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## **The Imperative of Effective Policy on E-Waste Management in Nigeria: A Study of Some Selected States in the South East Nigeria**

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### **ABSTRACT**

E-waste is a product of Electrical and Electronic Equipment (EEE), as a result of boom in the Information and Communication Technology (ICT) it has become a threat to the society. Generally e-waste is growing on daily basis as developed countries tend to discard or dispose off used ones, which are rarely done properly. It is on this note that most third world countries like Nigeria perceive this as a potential to create wealth and job opportunities out of these discarded products and then traffic them or better still allow them to be trafficked into the country. Hence this study tends to underscore, the need for effective management of this trend using relevant policy framework as it is becoming a menace in Nigeria.

**Keywords:** Electrical electronic waste, policy, management and Nigeria

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### **INTRODUCTION**

Waste started with human existence, and what may be called waste to one may not be waste to another person. Waste is not only a house bye product, but both office, factories etc. Waste can be defined as a substance produced in our daily activities which are unwanted and no longer useful to man (Federal Ministry of Housing and Environment Nigeria Monograph Series No. 2). For the purpose of clarity Waste are of two types Solid Waste and Liquid Waste [1].

In the context of this research it is necessary to define where e-waste belongs. Therefore waste can be classified according to their source, chemical composition, appearance texture or location. Solid wastes are product that normally appears in an object form, which can with time decay or not. Wastes that do not decay are known and called bio-degradable waste. Solid waste usually has shape, it can be felt and can be touched. However liquid wastes are products that usually appear as a substance and can as well flow or come in gaseous shape. Hence, these substances must be handled

and disposed off with care, so they do not constitute danger to public health. Waste however could be said to be relative especially in manufacturing and production sectors. Therefore E-Waste could be seen as the end products of all electrical electronic appliances or equipment (EEE) that has become obsolete or no longer in use, such as out dated, out used, obsolete spoilt, old electrical/electronic that has attained end of life. [2], argued that e-waste is the fastest growing rubbish streaming in the world and few regions are feeling its effects. It is estimated that Nigeria generated 1.1 Million tons of domestic e-waste every year [3]. In addition, developed countries especially Europe and Asia are exploiting lax West African Customs regulations to dispose of their own techno-trash [2].

### **STATEMENT OF PROBLEM**

Though e-waste is double-edge sword its economic importance in terms of employment generation and fund generation is much more outweighed by the health hazard associated with e-waste. People who earn their means of livelihood through e-waste are prone to health related problems and are worst affected by the effect of e-waste, while processing them. Researchers from Japan's Chime University in 2012 noted that the level of copper, Zink, lead and tin were extremely high in residual ash as a result of workers burning the wires they had collected to extract valuable metals. They also found moderately high level of bromine, arsenic and mercury, highly toxic elements which find their way into the ground, air and water supply [2]. As a result of influx of second hand electrical/electronic product imported into Nigeria many of our young people perceived it as an opportunity to generate fund and employment, while developed world or Western Nations see it as a benefit to dispose off waste. Considering its effects on our health and possible agricultural production, as well as fish farm, what is the take of the government in checking this menace? Obviously, these are equipments that have become unusable in Western Countries and they externalize the real environmental costs and liabilities to third world countries in which Nigeria belongs. Despite this knowledge and development, what are those possible challenges hindering government policies on the movement or better still shipment of e-waste into Nigeria aside the ones generated internally? What are the measures put in place by Nigerian government in managing internally generated e-waste in the country? It is against this backdrop that emphasis is laid on the imperative of effective policy on e-waste management in Nigeria.

### **OBJECTIVES OF STUDY**

The broad objective of the study is to critically evaluate the imperative of effective policy on e-waste management in Nigeria. The specific objectives are to:

- To find out the possible challenges hindering government policies on E-waste.
- To examine the measures put in place by government in managing E-waste in Nigeria.

### **Hypotheses**

1. Imperfection in environmental act has hampered the control of e-waste in Nigeria.
2. There are no developed incentives for the establishment of sustainable e-waste disposal facilities through mutual beneficial recycling scheme.

### **SCOPE OF THE STUDY**

The scope of the study comprised of some elected states in the South East, Abia State, Anambra State and Enugu State. The task of this study was on the imperative of effective policy on e-waste management in Nigeria.

### **RESEARCH DESIGN**

The survey research was used to gather data, the basis of its usability with large samples as the case with the present study where N=100

### **SAMPLE**

One Hundred and Fifty respondents formed the sample for the study. The sample had diversity in terms of age, sex, social economic status and experience among other variables.

### **INSTRUMENTATION**

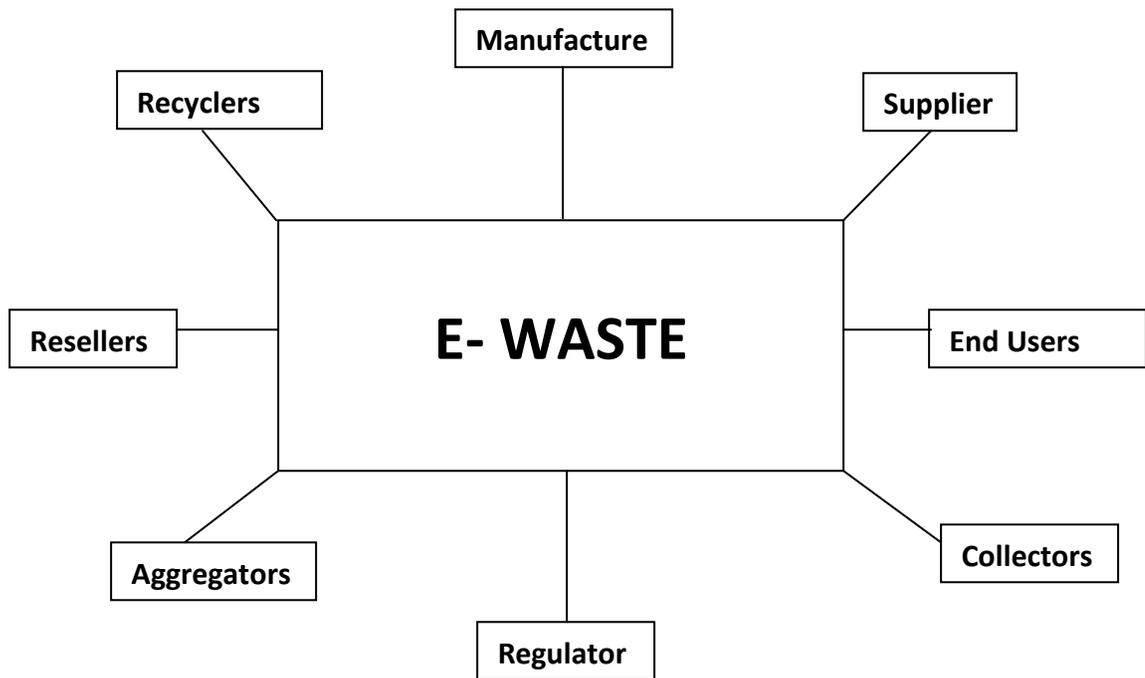
Questionnaire items were used to source data from the respondents. The items sought to which the respondents understood the problem of e-waste in Nigeria as were conceptualized in the literature review. The questionnaire was pilot tested and rated highly by meters with extensive experience in the use of the instrument for research purposes. The ease of access to the respondents by the researcher allowed for a personal administration of the instrument which ensured hundred percent return rates thereby eliminating non-return bias, in depth interviews were conducted with the 150 respondents as a follow up to the questionnaire in order to glean the subtle aspects that questionnaire items could not adequately elicit. Interviews focused mainly on the respondents' justification for particular response options to questionnaire items.

### **LITERATURE REVIEW**

E-waste or simply put Electrical Electronics Equipment (EEE) waste is a term used in describing old, obsolete, broken, discarded, end of life electrical electronic devices or appliances. It is a generic term embracing all type of waste containing electricity powered components that includes computers mobile phones, television set, and consumer electronic. Cathode ray tube (CRT), fridges which have been disposed off by

their original users [4]. Presumably e-waste could as well be seen as the end product of electrical electronic equipment that has become obsolete, spoilt or no longer in use. E-waste comprise of all electrical and electronic waste, hence the fastest and largest growing rubbish stream in the world and few regions are feeling its effects more in West Africa [3], E-waste is a term used to cover all items of electrical and electronic equipment and its parts that have been discarded by its owners without the intent of re-use [5]. The source of e-waste are electrical/electronic that are either outdated, out of fashion, spoilt etc from the homes, offices or factories, such as Television set, radio, washing machine, pc, monitors, microscope, incubators, scanners, egg device, Cpu, fax machine, mixer, signal generator, tube light air conditions etc. Therefore, these source captures industries, factories, homes and offices and has revolutionalized modern living international business, global governance, communication entertainment, transport, education and health care [2] E-waste is the means in which these products infiltrate into Nigeria in a larger quantity, since the Western countries have seen third world countries as final destination in dumping of e-waste then in turn Africans, Kenya and Nigeria have also perceived the influx as an opportunity for wealth creation and empowerment either refurbishing them or recycling them. Since poverty has created immense opportunity and insensitivity for illegal trafficking of e-waste, it is said to be a line-up of opportunities for unemployed youth to earn a living without considering the damages to health and the environment, thus to a large extent affecting our agricultural produce.

**STAKEHOLDERS OF E-WASTE GENERATION AND MANAGEMENT**



Meanwhile, there are two ways or approaches to recycling of these e-waste informal and formal recycling. Informal recycling involves burning, shredding and dismantling usually done in the shanties or back yard. While formal is a proper way of recycling e-waste putting people's health and the environment into consideration through both poses health hazard to the people in the environment and neighbouring communities, it is common knowledge that the concentration of many of these elements is at serious toxic levels, hence escalating e-waste crisis. According to U.S Environmental Protection Agency in [3], exposure to moderate levels of mercury will result in neuromuscular problems, such as muscle atrophy and weakness, poor cognitive functions headaches and tremors.

Worthy to note that Nigeria imported between 2010 to 2015, 75% of e-waste from Europe and 15% from Asia, 5% from Morocco, 5% from North America and other part of the world. [2]. Used electrical electronic equipment is often regarded as second hand goods or tocumbo goods. In all sincerity are there legislations guiding these out used electrical electronic equipment? Is there any law guiding the movement of e-waste into Africa and Nigeria at large? Are there laws checking the influx, types and kinds of used electrical electronic equipment known as e-waste? African states like Nigeria, Ghana, South Africa and Cote d' Ivoire have drafted e-waste strategies. In 1991 a treaty was signed by 33 African Countries including Nigeria to prohibit the import of any hazardous waste into the continent. Though, it was done at the regional level, it is called the Bamako Convention. It strictly and authoritatively stated that there is no importation of any hazardous waste unlike that of Basel Convention which states that if the recipient country permits, these hazardous or e-waste can be imported. In other words, it banned the unauthorized movement of waste without the consent of the receiving country, waste could mean e-waste or otherwise. However, the Bamako treaty went further to state categorically of banning the importation of e-waste into its member countries.

E-waste is the highest producer of smog when burnt. Considering the effect of smog and its attendant risk to climate, the government at this juncture must declare a war on the importation of e-waste in Nigeria. Not just the smog, e-waste are known to be made of more than 1000 different substances of which many are highly toxic [6], this is hazardous effect. Third world countries like Nigeria face increasingly severe pollution as a result of e-waste management and disposal challenges that threaten effort to improve the standard of living and worsen health conditions. In Urban areas of Nigeria and Africa

at large increase congestion, industrial expansion and lack of pollution control result in unhealthy levels of pollutions in the air and water. The growing global concern about sustainability arose as a result of increasing environmental degradation. The concern about pollution and deterioration of environmental quality has been building momentum to various environmental movements.

The uncontrolled transboundary movement of hazardous waste some of which declared as economic goods mostly from Europe, America and Asia are frequently sent to developing countries for disposal [7]. The hunger for access to information and communication technology (ICT) has been identified as indicators of a country's economic and social development (United Nation, 2011). However, the rapid growth in ICT has led to an increase in e-waste, but simultaneously to a decrease in product life time, such as the volume of waste generated is increasing by 10% annually [4]. Not only that South Eastern Nigeria lacks measures in e-waste management, but is facing huge challenge of e-waste imported illegally as second hand goods or tokumbo products. [5]in collaboration with [6], argued that most used electrical electronic equipment consignments imported into developing countries are mixtures of less than 25% of used functional EEE and over 75% of EEE. The proliferation of used electrical electronic equipment is now a global concern and there exist a rapid growth of EEE which requires disposal throughout the world. Worthy to note is that the United States of America discards 30 Million used computers each year and 100 million used phones are discarded annually in Europe [8]. However, about 500 million personal computers reach the end of their service lives between 1994 and 2003 [5]. Meanwhile there are other devices that were not taken into consideration here. In other words managing e-waste in South Eastern Nigeria must be clearly spelt out to check the impending dangers for instance the end product of e-waste such as lead, mercury, cadmium etc. into the soil and ground water causes acidification of the social [9], [10]; [5]; [11]; [6]. Record has shown that over 734 children below the ages of five out of 5,395 within the age brackets were confirmed killed from lead poisoning between 2010-March 2013 in Zamfara State [5].

#### **E-WASTE MANAGEMENT IN SOME SELECTED STATES IN SOUTH EASTERN NIGERIA**

The selected states in south Eastern Nigeria used as pilot study are Anambra state (Onitsha), Abia state (Aba) and Enugu state (Enugu). These states lack the political will to regulate the influx of e-waste in their various localities. It is a known fact in Nigeria that e-waste is mostly managed via municipal waste management scheme [7]. This portrays the likely threats of these state governments to achieve the desired goal of managing e-waste. [8], gave credence to this as they opined that processes of managing EEE stream

in South Eastern Nigeria are not clearly spelt out and practiced. As a result of rising increase in importance of used EEE which is the major source of e-waste in Nigeria, the National Environmental Standards and Regulatory Enforcement Agency (NESREA) in 2015 has ordered an e- waste carrying vessel at Tin-Can Island Port, Lagos to send its consignment back to the port of origin in the United kingdom, citing the provision of harmful waste Act, promulgated after the kobo waste saga in 1988- [8]. As a matter of fact, NESREA has intercepted and arrested five ships, carrying e-waste destined for Nigeria [6]. Suffice, to say there are likely facts affecting e-waste generation, collection and disposal in South Eastern Nigeria [2], includes the missing public awareness on e-waste toxicity and consumer common habits of buying used EEE which are at near end of life rather than new ones. Secondary, the inability to distinguish between UEEE and near end of life. Thirdly, government haziness to pronounce an outright ban on importation of UEEE or develop long term guidelines on imported used EEE to assist the importer in differentiating between e-waste and used EEE. Fourthly, absence of regional state standardized recyclable facilities for UEEE in Nigeria and South Eastern States at large. Finally, false declarations at the point of entry of UEEE as economic goods or second hand goods meant as gift or donation to individual or groups in developing countries.

#### PRESENTATIONS AND ANALYSIS OF DATA

The analysis is aimed at testing the significant difference between the proportion of response  $P_1$  and  $p_2$ . Hence the sample size was large and the parameter assumed to be normally distributed, the test concerning that parameter is carried out using the Z-text. It is used in testing the hypothesis  $H_0: P_1 = P_2$  (ie  $p=0.5$  as  $H_1: P_1 > 0.5$ ).

$$Z = \frac{P_1 - P_2}{\sqrt{\frac{Pq}{n}}}$$

Where

$P_1$  = the proportion of the population that say 'yes'

$P_2$  = the proportion of the population that say 'No'

$Q = 1-p$

$P = 0.5$

$n$  = sample size

#### Test of Hypotheses

##### Hypothesis 1

H1: Imperfection in environmental act has hampered the control of e-waste in Nigeria.

Ho: Imperfection in environmental act has not hampered the control of e-waste in Nigeria.

**Table 1**

	<b>Strongly Agree</b>	<b>Agree</b>	<b>Disagree</b>	<b>Not sure</b>	<b>Total</b>
<b>No of respondent</b>	29	18	6	3	56
<b>Proportion</b>	0.52	0.32	0.12	0.5	1.00

Here, the natural thing is to assume under Ho is that the proper of response are equal, thus, the assumption is that  $p = 0.25$ ,  $p_1 = 0.52$ ,  $p_2 = 0.32$ ,  $p_3 = 0.12$ ,  $p_4 = 0.5$  and compare each with the population proportion of  $p = 0.25$

For strongly agree

Ho: the proportion of  $p_1$  is 0.25 (ie  $p_1 = p$ )

$H_1$ :  $p$  is not equal to 0.25 (ie  $p_1 \neq p$ )

Test statistics  $z$  since sample size is large (i e 730)

So 
$$\frac{P_1 - P}{\sqrt{\frac{P(1-P)}{n}}}$$

$$\frac{0.52 - 0.251}{\sqrt{\frac{(0.25)(0.75)}{56}}}$$

= **4.32**

For  $\alpha = 0.05$ , for a two-tailed test  $z$  from the normal distribution table is 1.96.

**Decision:** Then the tabulated  $Z$  (1.96), Ho is rejected.

**CONCLUSION**

Therefore is  $P$  hence sufficient evidence abound that the proportion of respondents who strongly agree is significantly greater than 0.25 there is need to test “Agree” responses for significant difference from  $P_1 = 0.05$

The procedure is to carry on as before.

$$Z = \frac{10.5 - 0.251}{\sqrt{\frac{(0.25)(0.75)}{56}}} = 1.38$$

For  $\alpha = 0.05$ , the tabulated  $Z =$  value is 1.96

Since  $Z =$  Calculated is 1.38 which is less than 1.96  $H_0$  is accepted. Conclusion is that the proportion who agree to the opinion is not significantly higher than 0.25.

For “disagree” and “Not Sure” Opinions, it can be seen that the figures are very small considering the result from 0.32 figures an inference can be made that the outcome of the “disagree” and “not sure” opinions will not be significantly be higher than 0.25. And this will amount to testing the obvious.

Conclusion: Since the imperfection in environmental act has hampered the control of e-waste in Nigeria, the Act requires to be reviewed urgently.

Hypothesis 2

$H_0$ : There is no developed incentive for sustainable e-waste disposal facilities through mutual beneficial recycling scheme.

$H_1$ : There is a developed incentive for sustainable e-waste disposal facilities through mutual beneficial recycling scheme.

Table 2

E-Waste management can only be effective if the tiers of government can jointly monitor the importation of goods into the country.

	Yes	No	Total
<b>No of respondents</b>	38	19	57
<b>Proportion</b>	0.67 (p1)	0.33(p2)	1.00

$$\frac{0.65 - 0.33}{\sqrt{\frac{(0.5)(0.5)}{57}}} = 5.4$$

By using the normal distribution table at a 0.05, the tabulated z-value is 1.654, thus are tailed test for equality of the two; proportion (i.e  $H_0$ ) is rejected in favour of  $H_1$ .

Therefore  $p_1$  is significantly greater than  $p_2$

Decision: since the value of z-calculated is greater than the value of z-tabulated the  $H_0$  is rejected.

Conclusion:  $p_1$  is significantly greater than  $p_2$  which means that there is no developed incentive for sustainable e-waste disposal facilities through mutual beneficial recycling scheme.

### **SUMMARY OF FINDINGS**

E-waste has created means of livelihood to the teeming unemployed youths in the south east Nigeria. Imperfection in environmental act, legislations and effective monitoring has hampered the control of e-waste in Nigeria.

Developing countries are seen as fertile ground for dumping of e-waste in the world.

### **RECOMMENDATIONS**

Based on the findings of this study the following recommendations were made; Awareness and enlightenments campaign should be created to sensitize the public on the dangers inherent in dealing with e-waste product. Proactive measures should be employed in the treatment and final disposal of e-waste, hence best practiced recycling and environmental management option should be adopted. Regulations should be in place to check illegal importation of used electrical electronic equipment. This can be achieved by developing national polices, legislations, acts, regulations and guidelines strategies, review existing laws on e-waste management as well as key in to global and regional organized charters, treaties, standards and guidelines of leading proponents of WEEE. Finally NESREA Act should be reviewed along side other environmental Acts in Nigeria to check the ills. Hence Political will is fundamental in preventing South Eastern States of Nigeria from becoming an e-waste dumping ground.

### **CONCLUSION**

It might be pretty difficult to stop entirely the importation, trafficking and recycling of e-waste in Nigeria especially in the South East of Nigeria because of the high number of youths who make their living from the business. However effective check and regulations must be put in place along our boarder areas to stop the infiltration of e-waste. Meanwhile, the government should create more Job opportunities and empower the people. E-waste according to research has been condemned because of its hazardous nature and should as well be discouraged here Nigeria.

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