



## SURVEY ON E-WASTE REGULATION

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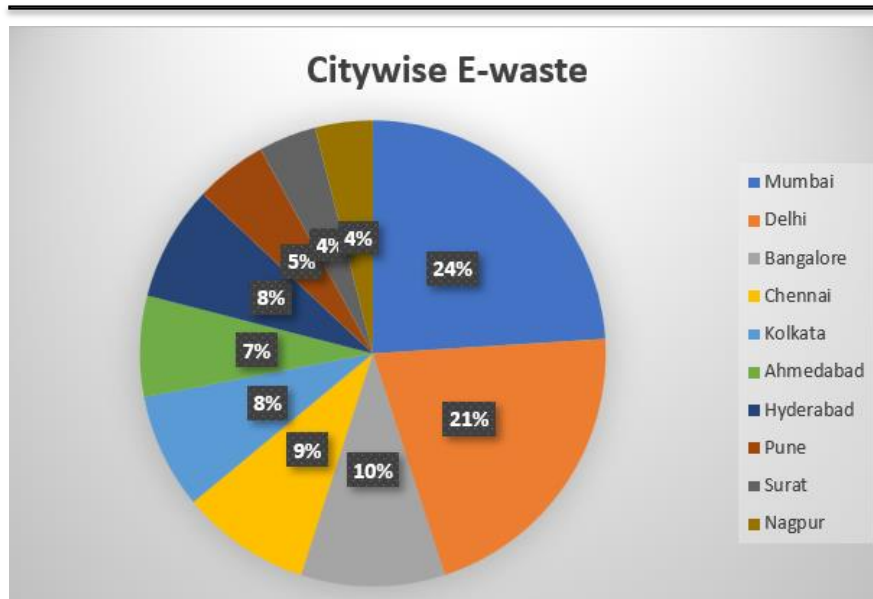
### ABSTRACT

*In order to reduce and manage the ever-increasing threat of E-waste to the environment and human health, the problem of E-waste has compelled environmental agencies of many countries to innovate, develop, and adopt environmentally sound options and strategies for E-waste management. This paper reviews the e-waste and environmental issues associated with discarded electronic devices. Additionally, the development and implementation of e-waste management plans in developing and developed countries, as well as potential environmental issues related to their disposal, are discussed. Also, the paper highlights the different health issues associated with e-waste generation.*

**KEYWORDS:** e-waste, landfilling

### INTRODUCTION

Our groove gives rise to a wide variety of different wastes emerging from different sources. Hence, Municipal waste is the waste that is being created by house folks which include organic waste, papers, metals, plastics, etc. One of the fastest and largest growing manufacturing industries in the world is the electronics industry. Every good thing comes with a price as a result of the growth of the electronics industry, a by-product form which is Electronic waste commonly known as E-waste or end-of-life(EOL) electronics, or Waste Electrical and Electronic Equipment (WEEE). Electronic appliances such as TVs, mobile phones, MP3 players, computers, DVD players, speakers, computer components, laptops, etc which have been disposed of or unwanted by their original users are Electronic waste. The waste which is produced by hospitals and other health care is commonly known as Biomedical waste units Which consist of waste sharps, discarded drugs, anatomical waste, etc. The waste that emerges from production processes, households, and industrial activities is known as hazardous waste. The problem of e-waste has become an instant and long-term consideration which leads to a considerable amount of environmental problems. According to the Central Pollution Control Board (CPCB), E-waste is expanding awfully, with a growth rate of about 31% annually. E-waste includes toxic components which are menacing to human health, such as mercury, polybrominated flame retardants, lead, cadmium, barium, etc. The effect of toxins on human beings includes heart, kidney, skeletal system damage, liver, and brain. In India, e-waste estimates comprise computer attachments (68%), telecommunication apparatus (12%), electrical tools (8%), health tools (7%), and household electrical scrap (5%). There are ten states which contribute 70% of the total e-waste generated in the country which is followed by Tamil Nadu, Uttar Pradesh, Karnataka, Gujarat, West Bengal, Delhi, and Madhya Pradesh, Punjab, and Andhra Pradesh. Of the top ten cities producing e-waste, Mumbai draws up at the top, ensured by Delhi, Bangalore, Ahmedabad, Chennai, Kolkata, Hyderabad, Surat, Puna, Nagpur, and Pune, As in the global context, it is evaluated that more than 53.6 million metric tonnes (Mt) of electronic waste is generated globally every year. The summons of managing e-waste in India is distinct from those of other countries. Consequently, Electronic and Electrical waste are hazardous to the environment and human health, and it also endangers different species. A management system has to be designed to provide environmental benefits from the collection, recycling, and mining of e-waste.

**Figure 1: Top ten Cities producing E-Waste**

## E-WASTE MANAGEMENT AND DISPOSAL SYSTEM IN INDIA

The rise of e-waste is extreme in India and there is no genuine disposal system in the country which has led to the limitless amount of e-waste. The matter of e-waste disposal, recycling, and reuse has become the field of serious discussion among economists. It was concluded that electronic waste is going to be a major issue in the near future due to an increase in the living standards of people. Currently, for the recycling of electronic waste, the country is highly dependent on the informal sector as only a few orderly e-waste recycling facilities are available. Approximately 95% of electronic waste is treated and refined in majorly urban slums of the country, where unskilled workers carry out procedures without protective tools, which not only deteriorates their health but also damages nature. India enacted its first environmental law namely, the (EPA) Environment production Act in 1986, which aims at making people responsible for producing pollution and damage to the environment. Under this Act, the state and central governments can enact legislation to shield nature and people from exposure to harmful waste of the environment, and any violation of this Act is liable for dismissal. The consequence of improper disposal of electronic waste affects air, soil, and water components of the environment. In addition, The Environment, Forest, and Climate change ministry broadcasted the E-Waste Management rules back in 2016, which are strict rules and are part of the government's commitment to nature governance. The rules aim at reuse and recovery of useful items from e-waste.

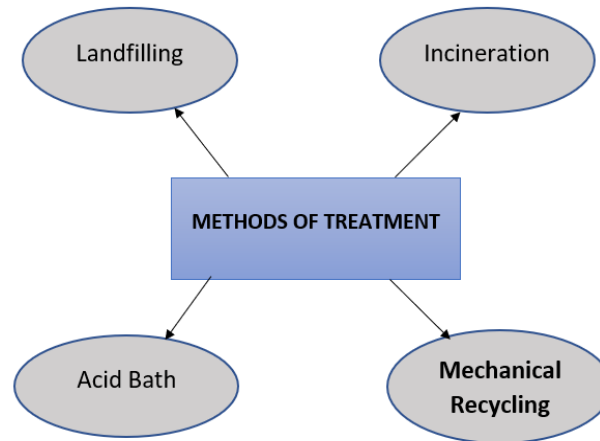
## E-WASTE CAN BE MANAGED IN FOLLOWING SMALL WAYS

- 1) Donating and reselling old working devices instead of throwing them away.
- 2) Giving back e-waste to electronic companies, as many companies accept old products with the aim of recycling and modifying them.
- 3) Buying Environment friendly electronic items.
- 4) Some damaged tools are recyclable, like laptops, mobiles, calculators, etc.
- 5) Keeping products clean so that products' life can be exceeded.

## DIVERSE METHODS OF TREATMENT AND DISPOSAL SYSTEMS ARE AVAILABLE WHICH INCLUDES

- 1) Landfilling: along with other municipal waste, e-waste is also openly burnt leaking toxic and hazardous elements into the atmosphere.
- 2) Incineration: Under this method, the waste is burned at a high temperature in designed incinerators, in which the volume of waste is being reduced and the energy produced is taken into use.
- 3) Acid bath: In this procedure, the e-waste is soaked in powerful sulphuric, hydrochloric acid solutions that take away the metal from the e-waste. The recovered metal is additionally reused to form other products.

- 4) Mechanical Recycling: This is the most eco-friendly practice in which the dry separation method is used to recover used motherboard, circuit boards, etc from e-waste and then recycle them. This is done without harming nature.



**Figure 2 : Methods of Disposal System**

## E-WASTE MANAGEMENT IN WORLD

The most important element of e-waste management system around the world are collection , treatment and disposal of e-waste. Almost all the developed nations own some framework which contains sets of rule and regulations , conventions, directives which is aimed at proper collection, treatment and recycling of e-waste, as well as better disposal of non-recyclable waste materials keeping the damages minimum to environment.

The majority of discarded electronics are disposed of through landfills. These electronic items are disposed of with other municipal garbage or are burned openly which cause toxic substances in air.

Compared to developed countries, underdeveloped or developing countries lack a proper e-waste disposal system. In developing countries, the informal sector employs unsafe techniques and practices, resulting in low material recovery.

A comparison of typical disposal systems in developed and developing countries are as follow :-

Developing and transition countries manage e-waste differently. E-waste management guidelines and information are lacking in developing and transitional countries. Most e-waste is disposed of in less complex ways, such as burning and dumping to uncontrolled landfills, which cause significant environmental pollution and occupational exposure to chemicals derived from e-waste.

The most common method to treat and dispose of e-waste are as follow:-

- 1) **Extended Producer Responsibility (EPR)** is a policy that approaches those producers who have significant responsibility for the treatment or disposal of post-consumer products.
- 2) **3Rs (Reduce, Reuse, and recycle)** E-waste often carries metals such as gold, copper, and nickel and rare materials of deliberate value such as indium and palladium. **Most of the precious metals could be recovered, recycled, and used as valuable sources of secondary raw materials.**

A table for differentiating ways of e-waste management in developing countries and developed countries.



Developed Countries	
Japan	Japan promotes a 3R system, where Retailers are required to gather used products, customers are chargeable for funding exercise and transportation by paying recycling fees to distributors. Manufacturers are required to set up pretreatment plants and collection networks. Further, bulk business consumers engage in treatment of electronic waste at their own expenses and return to producers by paying required recycling fees. Many laws have been enacted for managing e-waste in Japan.
Singapore	In Singapore, distributors have started commercial take-back schemes which involve setting prices of used mobile phones based on wear and tear. Respectively, 95% of used phones have been taken back. Second-hand items market is very well developed in Singapore, this all manifests efficient collection of e-waste products.
Switzerland	The first country in the whole World to develop an organized as well as formal waste management system for recycling and scrapping e-waste. Here, the extended producer responsibility principle is used to handle waste which makes retailers and exporters responsible for recycling and disposal. Municipalities are responsible for handling collection points for consumers while producers are responsible for bearing the costs of collection and treatment.

Developing Countries	
South Korea	South Korea has passed an act on the promotion of Conservation and Recycling the resources. The act aims at reducing the amount of e-waste which ends up in landfills and incinerators, and improving the performance and lifespan of such electronic devices.
China	China, one of the world's giftees of electronic items, is facing a huge burden of increasing e-waste generated domestically, there is a steady flow of imported e-waste entering the country from abroad, and their way of managing includes where dealers travel from door to door to buy unused electronic items and later reselling them to the informal sector. Further, the recycling process is done using methods such as scrapping metals by hand, burning toxic elements, disposing of parts in bodies of water, and much more.

## HEALTH IMPACTS

E-waste carries countless chemicals which are harmful to human and ecological health. It holds many risky metallic contaminants like lead, beryllium, mercury, cadmium, and brominated flame-retardants. These materials are disturbing and are difficult to recycle sustainably, even in many developing countries. E-waste gives distinct exposure because people are exposed to the complex mixture of chemicals from different sources and through different routes.

Out of these many toxic metals, Lead is mostly used in E-devices which results in various health issues due to environmental pollutants. Lead inscribes biological systems through food, air, soil, and water, which later makes children prone to lead poisoning. Mercury is poisonous in various forms which include inorganic, organic, and elemental. It contains an organic compound named methyl which has been proved to be a neurotoxicant that damages the brain and also causes enduring damage to the lungs, kidneys, and central nervous system.

For a childbearing mother, exposure to toxic e-waste can affect the development of her unborn child for the rest of his/her life such as premature births can happen or stillbirths. Elevated toxic chemicals negatively affect neonatal growth indices and hormone levels in exposed populations.



E-waste generally includes combinations of harmful materials and components down to microscopic levels. The wastes are fragmented down not just for recycling but for recoverable materials like iron, plastic, copper, etc. Though e-waste contains hazardous substances that are harmful to human health, they get strains into the soil, water, and air during treatment, and later adversely affect human health and ecology.

The World Health Organization launched the initiative in 2013, on E-waste and child health which aims at knowledge and awareness of health impacts; improving the health sector, tracking progress, and promoting waste policies.

## CONCLUSION

The whole study concludes that electronic waste is harmful as well as hazardous to nature and human health, which needs proper treatment to attain environmental sustainability. The escalating amount of e-waste is related to a lack of knowledge and capability to solve the problem.

Also, the challenges of handling electronic waste in India are contrasting to those in other countries, both developing and developed countries.

E-waste series has resulted in greater suitable use of sources inclusive of technical knowledge and technology for higher E-waste management. The Indian E-waste machine calls for numerous reforms for the environmentally sound and controlled clinical processing of E Waste. Further, studies, concerns, and studies are required for reforming the policies, legislature, and legal guidelines associated with E-waste to fit the Indian scenario. Also, there exists a want for locating the maximum environmentally pleasant recycling/disposal approaches and remedy alternatives for managing the E-waste containing diverse poisonous and dangerous materials.

Don't be so eager to buy more and more, if you cannot dispose of the old things properly. Be a part of the solution rather than increasing the pollution.

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