Research Article

E-WASTE MANAGEMENT: PROBLEMS AND SOLUTION

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Abstract

The industrial revolution followed by the advances in information technology has greatly changed people's lifestyle. Although this development has helped the human race but has led to the generation of electronic waste or E- waste. According to the Greenpeace report in 2007 India generates about 3, 80,000 tonnes of E-waste out of which only 3% goes for authorized recycling. One of the reasons for this is that the India has also become a dumping ground for many developed nations. The Basel Action Network (BAN) stated in a report that 50-80% of e-waste collected by the USA is exported to India and number of other countries. In Delhi alone around 10,000 to 20,000 tonnes of E waste is handled every year by 25,000 workers including children that also with bare hands. The improper dismantling and processing of e-waste has a great impact on human health as well as our ecosystem which include contamination and pollution. The lack of awareness of the people and their negligence is increasing the problem. So, there is an urgent need to plan a preventive strategy (Electronic Waste Management) and educate people about the same because it is rightly said everything has a price except health.

**Keywords:** Electronic Waste, Human Health, BAN, Electronic Waste Management, Awareness

INTRODUCTION

In this 21st century when the industrial revolution is at its peak which has done advances in various industries most promising being the technological university has changed people's life drastically. Although this development has helped the human race but has led to the generation of electronic waste or E-waste as they are popularly called. In India most of these electronic wastes which are very complex in nature and is also a rich source of metals such as gold, silver, and copper is stored at houses because the lack of knowledge amongst people interms of their dispose off. In Delhi alone around 10,000 to 20,000 tonnes of E waste is handled every year by 25,000 workers including children that also with bare hands. This improper dismantling and processing of e-waste has a great impact on human health as well as our ecosystem which include contamination and pollution. Thus, the need of the hour is proper e-waste management strategies.

E-Waste Generation in India

According to the Greenpeace report in 2007 India generates about 3, 80,000 tonnes of E-waste out of which only 3% goes for authorized recycling. This scenario is seen because India is one of the prime dumping grounds of waste for many developed countries. The Basel Action Network (BAN) stated in a report that 50-80% of e-waste collected by the USA is exported to India and number of other countries. It was reportedly estimated that in India as the industries and households are making 1.38 million computers obsolete every year thus accelerating the rate of production of e-waste by 10% annually.

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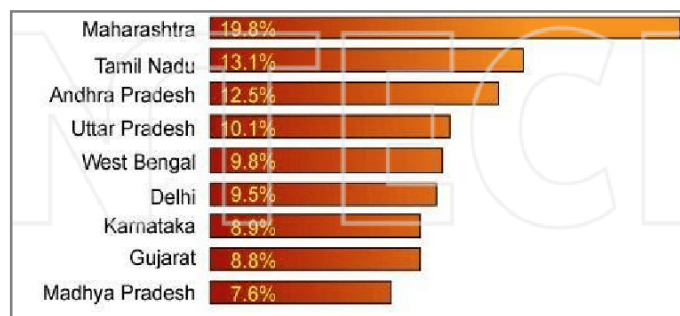
Source: Florin-Constantin Mihai, E-Waste in Transition - From Pollution to Resource, Published by InTech-Janeza Trdine 9, 51000 Rijeka, Croatia

Figure 1. State wise E-waste generation in India

Health Impacts

The electronic wastes have a great impact on the individual health especially children. The various effects of the metals present in the waste are listed below.

E-Waste Management

Figure 2. E-waste management

Source of e-wastes	Constituent	Health effects
Solder in printed circuit boards, glass panels and gaskets in computer monitors	Lead (PB)	Damage to central and peripheral nervous systems, blood systems and kidney damage. Affects brain development of children.
Chip resistors and semiconductors	Cadmium (CD)	Toxic irreversible effects on human health. Accumulates in kidney and liver. Causes neural damage. Teratogenic.
Relays and switches, printed circuit boards	Mercury (Hg)	Chronic damage to the brain. Respiratory and skin disorders due to bioaccumulation in fishes
Corrosion protection of untreated and galvanized steel plates, decorator or hardner for steel housings	Hexavalent chromium (Cr) VI	Asthmatic bronchitis. DNA damage.
Cabling and computer housing	Plastics including PVC	Burning produces dioxin. It causes Reproductive and developmental problems; Immune system damage; Interfere with regulatory hormones
Plastic housing of electronic equipments and circuit boards.	Brominated flame retardants (BFR)	Disrupts endocrine system functions
Front panel of CRTs	Barium (Ba)	Short term exposure causes: Muscle weakness; Damage to heart, liver and spleen
Motherboard	Beryllium (Be)	Carcinogenic (lung cancer) Inhalation of fumes and dust. Causes chronic beryllium disease or beryllicosis. Skin diseases such as warts.

(Source-Dr. Olubukola S. Adesina, The Negative Impact of Globalization on Nigeria, International Journal of Humanities and Social Science (2012), Vol. 2 No. 15)

Figure 1. Effects of e-waste on human health

Sustainable Product Design

Minimization of the formation of hazardous wastes can be done if we keep in mind these following factors which are

➢ Rethink of product design
Efforts should be made to design products with fewer hazardous metals.

➢ Use of renewable materials and energy
The plastics which are made with plant-based chemicals or plant-produced polymers should be used rather than that from petrochemicals. Bio-based toners, glues and inks should be used more frequently. Solar computers have been seen in the markets but there are costlier.

➢ Use of non-renewable materials that are safer
Many materials used are non renewable so designers should ensure to build for reuse, repair or upgradability. Example-Companies such as DELL and GATEWAY lease out their products ensuring that they get them back in order to further upgrade them and lease out.

Volume Reduction

This basically includes the techniques which remove the hazardous portion of a waste from the non hazardous ones. These techniques reduce the volumes as well as the cost of disposing of the waste materials. The techniques stated can be classified into two categories which are source segregation and waste concentration.

➢ Source Segregation
It is a simple and economical technique for waste reduction. The waste containing different types of metals can be treated separately so that the metal in the slurry can be recovered.

➢ Waste Concentration
The techniques included in this are gravity and vacuum filtration, ultra filtration, reverse osmosis etc. For example, an electronic component manufacturer can use compaction equipments to reduce volume of waste cathode ray-tube.

Responsibilities of Government

It is stated in the Environmental (Protection) Act 1986; the person responsible for hampering the environment will pay for the damage done. It is also mentioned in the principle 16 of the Rio Declaration on Environment and Development. Under the Environment (Protection) Act 1986, it is very well stated that the state and the central government can take every necessary step to safeguard the environment and people from the exposure to toxic and hazardous wastes and any violation to this is a punishable offence. The Central Board of Secondary Education in India is finalizing the set of rules and most recently issued a formal set a formal set of guidelines and eco-friendly handling and disposal of electronic wastes. The Ministry of Communication and Information Technology, has also published and circulated a comprehensive technical guide on Environmental Management for Information Technology Industry in India for the disposal of e-wastes.

Recycle

People should be aware about the recycling of e-wastes. Many electronic companies such as Apple, Dell, and HP have taken the initiative and started various recycling schemes. The company Nokia India announced its "recycling campaign" for the Indian region. The program basically urged people to dispose their mobile handsets and other accessories of any

brand to any of the 1,300 recycling units that are put across property dealers, care centers etc. The Company Nokia is taking the initiative to launch a campaign against electronic waste management. The Department of Environment in collaboration with the Delhi government has agreed on an innovative way to tackle the issue and are associating rag pickers in the general waste management. These rag pickers will be trained, given uniforms, ID cards, and hired to clean waste. The department also intends to involve eco-clubs, now running in over 1,600 government and private schools in the Capital, who will be interacting with these rag pickers of that particular area.

Conclusion

The hazardous nature and effect of the electronic wastes on environment and public health is rapidly increasing with time. The lack of awareness among the people and their negligence is increasing the problem.

So, there is an urgent need to plan a preventive strategy and educate people about the same because it is rightly said everything has a price except health.

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