

ELECTRONIC WASTE MANAGEMENT IN NIGERIA: ISSUES AND CHALLENGES

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Abstract

Access to Information & Communication Technology (ICT) is pivotal to a country's economic and social development and is currently improving throughout the developed and developing world. Nigeria has been undergoing rapid ICT transformation in recent years, attempting to bridge the digital divide by importing electrical and electronic equipment (EEE), which soon become technologically obsolete and find their way into landfills as electronic waste (e-waste) that pose health and environmental hazards to humans, livestock and ecology, if not properly managed. This paper reviews the issues relating to e-waste and identifies their sources, components and the dangers they pose to the environment. Sustainable means of managing e-waste in Nigeria was discussed. Recommendations were made on appropriate treatment of e-waste in order to make the environment safe for all.

Introduction

Technology is any modification made to the natural world to meet human needs or wants. Technology includes not only the processes and knowledge needed to operate and create products but also the tangible, physical products itself (Omorodion, 2016). The widespread application of

technology has brought many benefits. For instance, it does not only save time, but also more efficient to cook with a microwave oven or with an electromagnetic cooker. It is easier to communicate with people all over the world through e-mail, instant messaging, Skype, or social media, or even to withdraw or transfer money using an Automated Teller Machine (ATM). The closed-circuit television (CCTV) and improved lighting are more effective in reducing crimes of all dimensions and types. We cannot talk about the benefit of technology in our society today without the role of electronics technologies.

Electronics technologies have generally made life easy and convenient because of their efficiency and time saving in application. Information & Communication Technology (ICT) systems, as they are today, would not have been achievable without electronics technology. Entertainment industry (music, radio, television, computers etc.) would have remained crude if not for continuing development in electronic technology. Infact electronic technology has impact life in different sector of the society such as in communication, entertainment, transport, education, and health care sectors. Electrical and electronic equipment (EEE) have been instrumental to the revolution witnessed in this various sectors of human endeavor around Nigeria (Alabi & Bakare, 2011).

As there appears to be no signs of this revolution slowing down soon so also the growing concern on the increasing e-waste arising from the these sector. However in Nigeria, there is large digital divide, and only a small number of wealthy people have access to certain ICT-wares especially the branded new equipment. Consequently, most of the low-income earners rely on used ICT-wares considering that branded new electronic goods are relatively expensive for ordinary people. It is an attempt to bridge the digital divide that importation of electrical and electronic equipment (EEE), which soon become technologically obsolete and find their way into landfills as electronic waste (e-waste) became rampant. While there are many factors contributing to the digital divide,

the high price of information technology hardware is no doubt a significant one. Domestic and international trade in used EEE presents a possible important avenue to stimulate the dissemination of information technology and bridging the gap between the “haves” and the ‘haves-not” (Ongondo & Williams, 2011).

However, imports of used or rather end-of-life electronics to the developing countries such as Nigeria is a double-edged sword: the positive potential also carries with it the risk of becoming a dumping ground for waste equipment from rich developed countries (Agunwamba., Emenike, Tenebe, 2013). electronic waste pose health and environmental hazards to humans, livestock and ecology, if not properly managed. According to Osibanjo (2009). Electronic waste or e-waste is the disposal of electronic goods such as cell phones, mp3 players, televisions, and computers. Electronic waste is further defined as an unwanted electronic or electrical appliances such as old and outdated computers, laptops, televisions, cellular phones, mp3 players, telecommunication equipment, keyboards, mice, photocopiers, typewriters, etc. (Alexander & Bilitewski, 2008). The risk from e-waste affects the entire ecosystems and it is a major environmental health risk to wildlife and humans (Terada, 2012). Therefore Electronic waste, abbreviated as ‘e-waste’ is a term used to describe old, end-of-life electronic appliances such as computers, laptops, TV’s, radios, refrigerators etc., which have been discarded by users. E-waste comprises of numerous valuable but harmful substances that can cause an adverse effect on human health.

According to studies by the United Nations, anywhere between 20 and 50 million tonnes of e-waste are generated globally, an amount growing at a rate nearly three times faster than the overall municipal solid waste stream (Schluep; Hagelüken; Kühr; Magalini; Maurer; Meskers; Müller,& Wang, 2009). Electronic waste or e-waste is one of the fastest growing waste streams around the world, growing at a rate of 3–5% per annum or approximately three times faster than normal municipal solid

waste. Today, the amount of e-waste is rapidly growing in developing countries as they struggle to join the global information society. According to Basel Action Network (BAN) study in conjunction with BCC Nigeria, Nigeria imported more than 500,000 used computers annually through the Lagos port alone; About 25% of the imports are functional used electronics while the remaining 75% is junk or unserviceable, which is eventually burnt or dumped carelessly. According to Amachree (2013), a preliminary survey conducted in Lagos area after the BAN study showed that the volume of imported electronic equipment were: Computer village (15tons), Alaba International Market (100tons), Oshodi Market(15tons), Lawanson Market (30tons) and West Minister(40tons). These figures according Philip (2016) increases annually due to the fact that e-waste collection is not organised; there are no collection centers and most times, they are dumped along with other wastes; furthermore, Philip posited that a lot of e-waste are also stockpiled in offices and homes.

Unfortunately, recycling of these products is still in an inefficient manner. For example, such methods like open burning of plastics/copper wires to reduce waste volume and to salvage valuable metals like copper; and strong acid leaching of printed wiring to recover precious metals are still common. Moreover, e-waste contains hazardous materials such as lead, mercury, beryllium, cadmium, and brominated flame-retardants. It is time the authorities check this mindless export of death to Nigeria, especially as these wastes contain toxic elements such as lead and mercury. Even more worrying is the sight of men and women trawling through the discarded electronics hoping to find something worth selling, thereby exposing themselves to these hazardous elements. The researcher is, however, not oblivious of existing environmental laws and regulations. The Problem is that there is weak enforcement and a lack of awareness of the risks and potential harmful effects associated with e-waste, coupled

with a lack of technical capacity for environmentally sound management. Therefore this paper seek to review the issues relating to e-waste and identifies their sources, components and the dangers they pose to the environment and proffer sustainable ways of managing e-waste in Nigeria.

Sources of E-Waste in Nigeria

Cell phones, cameras, CD players, TVs, radios, drillers, fax machines, photocopiers, printers, toners, ink cartridges, batteries, re-chargeable batteries, digital calculators and clocks, CRT monitors, electric solders, computer mother boards, key board, industrial and house hold electronic machinery such as oven, fridge, sewing & washing machines, fan, air-conditioner, grinder, iron, heater, and laboratory electronic equipment's, etc, are example of electronic and electrical equipment. This can be broadly classified under three major types of goods: White goods which Comprising of household appliances like refrigerators, washing machines, and air conditioners. Brown goods which include televisions, cameras etc. and Grey goods which includes computers, scanners, printers, Mobiles phones etc. when these above mention electronic items are obsolete or no longer in use, therefore discarded, they are refer to or considered as e-waste.

E-waste is generated as a result of advancement in technology, changes in styles, fashion and status, nearing to the end of their useful life and not taking precautions while handling them. 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' equipment from developed countries(Xiaodong, Lee., Jeong., Kim, Cho, 2013). Where such imported devices are beyond repair, they are taken apart and used as spare parts for other broken devices. Scraps and non-reusable parts are either discarded in the main waste dumpster, burnt in major trash cans or just left

to lie around in the environment. 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 as used Electrical and Electronics Equipment (EEE) (Manhart Osibanjo, Adeyinka & Prakash 2011) . Basically, the e-waste stream in Nigeria originate from two distinct sources; local generation and importation of second hand electronic materials from the developed nations in the name of 'bridging the digital divide(Ongondo & Williams, 2011).

Waste Hazard

E-waste is not hazardous per se. However, the hazardous constituents present in the e-waste render it hazardous when such wastes are dismantled and processed, since it is only at this stage that they pose hazard to health and environment (Ongondo & Williams, 2011). Electronics and electrical equipment seem efficient and environmentally-friendly, but there are hidden dangers associated with them once these become e-waste. The harmful materials contained in electronics products, pose a real danger to human health if electronics products are not properly processed prior to disposal. Electronics products like computers and cell phones contain a lot of different toxins. For example, cathode ray tubes (CRTs) of computer monitors contain heavy metals such as lead, barium and cadmium, which can be very harmful to health if they enter the water system. These materials can cause damage to the human nervous and respiratory systems. Flame-retardant plastics, used in electronics casings, release particles that damage human endocrine functions. These are the types of things that can happen when unprocessed e-waste is put directly in landfill.

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E-Waste Component	Electric Appliances in which they are found	Adverse Health Effects
Lead	Cathode-ray tubes and Solders	Initial symptoms of exposure Are anorexia, muscle pain, malaise, and headache. Long-term exposure to lead decreases the overall performance of the nervous system. High level exposure causes brain damage and death.
Mercury	Found in fluorescent tubes, tilt switches (mechanical doorbells, thermostats), and flat screen monitors.	Sensory impairment, dermatitis, memory loss, and muscle weakness. Environmental effects in animals include death, reduced fertility, and slower growth and development
Arsenic	Found in computer chips and light emitting diodes	Arsenic is a known cancer-causing substance (carcinogen). It is known to cause skin and lung cancer.
Halogens	Plastics and insulation	These substances are of concern because of the possibility that toxins such as dioxins and furans may be created and released burning
Polyvinyl chloride (PVC)	PVC plastic is used in the insulation f some cables used in ICT equipment.	When burnt it produces highly toxic dioxins;
Sulphur	Found in lead-acid batteries.	Health effects include liver damage, kidney damage, heart damage, eye and throat irritation. When released into the environment, it can create sulphuric acid through sulphur dioxide

Sustainable ways of managing e-waste in Nigeria

In view of the hazardous environmental impacts and the high residual value, management of e-waste has aroused worldwide attention in terms of legislations and technologies. With this global trend, E-waste is one of the fastest-growing waste streams in Nigeria, owing to an increase in consumption of electrical and electronic equipment (Peeranart, Ravi, & Ming 2013). Nevertheless, as is the case in some other countries, E-waste management has not received sufficient attention. For the successful implementation of any waste management plan (including an E-waste management plan), the availability of sufficient and accurate information on the quantities and composition of the waste generated. At present, in Nigeria, there is no available and accurate information that describes the characteristics and generation rate of e-waste or the actual practice of management and handling of the waste. Currently, despite the fact that there is a primary national legislation for e-waste management (as part of general electrical / electronics sector waste regulation) existing in Nigeria, this primary legislation is not fully implemented across the States of the country. In practical terms, there is no definite policy or plan for the allocation of funds to prepare suitable equipment and facilities for the management of e-waste.

According to Mundada, Kumar, and Shekdar(2014) Nigeria lack well-established system for separation, collection, storage, transportation and disposal of e-waste as well as adequate enforcement and monitoring of regulations to hazardous e-waste. Laxity is experienced in the enforcement of existing laws that oversees general waste management. State-of-the-art facilities and efficient technological methods for e-waste are not common in developing countries and Nigeria is inclusive (Nnorom & Osibanjo, 2009). As a result, low-ends management options are used to manage e-waste. These options include disposal in open dumps, backyard recycling and disposal into surface water bodies (Puckett, 2005; Omole and Isiorho, 2011; Omole and Isiorho, 2014). In addition, there is no integrated

framework as regards to the management and monitoring of hazardous and toxic materials and waste in developing countries. Inadequate funding is also a factor that has limited the management efficacy of hazardous waste and this has culminated in slow sustainable development (Omole and Ndambuki, 2014). Nigeria is yet to experience a push-up in the recycling procedure associated with e-waste, so open dumping of materials tend to be preferred solution. This process promotes environmental pollution thereby exposing millions to the hazards involved (Okunola., Alabi., A. Adekunle., Bakare., Xijin ., Bin Li., Yuling ., & Xia, 2012).

The sustainability of e-waste management systems has to be ensured by improving the collection and recycling systems. It would be desirable to establish public-private partnerships in setting up buy-back or drop-off centers. Levying advance recycling fees is another approach to ensure waste management sustainability. To identify best e-waste management technologies across the globe and adopt them successfully can be key to a sustainable futuristic growth. Improved management options are required to eradicate e-waste from being indiscriminately disposed together with municipal solid wastes in Nigeria which is the order of the day.

Conclusion and Recommendations

The hazardous nature of e-waste is one of the rapidly growing environmental problems of the world. The ever-increasing amount of e-waste associated with the lack of awareness and appropriate skill is deepening the problem. A large number of workers are involved in crude dismantling of these electronic items for their livelihood and their health is at risk; therefore, there is an urgent need to plan a preventive strategy in relation to health hazards of e-waste handling among these workers in India. Required information should be provided to these workers regarding safe handling of e-waste and personal protection. For e-waste management

many technical solutions are available, but to be adopted in the management system, prerequisite conditions such as legislation, collection system, logistics, and manpower should be prepared. This may require operational research and evaluation studies. Government plays an important role in developing recycling capabilities in Nigeria. Incentives could also be provided to attract private sector partners who would set up state-of-art recycling facilities in Nigeria. This would create job opportunities for many people and take the financial pressure off the State's budget now that the various states of the federation is devising a mean to create job for her timing youth. Finally government should make sure that there is clear distinction between e-waste and other solid waste when choosing a dumping site.

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