



## E-WASTE MANAGEMENT AND ITS CONCERNS: A THEMATIC APPROACH

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### ABSTRACT

This paper reviews about the management of Electrical and Electronic waste (E-waste), its concerns and impact on the environment. The paper categorizes the E-waste management in three categories for effectively managing it. The author also discuss about the policies and recommendations regarding E-waste in the current scenario of E-waste in India and makes the recommendations about it.

**Index Terms:** Concern, electrical and electronic waste, recommendations, scenario.

### INTRODUCTION

In this silicon age, the continuous and constant betterment of technology has made life much easier as compared to previous times. Electronic gadgets like smartphones etc. have become a rage, all thanks to technological advances made by mankind. But this privilege has its own cons, one of them being the material waste generated by the consumption and disposal of these gadgets. This E-waste is the fastest stream of solid waste. Recycling and dumping of E-waste is more complicated and costly in comparison to general municipal solid waste.

What is E- Waste?

Electrical and Electronic waste is called E-waste. Any appliance using an electric power supply that has reached its end of life is known as E-waste<sup>1</sup>. (Each year 50 million tons of E-waste is produced. E-waste includes a wide and developing range of appliances ranging, such as refrigerators, air-conditioners, cell phones,

stereo systems and consumable electronic items to computers discarded by users<sup>2</sup>.

Why E-waste is Hazardous?

E-waste is hazardous because it contains number of toxic elements such as lead, mercury, cadmium etc. which are hazardous to humans and natural environment. E-waste shouldn't be directly dumped into landfills because it produces more harmful and toxic leachates than municipal solid waste. Also do not burn E-wastes such as net cables, circuits boards etc. in open air because it highly emits toxic fumes and gases which is very dangerous for our environment.



Fig 1. Graph illustrating projection of E-waste generation in India<sup>3</sup>

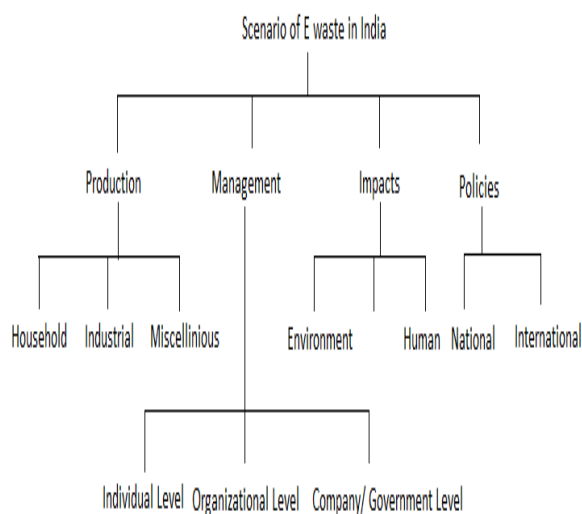
SCENARIO OF E-WSATE IN INDIA:  
HEIARCHY

Fig. Hierarchy of E waste in India

**PRODUCTION:**

E-waste is produced by household appliances, industrial machinery and other miscellaneous equipment. House hold appliances includes refrigerator, juicer, mixer, grinder, induction, batteries, exhaust fans, television (cathode ray tubes), computer, laptop, mobile phones etc.

Industrial machinery includes, CNC milling machines, CNC drilling machines, CNC lathe etc. Whereas machines like Gun Artillery, Tanks, X-ray machines, Medicinal Equipment's etc. falls under miscellaneous category. The figure1 shows the E-waste generated in India and its projection in future. This shows a huge requirement of E-waste management in near future. The above figure shows E-waste management scenario in India.

**MANAGEMENT:**

Management of E-waste is much difficult in handling, collection and storage rather than municipal solid waste. It should be managed effectively at various levels. These levels can be broadly classified into three types viz,

1. Individual/Personal Level.
2. Company & Government level.
3. Organization and NGO's

Failure at any level may lead to collapsing of whole management structure.

**INDIVIDUAL/PERSONAL LEVEL:**

This is the most basic and fundamental level of E-waste management. Awareness should be created among people about E-waste. Consumers should be informed about the toxic substances present in the E-waste as well as safe handling and disposal of E-waste after use. Proper collection centers should be there to collect the E-waste. Various means of communications like Radio, Media, internet etc. can be used for effective and efficient awareness drives.

**COMPANY AND GOVERNMENT:**

Producers/manufacturers should be held responsible for the discarded E-waste and managing it in safe manner. The companies should start policies like take back service, etc. so that after using the Electrical and Electronics products, the consumer wouldn't discard them inappropriately. E-waste is made up of two components namely, valuable and non-valuable components. Components such as aluminum, copper, gold, palladium, silver etc. are valuable components and components like plastic, rubber, ceramics etc. are non-value components. Research suggest that the recycler would prefer to collect the obsolete batteries directly from the consumer rather than from the manufacture, only if, the incentive return to the consumer is less than 33.92%, the recycling fee is less than 6.46%, and the price of the recycled material is more than 31.08% of the price of the battery<sup>4</sup>.

They also have to maintain records of E-waste generated by them and make such records available with state pollution control boards or the pollution of controlled comitteess<sup>5</sup>. Government should provide the recycling centers so that no one can dump the E-waste in open area and cause environment pollution. Toll free telephone number is provided to get E-waste picked up from home and recycled<sup>6</sup>.

Various initiatives are taken for E-waste management by government, the ministry of environment and forest (MOEF) has notified the E-waste management rules.

“The Central Pollution Control Board (CPCB) with the help of IRG-Systems South Asia Private Limited (IRGSSA) prepared a status report on “Management, Handling, and practices of

E-waste Recycling in Delhi” during the year 2004-2005. Based on these studies it was realized that guidelines for Environmentally Sound Management (ESM) of E-waste is very much essential. As a first step towards ESM, guidelines have been published. The hazardous waste (Management and Handling) Rules, 1989 was amended in 2000 and 2003. The rules have been notified under environment (Protection) act, 1986 which talk about E-waste also. The hazardous waste (Management, Handling and Trans boundary Movement) Rules, 2008 also has been notified under environment (Protection) Act, 1986, which deals with E-waste<sup>7</sup>.

#### ORGANIZATION AND NGO'S:

Due to uncontrolled disposal and burning of electrical and electronic waste, the involvement of Non-Governmental Organizations (NGOs) play a vital role in it. Saahas, the NGO involved in this pioneering effort, plans to hold campaigns in government offices to create awareness about E-waste and the need to dispose it safely<sup>8</sup>.

#### IMPACTS:

Direct disposing, burning and recycling of E-waste in open areas affect both humans and environment badly. As compare to municipal solid waste, E-waste is much more hazardous to humans and environment because it contain thousands of components made of deadly chemicals like lead, cadmium, chromium, mercury, PVC (polyvinyl chlorides) and antimony etc.

Long term exposure of these toxic substances damage the nervous system, kidney, bones, reproductive and endocrine systems and some of them are carcinogenic and neurotoxic. Directly disposing of E-waste into the landfills contaminates the soil and ground water because it produces toxic leachate (liquid form) which is much more harmful than municipal solid waste. About 25000 workers are employed to scrap-yards in Delhi alone, where 10,000 to 20,000 tons of E- waste is handled every year, with computers accounting for 25 % of it<sup>9</sup>.

Psychologically it is not preferred by any person to have waste of any kind including E-waste loitering around him or her. We all like to live in clean and green society.

Scientists who have experimentally determined in Guiyu, China (one of the popular E-waste recycling destination) have observed that because of recycling of E-waste, high lead content is found in the blood of workers. Children aged between 1-6 years living in Guiyu are found to be suffering from various types of anomalies in their brain due to high blood lead levels (BLLs) as compare to their neighboring town of Chendian, where there is no E-waste processing.

Guiyu had high incidence of skin damage, headaches, vertigo, nausea, chronic gastritis and gastric, duodenal ulcers, all of which may be caused by the primitive recycling processing of E-waste<sup>10</sup>. Children are particularly vulnerable to lead poisoning more so than adults because they absorb more lead from their environments<sup>11,12,13,14,15,16,17</sup>.

#### POLICIES:

It can be classified into two groups i.e. national and international.

At the national level the MOEF, India had notified the E-waste management rules for the first time. Since then several policies and initiatives have been launched by Indian government. The E-waste (management and handling) Rules, 2011 recognized the producers liability for recycling and reducing e-waste in the country. This rule came into effect in May 1, 2012. This rule come under Environment Protection Act(EPA).

Internationally: Switzerland was the first country in the world where an official e-waste management system was established and operated. Two different recycling systems are active in the country. One is run by SWICO Recycling Guarantee (The Swiss Association for Information, Communications and Organizational Technology) and manages the “brown” electronic equipment (e.g. computers, televisions, radios, etc.), while the other is run by S.EN.S (Stiftung Entsorgung Schweiz System) and manages the “white” electrical equipment (e.g. washing machines, refrigerators, ovens, etc.)<sup>18</sup>.

#### RECOMMENDATIONS:

- Public should be made aware of the hazardous substances present in E-waste.

- They should not discard, dump and burn it openly in the air because it directly affects humans, animals and the environment.
- Awareness in the public should be there through various means of communications like newspaper, posters and booklets etc.
- The government should provide the suitable recycling yards/centers to facilitate recyclers and prevent them from toxic and harmful side effects of their profession.
- Government should ban those companies or manufactures which are using lead-acid batteries in their products.

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