enforcement of laws.[86] It is often said; laws that are not enforced soon become dead letters.[87] Currently, there is lack of aggressiveness in tracking down and punishing polluters.[88] At least, the government should implement the hazardous waste rule & check the illegal imports of e-waste at the entry point itself for now, while we wait for specific regulations on e-waste.[89]

c. Awareness and sensitization on e-waste management: Knowledge/information circulates to others when channelled well.[90] It is confirmed that the public awareness and cooperation of manufactures

[83] P Kiddee *et al* 'Electronic Waste Management Approaches: An Overview' (2013) (33) *Elsevier* 1237
[84] U W Nwosu, *Environmental Law: The Nigerian Situation* (2nd ed Swiftcom Computers 2006) 167
[85] Ibid 169
[86] U W Nwosu, Environmental Law, The Nigerian situation (2nd ed Swiftcom Computers 2006) 167
[87] Ibid
[88] Ibid 168
[89] K K Sahu and A Agrawal, 'Processing of Electrical Waste' <*https://core.ac.uk*> accessed on 12 October 23
[90] I C Nnorom and O Osibanjo 'Electronic Waste: Material Flows and Management Practices in Nigeria' (2008) (28) *Waste Management Series* 1472

are essential for the advancement of e-waste management system.[91] Awareness should be raised among the enforcement agencies, businessmen and IT users.[92]

d. Proper processing of e-waste: The main environmental impacts of e-waste mainly arise due to inappropriate processing rather than inherent toxic contents. However, processing appropriately to recover valuable metals is the best alternative from the environmental and economic point of view. Therefore, there is a need to evolve proper strategy to achieve the target.[93]

e. Planting of special trees such as pines, date/palm trees, casuarinas, eucalyptus and other nitrogen fixing trees and low impact logging and deforestation.[94] This helps to absorb the carbon mono-oxide released from these e-wastes.

f. Recycling: Considering e-waste as an alternative resource of several metals, serious efforts must be put towards development of a suitable process technology in collaboration with premier technology institutions. [95] Households and businesses can send their used electronics for recycling. Recycling electronics avoids pollution and the need to extract valuable and limited virgin resources. It also reduces the energy used in new product manufacturing. In addition, public and private organizations have emerged that accept computers and other electronics for recycling.[96] Recycling is the suggested strategy when it

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[91] S Sivaramanan, 'E-Waste Management, Disposal and Its Impacts on the Environment' (2013) (3) (5) *Universal Journal of Environmental Research and Technology* 531

[92] K K Sahu and A Agrawal, 'Processing of Electrical Waste' <*https://core.ac.uk*> accessed on 12 October 2023

[93] M Oteng-Ababio 'Electronic Waste Management in Ghana: Issues and Practices' (2012) (1) *ALECEM* 1

[94] C A Omaka, *Municipal and International Environmental Law* (Lions Unique Concepts 2012) 267

[95] K K Sahu and A Agrawal, 'Processing of Electrical Waste' <https://core.ac.uk> accessed on 12 October 2023

[96] S Kumar et al, 'Electronics-waste Management' [2013] (4) (4) *International Journal of Environmental Engineering and Management* 389

is no longer possible or feasible to re-use the product or its parts. It means that all waste should be material-recycled as much as possible.[97]

g. Electronic companies and manufacturers should put continuous effort in eliminating toxic chemicals from electronic goods and ensure lead, cadmium, mercury & chromium free components and create computer components and peripherals of biodegradable materials.[98]

h. Efforts should be made by Nigeria to ratify the Bamako Convention on the Ban of the Import into Africa and the Control of Trans-boundary Movement and Management of Hazardous Wastes Within Africa, 1991. This convention covers radioactive substances as well as the hazardous substances.

i. Finally, a person's environmental right is as important as his right to life. [99] Everyone should know that environmentally responsible electronics use involves not only proper end-of-life disposition of obsolete equipment, but also purchasing new equipment that has been designed with environmental attributes.[100] Also, it is the responsibility of governments to allocate sufficient grants and protecting the internationally agreed environmental legislations within their borders. As e-wastes are the known major source of heavy metals, hazardous chemicals and carcinogens, certainly diseases related to skin, respiratory, intestinal, immune, and endocrine and nervous systems including cancers can be prevented by proper management and disposal of e-waste.[101]

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5.0 Recommendations

As a result of the toxic features of electronic waste and the danger in discarding the wastes alongside other wastes, we recommend that new specific laws on electronic waste management should be enacted. This law should properly describe what constitutes an electronic waste. It should also make adequate provisions on separation of e-waste from other wastes, disposal and recycling. Adequate punishments and fines should be prescribed and its method of enforcement clearly defined. The law should also bar e-products manufacturing companies from using toxic materials in the production of electronic appliances, rather, they should use environmentally friendly raw materials.

In the alternative, for the time being, we recommend that the instant laws on waste management should be amended to suit the special features found in electronic waste. In the same vein, we recommend that the bodies responsible for the enforcement of these laws should be up and doing, no matter whose ox is gored.

6.0 Conclusion

The environment is the platform upon which flora and fauna live on. The health of the environment determines the health of the lives it supports. On the other hand, law as a tool is used to regulate human behaviour towards his fellow, the environment, etc. Therefore, adequate, efficient and effective laws will go a long way in the management of electronic wastes. While waiting for a specific regulation on electronic waste from legislators, all hands must be on deck to curb this menace, by sorting out electronic wastes and handing same over to recyclers and waste scavengers for better management. In addition, we should try as much as possible to stop patronizing second hand electronic products that are unfriendly to the environment.