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E-Waste in India: The Dark Side of the Digital Age

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Abstract: The 18th century saw a new era in human civilization. As we enter the twenty-first century, the information and communication revolution has radically altered our lives. These spectacular modern developments have undoubtedly improved our lives. The massive amount of hazardous waste and other waste generated by electric products is one example. Dangerous to human and environmental health. So proper waste management protects livelihood, health, and the environment. It is a serious issue for modern societies that requires coordinated action. Inappropriate disposal of our high-tech revolution's fruits can be deadly. Devices have made many of our daily tasks easier. Rapid innovation and cost reductions have increased access to electronic and digital products. Globally, this has increased the use of electronic devices and equipment. The cities that generate the most e-waste in India are Ahmadabad, Hyderabad, Pune, Surat, and Nagpur. Ten states and 66 cities account for over two-thirds of all e-waste. India generated 1,015,861 tonnes of e-waste in 2019-2020. This is 33% more than in 2018-2019. In 2018, the country only made 3% and 12%. This study will try to understand e-waste and how it affects the environment and to what extent the government of India enacted legations for e- waste management

Keywords: E- Waste, Legislations, Effects, Agencies, Toxins And Techniques etc.

INTRODUCTION

While e-waste has a significant and growing impact, the majority of people are probably unaware of it. Toxicants such as lead and mercury leach into the environment as a result of insufficient recycling. Electronic waste (E-Waste) is a rapidly growing stream of waste generated by obsolete electronics and appliances (Arya *et al.,* 2018). Computers, televisions, phones, washing machines, refrigerators, and everything in between are all examples of electronic devices. The majority of these items aren't trash; they're simply out of date and have been replaced by the most recent model.

Globally, we generated 41.8 million tonnes of e-waste in 2014. Surprisingly little waste is recycled or reused. While e-waste has a significant and growing impact, most people are unaware of it. Inadequate recycling causes lead and mercury leaching. These and other e-waste contaminants have been linked to (Leung 2019) neurological and kidney damage, as well as cancer. Not to mention the fact that CFCs deplete (Thorat 2021) the ozone layer. The e-waste dumps and the surrounding areas are both toxic. As is the case with Ghana's Korle Lagoon, which is one of the world's most polluted bodies of water due to large "digital dumping" holes along its banks. A fascinating video about e-waste in Ghana and other developing countries is available on PBS.

E-waste generated in developed countries is largely exported to developing countries like India, Africa and China. Locals rummage through abandoned computer and electronics pits looking for copper and gold. Local recovery methods include acid baths and (Adeola, 2011) electronic burning. The legality of shipping waste to developing countries is questioned. After all, valuable reusable resources like iron (copper), gold, and silver are squandered annually to the tune of $52 billion (silver). Poor practises and regulations, on the other hand, cost the planet and its people's health.

Research Objectives

- Understand the meaning of e- waste and its effects.
- Analyse the role of enforcement agencies for better environment.
- Explain the legations of GOI of India related to e- waste.
- Shed light on techniques of e- waste dumping.

RESEARCH METHODOLOGY

The article uses descriptive and analytical evidence to back up its claims. It uses a wide range of secondary sources, including newspaper articles, magazine articles, and investigation reports, to accomplish this goal, among them.

DISCUSSION

We live in a time of rapid technological progress. Smart phones have largely replaced traditional mobile phones, LED and LCD displays have largely replaced televisions, and desktop computers have largely been replaced by laptops and tablets. When a new product

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model is released, the previous model becomes obsolete and is discarded. This electronic (Maheshwari, 2020) device is no longer functional or has become obsolete. Electronic waste includes computers, cell phones, televisions, washing machines, and refrigerators.

Millions of tonnes of electronic waste are generated each year in developed countries such as the United States, Japan, Ghana, Nigeria, Pakistan, and India. In developed countries, treating e-waste is prohibitively expensive. Waste is transported to developing countries due to the low cost of (Dwivedy *et al.,* 2012) shipbuilding. Residents, factory owners, and labourers in developing countries can collect valuable items from this waste for free. They gather useful items and toss the rest. Acid baths and electronic burning are used to recover useful ingredients. These techniques have been linked to serious health issues and may be hazardous to those who use them.

Lead, mercury, arsenic, copper, cadmium, nickel, zinc, gold, silver, and beryllium can all be found in monitors, circuit boards, and mono boards. Toxic toxins emitted by these metals are toxic to both animals and humans. When chemicals are produced on land, they can pollute both land and water. It contains the carcinogens polychlorinated biphenyl and polybrominated defanel ether (Paraphrased). Toxicants have been linked to birth defects, liver, cardiovascular, and skeletal system damage. They have also been linked to disruptions in the nervous and reproductive systems of humans. PC irritation causes dioxin-induced cancer. HCFCs are found in (Dave *et al.,* 2016) air conditioners, refrigerators, and washing machines. They are the primary depleting agents of the ozone layer. Toxins accumulate in food chains and traps, threatening all life. The environmental impact of e-waste is cause for concern. To reduce electronic waste, consumers and manufacturers must collaborate. The vast majority of electronic materials can be reused. These metals can be found in this reusable component. Remove this material from the garbage in a secure manner.

Recycling is promoted by manufacturers and authorised recyclers. By entering the recycling chain and offering a collection service, production can be improved. Financial incentives in the form of garbage economic value (Chaturvedi *et al.,* 2011) can be offered to encourage consumers to recycle. Encourage them to declutter their homes and dispose of old electronics. Dell, Apple, and HP are all recycling companies. All of these elements could play a role. All of these activities have the potential to contribute. Citizens must be aware of their responsibilities in terms of the environment. We should choose a modern model over a cumbersome method of disposing of electronics. Instead of dumping, consider donating or selling. Regulatory agencies can categorise waste and establish decomposition standards for each type.

It is preferable to develop scientific garbage disposal methods rather than use harmful techniques. The majority of electronic waste recycling in India ((Chaturvedi *et al.,* 2011) is done on an informal basis. Workers in this unregulated industry require specialised training. 4/11, electronic waste disposal, and scientific waste disposal should all be introduced to employees. It is possible for formal and informal waste management to coexist. Producers should also look for environmentally friendly raw materials. The general public should be educated about e-waste. Stakeholders include governments, educational institutions, and non-governmental organisations. E-waste regulations must be enacted and enforced by the government. Such behaviour should be severely sanctioned.

Tax breaks may be available to recyclers. Electronic waste is hazardous and must be disposed of properly. Non-governmental organisations (NGOs) can assist by educating the public, collecting waste, and providing waste management solutions. E-Parisissa is a fantastic e-waste initiative in India. Every year, Bangalore generates 8000 tonnes of computer scrap. The first e-waste recycling facility in India **(**Gupta, 2020) is E-Parisia. Its mission is to keep valuable metals, plastics, and glass out of landfills while also reducing pollution. In 1989, the UNEP convened the Basel Conference for the first time. The Indian Ministry of Environment, Forests, and Climate Change issued this rule. To manage e-waste, consumers, businesses, and governments must all work together.

Enforcement Agencies

Consequences for the planet and its residents. It exploded in 2016. The Ministry of Environment and Forests must identify hazardous wastes and issue export/import permits. 1974's Water

Pollution Prevention and Control **(Borthakur 2013)** Act established CPCB. The CPCB collaborates with state pollution control agencies. Authorities in hazardous waste management are also trained. Material specifications, leachate management, waste treatment and disposal procedures are also recommended. Provide authorizations, forward importer applications, and review matters relating to the identification and notification of disposal sites. ACT TO PREVENT WATER POLUTION The CPCB collaborates with state pollution control agencies. Permission to import hazardous waste is granted by the Environment (Protection) Act 1986. They also educate officials on the Hazardous Wastes Rules and their provisions. The DGFT inspects used goods.

Initiatives of Department of Information Technology

Within the Ministry of Communication and Information Technology, the Department of Information Technology is the electronic industry's nodal ministry. DIT encourages research and development to develop cost-effective and eco-friendly e-waste management methods. E-waste recycling technology should be developed to reduce waste to landfills while not polluting the air or water. Finding valuable materials and reusing plastics is expected to generate revenue. Many research projects are underway at Indian national institutions. Here are a few:

In March 2011, the project "Development of processing technology for recycling and reusing electronic waste" was completed. In the Council for Scientific and Industrial Research's National Metallurgical Laboratory (CSIR). This project's indigenous method extracted 90% of the metals from e-waste. The process produces no toxic gases or waste products. Unorganized e-waste (Dwivedy, 2013) recycling units pose less of an environmental risk. The process developed could recycle up to one metric tonne of electronic waste. Selling should be profitable. A group of EU countries has banned the import of electronic goods containing lead and mercury. Polybrominated diphenyl ethers, polybrominated biphenyles, etc. This ban hurts Indian electronic goods makers. So the Department of Information Technology recently established a hazardous raw material testing and certification facility at CMET in Hyderabad, India. Because these materials can be hazardous. This certification could help an Indian company sell to the EU.

M/s E-parisara Pvt. Ltd., Bangalore, is currently working on another project titled "Environmentally sound methods for metal (Gupta, 2020) recovery from printed circuit boards." They are also working on this project with the assistance of an authorised recycler. The project's main goals are to remove all of the parts and metal from printed circuit boards.

Waste plastics are being repurposed by the Central Institute of Plastics Engineering and Technology in Bhubaneswar. How it works: Electronic waste contains plastics like ABS, HIPS, PC, PP, PVC, and Nylons. Epoxy, phenolic, and polyester compounds are present. The project's goal is to reduce plastic waste by recycling waste plastics. Hairta NTI Chennai is involved. Before the UNDP and MCI funded DIT's environmental management systems for the IT industry programme. DIT now has funds (Paraphrased) from both groups (January, 1999- March, 2003). As part of this project, a "Environmental Management System for the Indian Information Technology Industry" was created and distributed. It discussed technologies that could help manage waste and reduce (Zhong, 2013) the use of hazardous chemicals in electronics manufacturing. DIT has taken the steps shown below for the electronics industry. Among the activities were:

On February 9th and 10th, 2001, a meeting called "Environmental Management in the Electronics Industry" was held in New Delhi. The Indian Printed Circuit Association assisted DIT, UNDP, and UNIDO in organising an environmental management technical seminar in Bangalore (IPCA).

The talks were given at ELCINA, Electronics Today, and IPCA conferences. Work on "Development of Lead-Free X-Ray Absorbing Coating Materials for CRT TV" began in Pune, India, in March 2011. DIT has developed **(Zhong 2013)** a technologically based method for recycling e-waste National Metallurgical Laboratory and Department of Information Technology jointly hosted a "National Seminar on Electronic Waste" on January 21 and 22. The seminar's goal was to educate stakeholders and develop an eco-friendly e-waste recycling strategy.

CONCLUSION

In the production and consumption of electronic goods, a paradigm shift is required. It isn't entirely the manufacturer's fault. We need to

move to a circular economy, where resources are recovered and reused rather than discarded. Designers, manufacturers, investors, traders, raw material producers, consumers, and policymakers must all work together to reduce waste by increasing product longevity and reparability. We can still "Be the Change," As Ghandi put it, even if we all have hectic lives. For example, we can easily apply what we learned in elementary school about the three R's. In India, most e-waste is recycled in large unorganised units. Metal extraction from PCBs is risky. Those who rely on technology for a living need education, awareness, and most importantly, affordable technology. Managing e-waste in India requires a holistic approach. It is necessary to develop a mechanism for integrating small unorganised and large organised units into a single value chain. Unorganized units can extract, recycle, and dispose of waste, whereas organisations can collect, dismantle, and sort it. Before recycling your device, separate any broken parts to prevent **(Paraphrased)** hazardous chemicals from leaking. When handling broken objects, use latex gloves and a mask. Find a responsible recycler who meets the highest standards for e-waste recycling.

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