IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

E-WASTE MANAGEMENT

Harshdeep Kaur Sohal

Abstract:

Electronic waste or commonly called as e waste is a waste that is formed by the disposal of the electronic goods. Increase in population purchasing power and the development of technology is a leading cause towards E-Waste Management. Electronic scrap components such as CPUs(central Processing Units), contain potentially harmful substances such as lead, cadmium, beryllium and brominated flames. This paper aims towards the research done on E-waste and its treatment that includes various processes and steps. The e-waste management in the developed and the developing countries is done by going through various challenges and hurdles. To label the issue of e-waste management in a justifiable method, the concept of EPR (extended producer responsibility) will be helpful.

Keywords: E-Waste, CPUs, EPR (extended producer responsibility)

1.Introduction

These days, Fastest-growing technology is the electronic technology that includes the electrical and the electronic devices such as refrigerators, televisions, ovens, hairdryers and many more. E-waste is something that is referred to as the discarded electrical and electronic devices, the devices that are destined to refurbishment, resale, reuse and recycle. The Electronic waste now-a-days is the most commonly generated waste as almost all the world population is tech-dependent. There has been a massive increase in the e-waste over the years. Between the year 2010-2019 e-waste generation increased by roughly 60 percent, and this growth shows no signs of slowing down. Around year 2030, the yearly e-waste generation is on the track to reach a mind-blowing 75 million metric tons e-waste. E-waste management is necessary as well as important these days because a large amount of e waste is being generated everyday in different parts of the country as well as the world. Managing e-waste sounds as the easiest task to do but it is much more than that. E-waste management requires a lot of thinking, processing and then comes the most difficult task of the process i.e., implementation. Talking about India, In India, solid waste management, with the emergence of e-waste, has become a complicated task. Around 24,990 workers including children are involved in coarse dismantling units in Delhi solitary where 10,000–21,000 tonnes of e-waste is taken care every year by desolate hands. The 4 R's of e-waste management are the:- Reduce, Reuse, Recycle and Recover. As the e-waste is growing at an alarming rate, the need of proper e-waste management has been realised. It is important to review the public health risks and strategies to battle this growing . The E-waste management awareness has emerged since 2002 in the "European Union Waste of Electronic and Electrical Equipment Directive".

2. LITERATURE REVIEW

The paper aims to analyse and define the cores areas of research done on the Electronic waste, commonly called as the E-waste. This paper also highlights the various management techniques and the steps taken to overcome and to control the generation of e-waste .Before Talking about E-waste management, let's first understand what exactly is meant by E- waste. E-waste refers to the Electronic waste generated globally everyday .E-waste

includes the unwanted electrical appliances or the appliances that are not working or are nearing the end of their useful life. The e-waste is being generated at an alarming rate these days which needs to be controlled and managed as early as possible. The e-waste management is a easy task if the steps or the processes are implemented properly and followed by each one of us with full dedication. The government has been implementing various e-waste management rules to control the e-waste. E-waste during recycling is risky as it contains various toxic substances that leads to toxicity and the pollution when burnt in the atmosphere. The constituents of e-waste includes the various substances such as the valuable metals like silver, gold, palladium and platinum, useful metals like zinc(Zn), copper(Cu), iron(Fe),and various others. As you can see the above pie chart, what we can infer this pie chart us that the main constituent of e-waste generated globally all over the world is Steel with a percentage of 29%, followed by glass with the percentage of 22%, then comes the plastic that constitutes 19% of the totally e-waste produced globally followed by aluminium (Al) 10%, lead (Pb) 8%, copper (Cu) 7%, zinc (Zn) 3% and the other metals with the percentage of 3%.

3. TYPES OF E-WASTE

The E-waste or the electronic waste can be classified into the following categories:

1. **MAJOR APPLIANCES**: Air conditioners, Washing Machines, induction, fans, Dryers, etc.
2. **SMALL APPLIANCES**: Vacuum cleaners, irons, Blenders, Fryers. kettles, water purifiers, toasters, etc.
3. **COMPUTER AND TELECOMMUNICATION APPLIANCES**: Laptops, PCs, Telephones, Mobile phones, charger smart watches etc.

Apart from the types of e-waste listed above, there are various types of e-waste such as electronic scrap components like CPU's (Central processing unit) contain the potentially harmful substances such as cadmium, lead, mercury and brominated flame components. Some devices such as CRTs also contain some harmful substances those if generated into environment, can be a threat to the living population as well as the environment and nature. It is a fact that an device running on electricity will definitely contain certain harmful and pollution-causing elements such as lead, cadmium, beryllium, mercury and various others. Some more types of e-waste are given below in table 3.1:

S.NO	SOURCE	WASTE GENERATORS	TYPES OF SOLID WASTE
1.	Residential	Single and multifamily dwelling	Cardboard, papers, plastic wastes, food wastes, etc.
2.	Institutional	Schools, colleges, prisons, hospitals and government centres	Plastics, Paper, Glass, Metals, Wood, Food and hazardous wastes
3.	Industrial	Fabrication, light metals, heavy metals, construction sites	Ashes, special wastes, construction wastes, Arsenic, Chromium
4.	Agriculture	Crops, orchis, vineyards, feedlots, farms	Spilled food waste, Agriculture wastes

5.	Municipal Waste	Municipal waste from homes, institutions and small businesses	Glass, Metals, Sanitary waste in septic tanks,
6.	Canteens	Food Wastes	Fruit and Vegetable leftovers, Food leftovers

4.CAUSES OF E- WASTE

We know that the e-waste is bring generated today at an alarming rate. But what is the reason behind the generation of such a huge amount of e-waste? Talking about the causes of e-waste, there are many including the changes in style, fashion and status, end in the helpful life of the device, not taking precautions while handling these devices and various others. Due to the technological advancement, many electronic devices becomes outdated and out of fashion, within a short period of time, creating a large amount of unwanted excessive waste of electronic products. The mass production and large-scale manufacturing of new models of various electronic device also contributes towards the e-waste. The growing quantity of electronic products being produced by businesses and purchased by people is the primary cause of electronic trash. The need is great. It is frequently less expensive to buy a replacement when electrical products or appliances break than to fix the original. In some cases, like when a new model of a mobile phone is released, people like to upgrade to that model. To put the problem of electronic waste in perspective, 53.6 million tonnes of e-waste were produced globally in just 2019 alone.

4.1SOURCES OF E-WASTE

The various sources of e-waste are listed below:

1.large home appliances such washing machines, dishwashers, refrigerators and freezers, and televisions.

2.Small appliances used in the home, such as toasters, coffee makers, irons, and hair dryers.

3.Equipment for information technology (IT) and telecommunications, such as desktop computers, laptop computers, mobile phones, printers, scanners, and photocopiers.

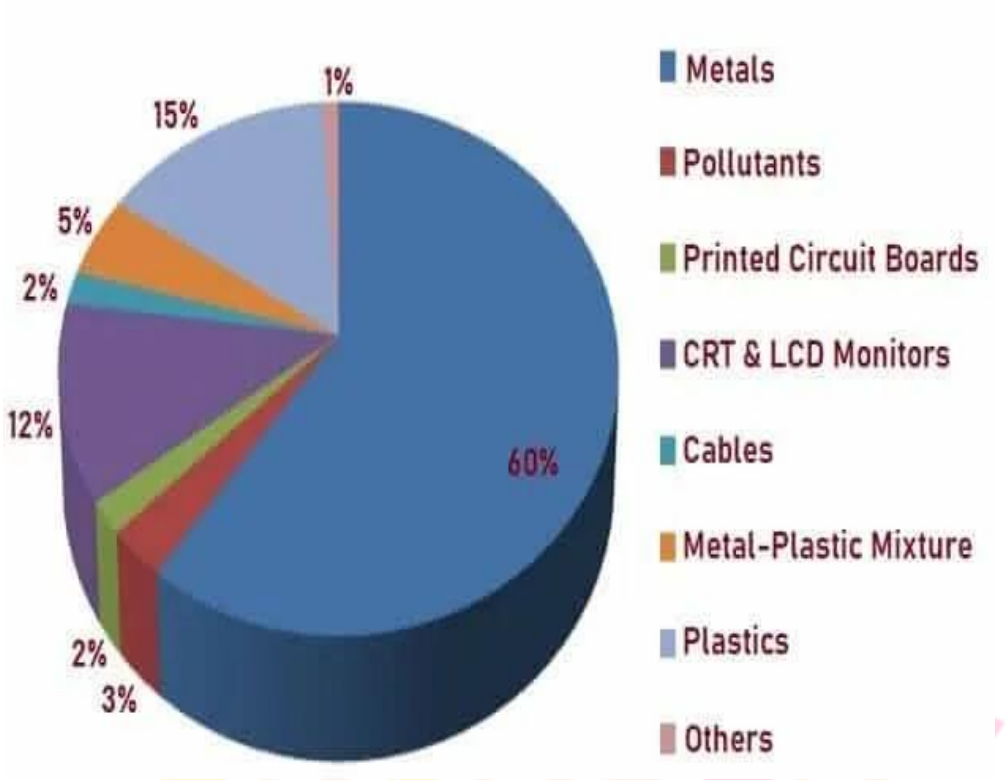
4.Lighting fixtures like fluorescent lights.

5.Tools that are electronic or electrical, such as portable drills, saws, screwdrivers, etc.

6.Toys, leisure items, and sporting goods.

7.Instruments for monitoring and controlling.

8.Automated dispensing systems.



As you can see from the above pie chart, it is clear that the main source of e-waste are the metals with a percentage of 60%, followed by plastics 15%, CRT and LCD Monitors(12%), cables(2%), Metal-Plastic Mixture(5%), Pollutants(3%), Printed circuit boards(2%) and various others(1%). Antimony, arsenic, beryllium, cadmium, chromium, cobalt, indium, lead, mercury, nickel, and thallium are a few of the hazardous metals used in electronics. Other causes of the enormous production of e-waste include I the quick development of the information and communication sectors, (ii) the adaptability of electronic equipment, (iii) the quick development of current technology, and (iv) the trend of falling electronic device prices. In 2030, the generation of e-waste is predicted to increase by almost 50%.

4. EFFECTS OF E-WASTE

The Effects on AIR:

Contamination withinside the air happens whilst e-waste is informally disposed with the aid of using dismantling, shredding or melting the materials, liberating dirt debris or toxins, which includes dioxins, into the surroundings that motive air pollutants and harm breathing fitness. E-waste of little fee is frequently burned, however burning additionally serves a manner to get precious metallic from electronics, like copper. Chronic illnesses and cancers are at a better hazard to arise whilst burning e-waste as it additionally releases first-rate debris, that could tour lots of miles, developing severe poor fitness dangers to human beings and animals. Higher fee materials, which includes gold and silver, are frequently eliminated from enormously incorporated electronics with the aid of using the use of acids, desoldering, and different chemicals, which additionally launch fumes in regions in which recycling isn't always regulated properly. The poor results on air from casual e-waste recycling are maximum risky for people who manage this waste, however the pollutants can make bigger lots of miles far-far from recycling sites.

The Effects on SOIL:

When incorrect disposal of e-waste in everyday landfills or in locations in which it's miles dumped illegally, each heavy metals and flame retardants can seep without delay from the e-waste into the soil, inflicting infection of underlying groundwater or infection of plants that can be planted close to with the aid of using or withinside the

place withinside the future. When the soil is infected with the aid of using heavy metals, the plants grow to be prone to soaking up those toxins, which could reason many ailments.

When huge debris are launched from burning, shredding or dismantling e-waste, they fast re-deposit to the floor and contaminate the soil as well, because of their length and weight. The quantity of soil infected relies upon on a selection of things along with temperature, soil type, pH tiers and soil composition. These pollution can stay withinside the soil for an extended time frame and may be dangerous to microorganisms withinside the soil and plants. Ultimately, animals and natural world counting on nature for survival will turn out to be eating affected plants, inflicting inner fitness problems.

The Effects on WATER:

After soil contamination, heavy metals from e-waste, along with mercury, lithium, lead and barium, then leak via the earth even similarly to attain groundwater. When those heavy metals attain groundwater, they finally make their manner into ponds, streams, rivers and lakes. Through those pathways, acidification and toxification are created withinside the water, that's dangerous for animals, flowers and groups although they may be miles farfar from a recycling site. Clean ingesting water turns into complicated to find.

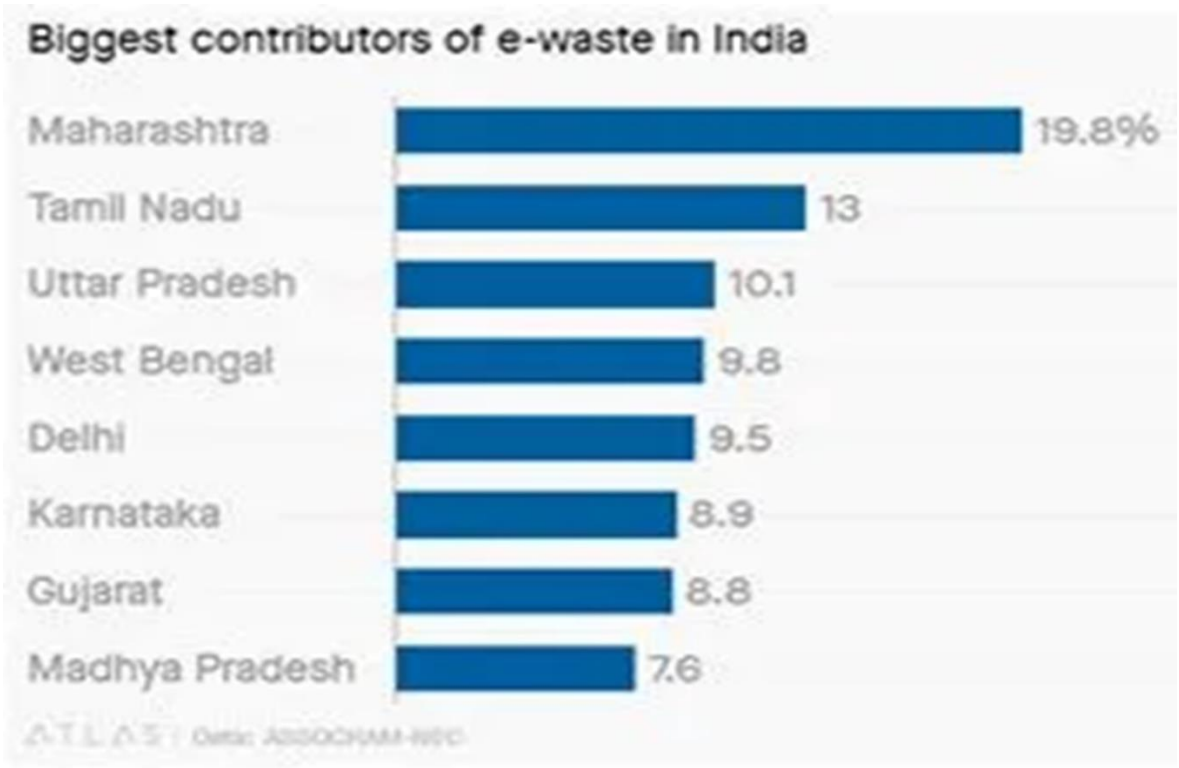
Acidification can kill marine and freshwater organisms, disturb biodiversity and damage ecosystems. If acidification is found in water supplies, it could harm ecosystems to the factor in which recuperation is questionable, if now no longer impossible.

The Effects on HUMANS:

As mentioned, digital waste incorporates poisonous additives which are risky to human fitness, including mercury, lead, cadmium, polybrominated flame retardants, barium and lithium. The poor fitness consequences of those pollution on people consist of brain, heart, liver, kidney and skeletal device damage. It also can appreciably have an effect on the worried and reproductive structures of the human body, main to disorder and beginning defects. Improper disposal of e-waste is unbelievably risky to the worldwide environment, that's why it's so essential to unfold focus in this developing trouble and the threatening aftermath.

To keep away from those poisonous consequences of e-waste, it's far essential to nicely e-cycle, in order that gadgets may be recycled, refurbished, resold, or reused. The developing movement of e-waste will most effective get worse if now no longer knowledgeable on the right measures of disposal.

6. E-WASTE PRODUCING STATES



The biggest contributor of e waste in India is Maharashtra with a percentage of about 20%, followed by Tamil Nadu(13%), Uttar Pradesh(10.1%), West Bengal(9.8%), and others.

7. CONCLUSION

Review on e-waste studies found that the trend of studies subject matter was shifted to using cyber-bodily gadget (CPS) to sell symbiosis among the stakeholders.Another emerged subject matter is locating environment-friendly recuperation technique which can sell e-waste as resources for production (Bath et al., 2012; Kong et al., 2012; Liu et al., 2016; Wu et al., 2017; Cyganowski et al., 2017; Sahajwalla and Gaikwad, 2018). However, the implementation of the aforementioned studies turns into destiny goals in growing countries because of much less studies and restricted subject matter regarding e-waste and lag of generation development. There are some perspectives regarding each subject matter studied for developing countries. Lack of data on EEE traceability complicates the take a look at on e-waste technology and flow. Although some researches have modelled e-waste technology quantitatively, the state of affairs of EEE reuse across the diverse financial region in a rustic need to be considered. Markov version or semi-Markov version is recommended to version the modern situation and expect the life of EEE utilization in outcome of numerous degrees of product Analysing the flow of EEE products sold in growing countries is still a challenge due to smuggling, unrecorded neighbourhood production, and product traceability (Kojima, et al., 2009; Panambunan-Ferse and Breiter, 2013; Nguyen, et al., 2017). How to evaluate the product existence cycle of electronic products from fabric extraction to the disposal or return stays unclear. However, existence cycle evaluation will offer a quantitative review on product path and can be implemented to pick out the control strategy, which gives the bottom bad effect at the environment. According to the writer's knowledge, financial evaluation on e-waste capability recuperation while regarding the cost has not been conducted. Even further, the financial evaluation of the capability revenue of e-waste recuperation has not been studied in growing countries. This take a look at will additionally assist to determine on the motivation gadget to sell e-waste closed-loop control gadget (Kojima, et al., 2009; Gnoni, et al., 2017; Shevchenko, et al., 2019). Based on previous studies, the motivation gadget will sell consumers' participation, which is one of an important factor in e-waste control (Zeng, et al., 2016). Therefore, purchaser behavior regarding e-waste disposal

and return-to-manufacturer gadget needs to be explored. In conclusion, there are lots of studies opportunities to be explored to improve e-waste control and practice in growing countries, especially in Indonesia.

8. REFRENCES

1.https://www.researchgate.net/publication/342685930_E-Waste_Current_Research_and_Future_Perspective_on_Developing_Countries

2.https://elytus.com/blog/e-waste-and-its-negative-effects-on-the-environment.html

3..https://tec.gov.in/pdf/Studypaper/e%20waste%20management_11.08.pdf