IJARETY

International Journal of Advanced Research in Education and TechnologY (IJARETY)

Volume 11, Issue 2, March 2024

Impact Factor: 7.394

www.ijarety.in editor.ijarety@gmail.com

International Journal of Advanced Research in Education and TechnologY(IJARETY)

| ISSN: 2394-2975 | www.ijarety.in| | Impact Factor: 7.394| A Bi-Monthly, Double-Blind Peer Reviewed & Referred Journal |

|| Volume 11, Issue 2, March 2024 ||

DOI:10.15680/IJARETY.2024.1102003

Study on E-waste Generation and Management

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ABSTRACT: The rapid growth in waste generation is a major byproduct of increasing consumption, as per the world bank (2012) estimates by 2025, 4.3 billion urban residents will generate 2.2 billion tons per year of municipal solid waste; out of that IT and electronics industry contributes major waste due to changing lifestyle of people, technological development, low cost availability of electronic gadgets and hunger race has led to increased rates of consumption of electronic products. The high obsolescence rate, change in application systems, new technological development and peer pressure has led to increased generation of waste steam of Electronic and Electrical Equipment. E-waste contains many hazardous constituents that may negatively impact the environment and affect human health if not properly managed. Various organizations, bodies, and governments of many countries have adopted and/or developed the environmentally sound options and strategies for E-waste management to tackle the ever growing threat of E-waste to the environment and human health. The growing amount of E-waste is not only an environmental issue but also a source of precious metals and rare earth elements. Since waste management plays major role in environment protection and sustainability; the adverse impacts of improper waste management are very serious and need to be documented.

KEYWORDS: Waste Management, E-waste, Environment, Sustainability.

I. INTRODUCTION

E-waste, comprising discarded electronic devices, has become a significant environmental and health concern globally. With the rapid growth of technology adoption and consumption, countries like India face substantial challenges in managing e-waste effectively. This case study delves into the dynamics of e-waste generation in India, exploring its causes, impacts, and potential solutions. Reduction in the cost of electronic devices and rapid change in technology are two main factors for increase in sale of electronic devices in India. Frequent change in technology is also one of the major factors. Due to frequent change in technology the life span of these electronic devices is going shorter day by day. Causes of E-waste Generation the rapid growth of technology adoption and consumption, coupled with a reduction in the cost of electronic devices, are primary drivers of the increased sale of electronic devices in India. Furthermore, frequent changes in technology lead to shorter lifespans of electronic devices, contributing to the generation of e-waste. E-waste contains various hazardous substances such as heavy metals (lead, cadmium, mercury), plastics, and brominated flame retardants. Improper handling and recycling of e-waste, especially in the non-formal sector using primitive methods, can lead to environmental contamination and pose health risks to humans. Contamination of rivers, wells, and other water sources, as well as air pollution from the emission of gases and burning of e-waste, are significant concerns. The hazardous substances found in e-waste, such as lead, cadmium, and mercury, can cause serious health issues when exposed to humans. Inhalation of gases during recycling, skin contact with hazardous substances, and exposure to acids used in the recovery process can all pose health risks to workers involved in e-waste recycling. Effective management of e-waste requires a multi-faceted approach involving legislation, regulation, awareness campaigns, and infrastructure development. Implementing proper recycling methods in the formal sector, raising awareness about the hazards of e-waste, and promoting the adoption of sustainable practices are essential steps towards mitigating the environmental and health impacts of e-waste.

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II. CURRENT PROBLEMS

Even though India has increased e-waste collection and processing by four times in four years, 95% of e-waste is illegally handled by the informal sector. The informal waste pickers, known as kabadiwalas, do not follow environmental standards and burn materials that cannot be recycled or divert to landfills, potentially causing severe environmental damage and health hazards. Furthermore, recyclers in the informal sector use rudimentary recycling techniques that can release toxic pollutants into the surrounding environment. Many hazardous substances in e-waste are extremely dangerous to human health and the environment.

As per the source after the United States and China, India is the world's largest producer of e-waste, producing 3.23 million tonnes per year.

In 2020-2021, India processed 3.4 lakh tonnes of e-waste. According to CPCB, the generation of plastic waste per year is increasing by 3%, and the generation of e-waste is even higher, with waste produced totalling 7.1 lakh tonnes in 2018-19 and 10.14 lakh tonnes in 2019-20. Every year, there is a 31% increase. There are only 468 authorised recyclers and 2,808 collection points in 22 states. The capacity of 468 recyclers is 13 lakh tonnes, which is insufficient to meet India's e-waste generation.

III. NEGATIVE EFFECTS

Air pollution is a big problem in India; nine out of the ten most polluted cities in the world are in India. Plastic and other low-value e-waste are frequently burned, releasing fine particles into the air. DE soldering is a technique for extracting gold and silver from e-waste materials that, if done incorrectly, can emit chemicals and harmful fumes. **80% of India's surface water is polluted, and sacred rivers Ganga and Yamuna are considered among the most polluted rivers in the world.** Dumping e-waste into landfills impacts surface and groundwater because harmful chemicals leach from landfills into surface water. Furthermore, toxic by-products of improper e-waste recycling will end up in sewers and city drains. These products can contaminate surface water if they enter local waterways.

IV. METHOD OF RECYCLING OF E-WASTE

- E-waste recycling is challenging because discarded electronic products are sophisticated devices consisting of varied proportions of Glass, plastic, and metal. The recycling process differs based on the material and technology employed.
- Collection and transportation: - Collection and transportation are the first steps in any recycling process, including E-waste. Recyclers place collection bins or electronics take-back booths in key locations and transport the material collected to recycling plants or centres.
- Shredding, Sorting and Separation: The collected material will be processed and separated into clean commodities to create new products. The first step in e-waste shredding is sorting and separating plastic from metals and internal circuits. E-waste is shredded into 100mm pieces before being sorted.
- A strong magnet separates iron and steel from waste streams on the conveyor.
- Mechanical processing is used to separate aluminium, copper, and circuit boards from the material stream, which is now mostly plastic. Glass is separated from plastics using water separation technology.
- The quality of extracted materials is improved by visual inspection and hand sorting.
- The final step in the separation process is to locate and extract any remaining metal remnants from the plastics to purify the stream even further.
- Following the completion of the shredding, sorting, and separation stages, the separated materials are ready for sale as usable raw materials for manufacturing new electronics or other products.

V. IMPORTANCE OF E-WASTE RECYCLING

- Electronic devices contain precious metals such as gold and silver; however, only 10% of those metals are recycled, with the remaining in the trash. We can make the world a better place by recovering precious metals.

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- When we recycle electronic waste, we are removing hazardous materials found in electronic products, such as mercury, chromium, and cadmium. These substances are hazardous to human life and also contain heavy metals.
- Poisonous materials harm the ecosystem, including plants, trees, and animals. They can also create natural disasters, resulting in human tragedy and loss; hence e-waste recycling is essential.
- The recovery of valuable materials from the recycling process reduces the demand for new raw materials.
- Using recycled material will also help reduce greenhouse gas emissions when new products known as "virgin material" are manufactured or processed.
- Electronic devices refurbished, reused, and donated to a worthy cause can also be kept out of landfills and protect the environment.

VI. CONCLUSION

Effective management of e-waste in India necessitates a multi-pronged approach encompassing policy interventions, technological innovation, stakeholder engagement, and public awareness. By adopting sustainable practices and leveraging emerging opportunities, India can mitigate the adverse effects of e-waste generation while harnessing the potential of a circular economy. Most of the e-waste is recycled in India in unorganized units, which engage significant number of manpower. Recovery of metals from PCBs by primitive means is a most hazardous act. Proper education, awareness and most importantly alternative cost effective technology need to be provided so that better means can be provided to those who earn the livelihood from this. A holistic approach is needed to address the challenges faced by India in e-waste management. A suitable mechanism needs to be evolved to include small units in unorganized sector and large units in organized sector into a single value chain. One approach could be for units in unorganized sector to concentrate on collection, dismantling, segregation, whereas, the metal extraction, recycling and disposal could be done by the organized sector.

REFERENCES

[1] Central Pollution Control Board. 2008. Guidelines for environmentally sound management of E-Waste. www.cpcb.nic.in/latest/27.06.08%20guidelines%20for%20E-Waste.pdf. Accessed 8 May 2016.
[2] CPCB (Central Pollution Control Board). N.D. Implementation of E-Waste Rules 2011: Guidelines. Accessed 3 May 2015. www.cpcb.nic.in/ImplimentationE-Waste.pdf. Accessed 3 May 2015.
[3] Government of Gujarat. 2014. Policy guidelines for condemnation/disposal of ICTE assets and management of eWaste for Gujarat State. https://gil.gujarat.gov.in/grs/eWaste_GR_dated_24.12.2014.pdf. Accessed 12 May 2016.
[4] GTZ-MAIT. 2007. e-Waste assessment in India: Specific focus on Delhi: A quantitative understanding of generation, disposal, & recycling of electronic waste. http://weeerecycle.in/publications/reports/GTZ_MAIT_E-waste_Assessment_Report.pdf. Accessed 8 May 2016.
[5] Herat, S. and P. Agamuthu. 2012. E-waste: A problem or an opportunity? Review of issues, challenges and solutions in Asian countries. Waste Management & Research 30(11): 1113–1129.
[6] Kwatra, S., S. Pandey, and S. Sharma. 2014. Understanding public knowledge and awareness on e-waste in an urban setting in India: A case study for Delhi. Management of Environmental Quality: An International Journal 25(6): 752–765.
[7] MoEF (Ministry of Environment & Forests). 2010. Report of the Committee to Evolve Road Map on Management of Wastes in India. www.moef.nic.in/sites/default/files/Roadmap-Mgmt-Waste.pdf. Accessed 8 May 2016.
[8] MoEF (Ministry of Environment & Forests). 2011. e-Waste (Management and Handling Rules), 2011. www.moef.nic.in/downloads/rules-and-regulations/1035e_eng.pdf. Accessed 3 May 2015.
[9] Palmer, K. and M. Walls. 1999. Extended product responsibility: An economic assessment of alternative policies. Resources for the Future Discussion Paper 99-12. Accessed 2 December 2016.
[10] Pradhan, J. K. and S. Kumar. 2014. Informal e-waste recycling: Environmental risk assessment of heavy metal contamination in Mandoli industrial area, Delhi, India. Environmental Science and Pollution Research 21(13): 7913–7928.
[11] Prasad, P. 2006. Environment protection: Role of regulatory system in India. Economic and Political Weekly 41(13): 1278–1288.
[12] Priyadarshini, K. and O. K. Gupta. 2003. Compliance to environmental regulations: The Indian context. International Journal of Business and Economics 2(1): 9–26.

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[13] Rajya Sabha. 2011. E-waste in India. New Delhi: Rajya Sabha Secretariat. http://rajyasabha.nic.in/rsnew/publication_electronic/E-Waste_in_india.pdf. Accessed 9 March 2013.
[14] Wath, S. B., P. Dutt, and T. Chakrabarti. 2011. E-waste scenario in India, its management and implications. Environmental Monitoring and Assessment 172(1–4): 249–262.

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