End of Life Strategies For Effective Electronic Waste Management In Nigeria

Engr. T. J. Alake & Engr. (Dr) G. I. Ighalo

Abstract Wastes in Electrical and Electronic Equipment is becoming a mammoth task and spreading like gangrene that is becoming weird in handling because of its inherent environmental effects and hazards. This paper elicits the various options available for the effective management of electronic wastes (e-wastes) or wastes in electrical and electronic equipment (weee) especially the domestic electronic appliances that have reached their end of life. Questionnaires were utilised to collect information from the various stakeholders and the result showed that the three 'R' – Reuse, Repair and Recycle are the best options for the effective management of most electronic products and that weee could be utilised to an advantage of economic boom and material recovery.

Keywords: disassembly, End of Life (EoL), recycle, waste, weee.

Introduction

Electronic wastes (e-waste) or waste from Electrical and Electronic Equipment (WEEE) is becoming a contentious issue in Nigeria .It is usually borne out of equipment unreliability either as a result of substandard items or equipment expiration of useful life. WEEE is industrial wastes that are non biodegradable, synthetic in nature and it is usually accompanied by an unconventional method for its disposal, management and containment. There is need to focus on planning, organising, directing, coordinating, and control of wastes so as to secure optimum result for waste reduction, may be because of market strategies. WEEE is becoming more tedious because the life span of most electronic goods is becoming shorter and the amount of broken or obsolete equipment that is being thrown away is increasing (Kurian, 2007; ICCN, 2010; BAN, 2005.) Nnorom et al (2009) established that ICT (information and communication technology) development in most developing countries, particularly in Africa, depends more on second hand or refurbished electrical and electronic equipment. Most of these equipments are imported without confirmatory testing for functionality. As a result of this, large volumes of e-wastes find their way into this country. Many components of disposed electrical equipment are heinously toxic, non-biodegradable and ecologically debilitating in nature if accidentally released into the environment. These toxins will of course ultimately end up in the biological systems of living organisms causing terminal ailments and diseases like cancer, tuberculosis and ultimately death if allowed (ICCN, 2010). While there is no generally accepted definition for the term **e-waste** or **weee,** it can be largely classified as a waste type consisting of any broken or unwanted part of an electrical or electronic appliance or component. Succinctly put, e-waste can be defined as electrically powered electronic equipment or products which have been removed one way or the other from their normal cycle of use either by becoming obsolete, abandoned or impaired beyond further use. Also, e-waste is also often loosely applied to consumer and business electronic equipment that is near or at the end of its useful life. Outdated computers, television, VCRs stereos, copiers and fax appliances are common examples of e-wastes (Wikipedia, 2010). ICCN, 2010 affirmed that e-wastes encompass all known cadre of wastes created as a direct consequences of the existence of an electronic or electrical product and the associated processes involved in their original manufacture. Monomaivi, et al. (2009) opined that when electrical and electronic products are disposed of in landfill sites, millions of tonnes of materials that could be recovered and reused for new products are being lost. Recovery of these materials would reduce the need to extract more raw materials for the manufacture of new products.

Materials and methods

Structured questionnaires directed to randomly select electronic repair technicians with standard repair workshops, domestic electronic goods consumers and some distributors of electronic products within the purview of ascertaining their management approach to e-wastes generated as a result of their daily schedule of activities. Also direct field work/survey was carried out coupled with desk top studies. Focus was placed on Alaba International Market, Badagry road, Lagos which is the major in- let for virtually all electronic products(especially second hand electronic goods popularly referred to as 'TOKUNBOS' and it's reputed for high skill at informal or backyard repair and maintenance of electronic products. Responses to questionnaire are as indicated in tables 1 to 3

Table 1: Equipment disposal method for observed among 250 randomly sampled electronic equipment consumers

	Questions responded to	Respondents		Percentage of Respondents to:	
		Yes	No	%Yes	%No
i	Is there any recycling centre around you where dead equipment or irreparable equipment can be dropped for reprocessing?	-	250	-	100
ii	Are you aware of extended producer responsibility?	15	235	06	94
iii	Does your retailer encourage you to return your electronics to him at the end of their life?	-	250	0	100
Iv a	Have you ever disposed of any unserviceable household electronics?	245	05	98	02
	If yes what method:				
b	(i)By burning / incineration	24	226	10	90
	(ii) Municipal solid wastes	55	195	22	78
	(iii) Land Filling	68	182	27	63
	(iv) Abandoned with repair men	45	205	18	72
	(v) Keep at home	34	216	14	86
		170	80	68	32
v.	Will you be willing to pay a token for the final disposal of your electronics after their end of life?	120	130	48	52
vi.	Are you aware of the dangers of burning / incinerating or land filling with electronics?	80	170	32	68

Table2: Municipal Waste Collectors

	Questions Responded to by 30(Thirty) Municipal Waste Collectors	Respondents Answering			
		Yes	No	%Yes	%No
i.	Are electronic wastes separated from other biodegradable wastes	-	30	0%	100%
ii.	Do you have a special arrangement for WEEE collection and processing What method of disposal do you employ? i. Land filling	30	-	100%	-
	ii. Incineration	30	-	100%	-
	iii. Stock piling	0	-	100%	-

Table 3: Responses to questions from 50(fifty) Electronic

Repair Technicians who specialise in the repair of TV receivers, DVDs, VCDs and VCRs

	Questions Responded to	NO OF RESPONDENTS			
		YES	NO	%YES	%NO
i.	What do you do with unserviceable / irreparable equipment: (i) Dump them in the municipal waste collector (ii) Burn them/ incinerate (iii) Dump in the swamp (iv) Material recovery	 45 05 35 24	 05 45 15 36	 90 10 70 48	 10 90 30 52
ii.	Are you aware of the dangers of illicit destruction of e-wastes	15	35	30	70
iii	Has any manufacturer/ distributor requested for the collection of dead electronics	-	50	-	100
iv	What do you do with most of the stock-piled unserviceable equipment? i) Use them as spare parts ii) Do not know where to dispose them? iii) Do bulk of your e-wastes come from customers who abandoned their equipment?	 54 48 58	 06 10 02	 90 80 97	 10 20 03

Findings

1. There is no formal setting for e-waste collection within this country, most repairs technicians have the gamut of e-waste (especially T.V receivers, D.V.D., V.C.D) in their stock because most owners abandoned them, and because when repair was to be done there were no spare parts and those who have reached their end of life were abandoned.
2. Most junks of weee were found to be used for land filling and open burning.
3. Poor awareness on the part of the entire down trodden populace, of the negative effect of using weee materials for land filling and otherwise burning them.
4. Inadequate conditions of informal recycling since there are no formal recycling facilities being provided either by manufacturers or distributors of electronic products, the highest percentage of recycling being done is the utilization of parts of unserviceable appliance as spare parts for the ones to be repaired or upgraded.
5. Reluctance on the part of the corporate to address the critical issues of extended producers responsibility and end of life option for their manufactured electronic products. Even the compulsory labelling of such products as hazardous is never observed. The consequence of this is that a lot of toxic materials enter the waste stream with no special precautions to avoid the known adverse effects on the environment and human health.
6. Inadequate legislation on electronic waste management in Nigeria while there are strict laws and effective enforcement of such laws that affect municipal solid wastes dumping.

Conclusion and recommendation

Since there has been no formal **weee** structure set up**,** there is need to set up through the informal sector waste collection system especially through a system where by road side repair technicians will be the primary collector before sending such wastes to designated centres for final formal collection. This pre-processing can start from these informal units, it offer numerous job opportunities. Emphasis should be on the use of less toxic materials for electronics production. It should be such that can be easily recoverable and recyclable materials which can be taken back for refurbishment remanufacturing disassembly and reuse. Nigeria should follow examples of European countries that have banned the importation of production of CRT materials and such products that contain hazardous substances. Segregation of products by manufacturer, type and product will be an obvious advantage for future re-processing.

References

1) BAN (2005): The Digital Dump: Exporting Re –Use and Abuse to Africa, Basel Action Network.October 2005.www.ban.org

2) Chatterjee,S and KrishnaKumar (2009):Effective Electronic Waste Management and Recycling Process Involving Formal and Nonformal Sectors.International Journal of Physical Sciences 4(13)pp 893-905

3) Gramatyka,P.,Nowosielski,R.,and Sakiewicz, P (2007):Recycling of Wastes Electrical and Electronic Equipment. Journal of Achievements in Materials and Manufacturing Engineering.20(1-2)

4) Institute of Chartered Chemist of Nigeria (2010); The Menace of Electronic Waste www. iccn.org.ng.

5) 5. Kurian Joseph(2007): Electronic Wastes Management in India.Proceedings 11th International Waste Management and Landfill Symposium,1-5 Oct ;Italy

6) Monomaivi Bool.P. (2009):The Management of Waste Electrical and Electronic Equipment in India.Journal of Resources Conservation and Recycling.53(3),1366-1444.

7) Nnorom , I.C. Ohakwe ,J and Osibanjo,O.(2009):Survey of Willingness of Residents to Participate in Electronic Waste Recycling in Nigeria-A Case Study of Mobile Phone Recycling.Journal of Cleaner Production.17(18) 1629-1637.

8) Osibanjo,O and Nnorom,I .C (2007):**The challenge of electronic waste (e-waste) management in developing countries**Available on-line http://wmr.sagepub.com/cgi/content/abstract/25/6/489

9) The **Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal**, usually known simply as the **Basel Convention(2007)**, is an international treaty www.basel.int/meetings/oewg6