

E-WASTE MANAGEMENT IN INDIA

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Abstract: *The electronics industry is the world's largest and fastest growing manufacturing industry. It has played a significant part in socioeconomic and technological growth of societies. But E-waste is now rapidly growing problem in the world with rapid growth of technology. E-waste or Electronic waste refers to electric or electronic equipments that have worn out or have reached their end of life. E-waste is often misinterpreted as related to the old computers or IT equipments in general, while the synonymous term Waste Electrical and Electronic Equipment (WEEE) also used in the international literature. E-waste contains substances like computer, cell phones, refrigerators, air conditioners, washing machines etc. Currently e-waste management in India encounters many challenges like recycling, poor awareness about issues related to e-waste. This paper attempts to provide a brief insight into the concept of E-waste and its management strategies in India and also to find out the environment and health concerns attached to it. The other purpose is to provide some suggestions and recommendations to improve e-waste management.*

IndexTerms: *E-waste management, Extended Producer Responsibility, Management Techniques, Impact on Environment.*

Introduction

Electronic industry is fastest growing industry in the world. As industry is growing faster outdated electronic components are replacing with upgraded technology products resulting in piling up of e-waste. Today we can see the spectacular developments and enhanced quality of our lives. At the same time, these advances have led to many problems including wastes generated from electric products. The problem of E-waste has become a major threat to the world. E-waste consists of waste electronic or electrical components that are now no longer used or produced. E-waste contains thousands of substances like computer, cell phones, refrigerators, air conditioners, washing machines, VCRs, audio video components and various household devices. These electronic components contain harmful products like lead, cadmium, beryllium which are toxic, carcinogenic and dangerous to environment and human health. In the last ten years, e-waste has become a global issue. India too, generates a large quantity of electric waste every year that India has become fifth largest producer of E-waste.

Whenever we think of waste, we think in terms of garbage or solid/semi solid waste and not anything else. Compared to conventional municipal wastes, certain components of electronic products contain toxic substances which can generate hazards to the environment as well as to human health. According to Environment ministry of India, 1.7 million MT of e-waste is generated annually in India. India has become the fifth largest generator of E-waste globally with unorganized market of about 95% dealing with E-waste. In the absence of proper management mechanisms, Mumbai has become largest E-waste producer in India, followed by Delhi. While Bengaluru, the IT capital of India is also a junk yard of electronic wastes.

As per the current E-waste rules, 2016, firms concerned are supposed to collect 20 per cent during 2018-19, 30 per cent during 2019-20 and so-on.

Pollutants in E-Waste and their impacts on health and environment

Major pollutants and their occurrences in waste electrical and electronic equipments:

- **Lead:** Lead rechargeable batteries, transistors, PVC
Impacts: i) Lead attack the brain and central nervous system to cause coma and even death.
 ii) Lead can affect children's brain development resulting in reduced IQ.
 iii) Lead causes Anemia, hypertension, toxicity to reproductive system.
 iv) Lead affects the central nervous system of animals and inhibits their ability to synthesize red blood cells.
- **Copper:** cables, circuits
Impacts: i) Excess copper intake cause stomach upset, nausea and diarrhea.
 ii) It can cause liver and kidney damage and even death.
 iii) It can interrupt activities in soil.
 iv) Decomposition of organic matter may seriously slow down because of this.
- **Cobalt:** Insulator
Impacts: i) it can cause nausea and vomiting.
 ii) Thyroid damage.
 iii) Heart problems, vision problems
- **Cadmium:** Batteries, CRTs, circuit boards.
Impacts: i) It can result in fever and muscle pain.
 ii) It can damage lungs.
 iii) It can result in kidney, bone and lung disease.
- **Barium:** Electron tubes, Lubricant additives.
Impacts: i) Breathing difficulties.
 ii) Increased blood pressure.
 iii) Muscle weakness;
 iv) Swelling of brains and liver.

- **Zinc:** Steel, Brass, Alloys, rechargeable batteries.
Impacts: i) Danger to unborn and new born children.
ii) Skin Irritation.
iii) Nausea and Anemia
iv) Disturb the metabolism.
- **Mercury:** LCDs, Switches, Batteries in clock.
Impacts: i) Muscle weakness
ii) Impairment of speech, hearing, walking.
iii) Changes in nerve responses.
iv) Poor performance on tests of mental function.
- **Nickel:** Alloys, batteries, semiconductor.
Impacts: i) Respiratory failure.
ii) Sickness and dizziness.
iii) Heart disorder.
iv) Birth defects.

Management Techniques used in India

Currently, e-waste management in India encounters many challenges like recycling, poor awareness about how to reuse this waste. The e-waste management strategies used should address issues from production and trade to final disposal. This should include proper training, legislations and guidelines for all involved. All the stakeholders in this e-waste chain should recognize their responsibility about safe management of e-waste. These stakeholders are manufacturers, suppliers and consumers which play a significant role in management of e-waste.

Extended Producer Responsibility

The Extended Producer Responsibility (EPR) is an environmental policy approach in which a manufacturer of the product is responsible for post consumer stage of the product's life cycle, including its final disposal. The greater the ability of the stakeholder to influence the environmental impacts of the product system, greater the share of responsibility for addressing those impacts should be. Consumers can affect the environmental impacts of products by choosing environment friendly products, proper maintenance and environmentally conscious operation of products and by proper recycling and disposal methods. Suppliers play a significant role by providing manufacturers with environmental friendly materials and components. Manufacturers can reduce the life-cycle environmental impacts by using appropriate product design, recyclable material choices.

Following techniques are used in India to manage e-waste:

- **Reusing:** Reusing and Recycling are one of the environmental friendly ways of dealing with E-wastes. They have been preferable because they increase the lifespan of the products and therefore imply less waste over time. Reuse constitutes direct second hand use, or use after slight modifications are made to the original functioning equipment like memory upgrades etc. However they end up as waste eventually as they have limited life span. E-waste is also sold in the market to scrap dealers who dismantle it instead of recycling. Dismantling e-waste products releases further toxic emissions in the air causing further pollution.
- **Recycling:** Those electronic components which cannot be repaired are recycled. Recycling has been the most feasible way to manage the E-waste. Recycling means to separate in different parts so that they can be categorized in to components that can be reused or that still need recycling process. Many components can be reused like plastic, metal, glass, mercury.
- **Land filling:** This is oldest method of waste management in India and also cost efficient. Land filling means dumping off waste material in to pits in land and cover waste with layers of soil. Toxic chemicals in electronic products can leach into the land over time or are released into the atmosphere. Leaching affects water and soil also and hence affects the whole ecosystem. Waste material is confined to as small area as possible. Every year millions of tones of e-waste end up in landfill.
- **Incineration:** It involves the combustion of organic substances of waste material at high temperature. It converts waste material in to gas, ash and heat. Unregulated burning releases toxins which are potent and damaging to human and animal health in many ways. Incineration does not completely destroy waste material instead it reduces the mass for disposal. The impacts of this informal method are worst on the workers who handle this waste.

Impacts of currently used E-waste Management techniques on Environment: Above described techniques have following impacts on environment:

- **Hazards due to Recycling:**
 - Methane gas produced during recycling can cause global warming.
 - Recycling equipments are cost effective.
- **Hazards due to Land Filling:** Land filling is not environmentally safe method for biologically degradable substances like Cd, CFC, Hg. Some other hazards of land filling Method:
 - Toxic substances can reach in to soil, plants and water, and become environmental hazards.
 - Acid formation from solid waste produced organic acids at high concentration.
 - Gases produced from landfills damage ecosystem.
- **Hazards due to Incineration:**
 - Hormonal defects.
 - Higher incidence of cancer and respiratory problems.
 - Leads to health deterioration and environmental degradation.

However, Recycling is best method amongst all.

Suggestions: In India, e-waste collection, transportation, recycling, disposal is done manually by untrained labors. Due to poor awareness e-waste is thrown along with garbage or sold to scrap dealer. As this e-waste contains metals like copper, iron, steel so recycling of e waste is an important subject to recover these metals.

- Stop e-waste from abroad.
- Use cloud applications.
- Avoid purchasing unnecessarily electronic gadgets.
- Take equipments to the store for upgraded version.
- Electronics that are in good condition can be reused.
- Use rechargeable batteries.
- Choose products with greater recycled contents.

Conclusion

Latest electronic gadgets are becoming one of the essential lifestyle needs. However, most of them don't know what to do with old gadgets. Moreover, they do not even think about the link between fast obsolescence of e-products with the environmental and health impacts. It is essential to understand this link and make ourselves a responsible buyer. Level of awareness should be increased so that people can manage e-waste properly without affecting environment and human health. What is done with old electronic equipments is what is contributing to the e-waste problem. Every stakeholder in the e-waste management chain must fulfill his responsibilities by preferring the environment friendly methods on their level. Government should make laws and regulations for electronic devices to be properly disposed off. People can follow the companies which provide the best electronic waste recycling solutions like e-stewards. There is an emergent need to implement the existing policies and guidelines and practice for a healthy E-waste management system.

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