

E-WASTE FOR WEALTH AND JOB CREATION FOR SUSTAINABLE DEVELOPMENT

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Abstract

Electronic equipment can contain up to 60 different chemical elements. The improper ways of collecting e-waste, recycling technologies and illegal dumping means; the majority of these valuable resources are lost when equipment reaches their end-online. As a result, environmental hazards emanated there by causing damage to human and animal health. Failures to close this gap, e-waste can adversely affect the environment and resources based on secondary equipment reduced. Wealth mentality and job creation from e-waste should be encouraged through these recycling technological techniques recommended from this paper. How can e-waste be recycled technologically to create wealth instead of the negative belief that once it is waste it is useless; helping to eradicate environmental pollution danger. Since e-waste contains hazardous materials which become a major crisis for any society, their recycling processes through primitive means for extraction of precious metals is a real concern in the developing countries. Here is the focus. Recommendation is that government should encourage recycling of e-waste to be done properly using technological applications to create jobs for sustainable development

All along we assumed that every waste is a bad situation and that it can cause harm to human health and hence has to be discarded. But a critical look at electronic waste (e-waste) one can give that assumption a second thought by trying to create wealth in order to empower the youth in terms of job creation and the supply of raw materials for sustainable development. A lot of computer have been entering the country yearly,

according to Inye (2013) that "140,000 personal computers were consumed in Nigeria in 2012. With this revelation, it means that a lot of computers and other electronic equipment have been pouring in yearly into the country. And the life span of some of these equipment are not more than five years; now, how do we dispose them after they might have expired so that they will not cause harm to the people, the environment and at the same time use them to generate income. Chemicals such as beryllium, found in computer motherboards, and cadmium, used in chip resistors and semiconductors, are poisonous and could lead to cancer. Chromium in floppy disks, lead in batteries and computer monitors, and mercury in alkaline batteries pose severe health risks (Eugene, 2013). Lina (2013) cited by Opara (2013) maintained "we need to act now before it becomes an unstoppable waste tsunami that causes irreversible damages to our health and environment. The enormous waste stream contains billions of pounds of hazardous materials, including lead, mercury, beryllium, cadmium, brominates (flame retardants) and more than 1,000 different toxic harmful to human being and the environment if not disposed off properly. This made Achim (2013) to conclude that managing e-Waste had become not only important, but absolutely urgent, owing to the fact that e-Waste contained a veritable cocktail of toxic material. Also, as people become more dependent on electronic products to make life more convenient the stockpile of used, obsolete product grows. The disposal of electronics is

growing problem because electronic equipment frequently contains hazardous substances.

The challenge e-Waste imposed on the world today cannot be over emphasised and it is more serious in a developing country such as Nigeria. Since the country is still struggling with the problems of insecurity, power supply and poor health care delivery etc, it will be unwise to allow e-waste to compound existing situation. Due to poverty, lower environmental standard, and working conditions in the developing countries, e-waste is being sent to them as second-hand electronic product, popularly known as "Tokumbo" making them extended e-waste dumps for the developed nations.

Concept of E-Waste

As x-rayed by (Onyeje, Opara 2013), Chatterjee and Kumar (2009) Electronic(e)-waste can be said to be the discarded computers, office electronic equipment, entertainment device electronics, mobile phone, television sets and refrigerators. E-waste is an euphemism for waste materials coming from products of technology. It is any refuse created by discarded electronic devices and components involved in their manufacturing or use. This waste is also called e-Garbage and Waste Electrical and Electronic Equipment. Below are some of the causes of e- waste.

1. The rapid growth of technology devices. It is estimated that there are over a billion of personal computers in the world at present. In developed countries these have an average life span of only 2 years. In the United States alone there are over 300million obsolete computers. Hence, we must address the issue of disposal of large numbers of "end-of-life" computers and other ICT equipment.
2. Computers contain toxic materials: Thousands of substances are used to

manufacture a computer. To produce one computer 240kg of fossil fuel, 20kg of chemicals and 150kg of water are needed (gupta_basu22@yahoo.com).The following are identified by as some of the problems of e-waste.

- a. Electronic waste is a valuable source for secondary raw materials, if treated properly, however if not treated properly it is a major source of toxins. Rapid technology change, low initial cost and even planned obsolescence have resulted in a fast growing problem around the globe. Technical solutions are available but in most cases a legal framework, a collection system, logistics and other services need to be implemented before a technical solution can be applied.
- b. Due to lower environmental standards and working conditions in China, India, Kenya, Nigeria and elsewhere, electronic waste is being sent to these countries for processing - in most cases illegally. Delhi and Bangalore in India Uncontrolled burning, disassembly, and disposal are causing environmental and health problems, including occupational safety and health effects among those directly involved, due to the methods of processing the waste.
- c. Electronic waste is of concern largely due to the toxicity of some of the substances if processed improperly. The toxicity is due in part to lead, mercury, cadmium and a number of other substances. A typical computer monitor may contain more than 6% lead by weight, much of which is in the lead glass of the CRT. Up to thirty-eight separate chemical elements are incorporated into electronic waste items. The unsustainability of discarded electronics and computer technology is another reason for the need to recycle - or perhaps more

practically, reuse-electronic waste.

- d. Electronic waste processing systems have matured in recent years following increased regulatory, public, and commercial scrutiny, and a commensurate increase in entrepreneurial interest. Part of this evolution has involved greater diversion of electronic waste from energy intensive, down-cycling processes (eg. conventional recycling) where equipment is reverted to a raw material form. This diversion is achieved through reuse and refurbishing. The environmental and social benefits of reuse are several: diminished demand for new products and their commensurate requirement for virgin raw materials (with their own environmental externalities not factored into the cost of the raw materials) and larger quantities of pure water and electricity for associated manufacturing, less packaging per unit, availability of technology to wider swaths of society due to greater affordability of products, and diminished use of landfills.

Importance of Recycling of E-waste

Globally, 50 million tons of e-waste is generated annually and has all 'potential' to grow at much faster rate than any other waste streams. It is very interesting to note that even after the due use, this particular 'waste' is of great significance & value. Generally speaking, e-waste consists of more than 92% recoverable and reusable commodities, some of them are highly precious and limited and in terms of absolute numbers, 50 million tons of e-waste consists of 15 million tons of steel, 4 million tons of aluminium, 6 million tons of copper , glass, plastic, silver, gold, palladium, platinum, iridium etc, (Onyeje 2012) . To reproduce the above commodities, we need to go deeper in to the mines and excavate in multiples to produce required quantities of respective commodities, invest in infrastructure, use billion of units of

electricity, millions of man years and generate carbon foot print; need to resolve. The above certainly justifies that end of life electrical & electronic equipments are really "Resource" and by recycling we can save lots of other inputs which may be used elsewhere for other socio economic developments. A study shows that after spending typical US\$12.5 -19 per a personal computer (PC) with colour monitor, a trader can earn around US\$50-60 by selling its disassembled components, modules to different recyclers or re-users and by recovering precious Metals and other valuables (<http://toxtcstink.org/dn.php?sertion=l&ki=37&atan=0>). In another study, it is estimated that 1000kg of Populated PCB recycling by Chatterjee and Kumer, (2009), showed that e-waste recycling can be considered to be of computer as e-waste yields 284 gram of gold (Gao , Li,and Zhang, 2004). An analysis of PC r profitable business if it is properly adopted by the developing countries such as Nigeria. The resulting precious materials that were got from a single Computer system confirmed this: A system is made of: metal/plastic enclosure, switch mode power supply unit, cooling fan, main motherboard, Auxiliary cards, Hard disc drives, CD/DVD read/write devices and main power cable, inter connecting cable for connection with Printer, monitor, modems, scanner.

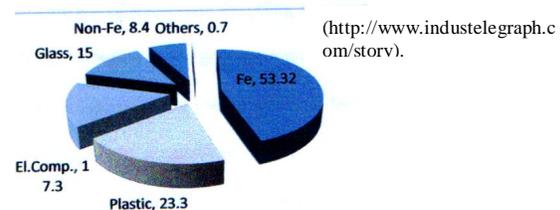


Figure 1: showing the contents of materials recovered from a recycled PC (Chatterjee and Kumar, 2009); PC (Avg. Weights 29.6kg) Ingredients by %.

How to Manage E-waste

The following are some of the ways e-waste can be managed. These include:

Recycling: This is a process whereby equipment is reverted to raw material form. It is done by sorting, dismantling, and recovering of valuables. This diversion is achieved through reuse and refurbishing. The environmental and social benefits of reuse are diminished demand for new products and virgin raw materials (with their antecedent environmental issues); larger quantities of pure water and electricity for associated social benefits of reuse are diminished demand for new products and virgin raw materials (with their antecedent environmental issues); larger quantities of pure water and electricity for associated manufacturing; less packaging per unit; availability of technology to wider swaths of society due to greater affordability of products and diminished use of landfills. Audiovisual components, televisions, VCRs, stereo equipment and mobile phones, and others are handheld devices, and computer components contain valuable elements and substances suitable for reclamation, including lead, copper, and gold, (Gao Z, Li, J, Zhang, H. C. 2004).

Responsible Recycling: It aims at minimizing the dangers to human health and the environment that disposed and dismantled electronics can create. Responsible recycling ensures best management practice of the electronics being recycled, worker's health and safety, and consideration for the environment locally and abroad.

Advantages of Recycling: Recycling raw materials from end-of-life electronics is the most effective solution to the growing e-waste problem. Most electronic devices contain a variety of materials, including metals that can be recovered for future uses. By dismantling and providing reuse possibilities, intact natural resources are conserved and air and water

pollution caused by hazardous disposal is avoided.

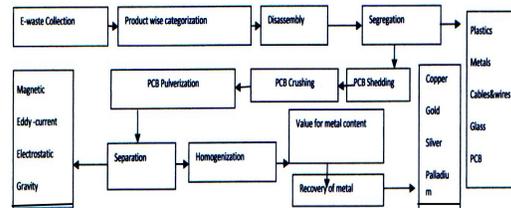


Figure 2, Showing Process Flow Chart of Salable Materials of E-waste (Chatterjee and Kuma, 2009)

E-Waste Substances: Some computer components can be reused in assembling new computer products, while others are reduced to metals that can be reused in applications as varied as construction, flatware and jewellery. Substances found are epoxy resing, fibreglass,PCBs, PVC, thermosetting plastics, lead, tin, copper, silicon, beryllium, carbon, iron and aluminium. Others are cadmium, mercury, and thallium. Also, americium, antimony, arsenic, barium, bismuth, boron, cobalt, europium, gallium, germanium, gold, indium, lithium, maganene etc.

E-Waste Health Effect: Americium causes carcinogenic; Mercury: sensory impairment, dermatitis, memory loss and muscle weakness and infertility and slow growth and development; Sulphur- liver, kidney and heart damage. Throat and eye irritation; Lead- impaired cognitive function, behavioural disturbances, attention deficits, hyperactivity, conduct problems and lower IQ. (Chem ,2011).

Conclusion

Up till now, e-Waste was seen only as a serious challenge that was about drowning developing nations, for instance, Nigeria. However, this paper has revealed the good things that can come out of e-waste. Wealth can now be generated from it; employment can be created for the nation's teeming unemployed

youth and a cleaner environment can now be guaranteed. Also Nigerians can continue to enjoy the benefits of ICT without fear of negative consequences of e-waste. It is therefore appropriate to devise an approach to manage and recycle the e-waste in self-

Recommendations

This paper therefore recommends amongst others that:

1. There should be e-Waste management awareness programme by the government: The the government should as a matter of urgency set up e-Waste management board that will oversee e-waste procedure.
2. Establishment of e-Waste disposal points: Different disposal locations where used floppies/CDS, hard disks, monitors etc should be taken to.
3. Establishment of Recycling Factories: Factories where e-Waste could be recycled should be located at different places within the country
4. Awareness should be created on wealth from waste: Wealth mentality should be developed as a mind set, and it should be taught in schools.
5. There should be a capacity building with the aim of drawing the attention of the public to the problems connected to WEEE.
6. Government should improve on the infrastructures, systems and technologies to realise a sustainable recycling on global level.
7. Reduction of negative consequences of electrical and electronic appliances throughout their entire life cycle should be focused upon.

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