Study on Social Relevance: Electronic Waste Management in India

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***Abstract*— One of the wastes with the fastest global growth is e-waste. It's a problem that affects everyone, and living without machinery is quite difficult. The machines that make our lives so much easier and more pleasant have a huge impact on us as humans. Government, private, public, and industrial sectors are all sources of e-waste in India. E-waste is dangerous in nature when it contains components like arsenic, cadmium, selenium, flame retardants, lead, mercury, and hexavalent chromium in excess of threshold levels. We'll examine environmental impacts, different disposal options, health risks, and suggestions and recommendations. In comparison to all other industries, residential e-waste contributes a very meagre 15%, with manufacturers providing the majority of the remaining 15%. the key**

Keywords—E-Waste, Metallurgy, Disposal, Health, Environment, Recycle

I. INTRODUCTION

The phrase "e-waste," which refers to obsolete electrical or electronic equipment, is used to characterise this type of waste. E-waste is the biggest and most inventive industry of its type. They break down after usage creating a complicated waste product that contains a variety of hazardous substances, heavy metals, acids, and non-biodegradable plastics. Every year, tonnes of electronic waste are shipped across the oceans. Most of them are either exported for recycling or are thrown away.

If used electronics are intended for recycling, dumping, resale, or any of the aforementioned activities, they are deemed to be electronic garbage (e-waste). E-waste is made up of dangerous and poisonous components like CRTs that may include toxins including mercury, cadmium, beryllium, lead, and other heavy metals. Electronic garbage needs particular treatment and appropriate recycling techniques because it contains both valuable and harmful materials. These compounds damage nearly all of the body's major systems after continuous exposure during dangerous e-waste recycling activities, including lung cancer, the heart, liver, nerve and blood systems, brain development, skin diseases, and spleen damage.

II. E-WASTE MANAGEMENT IN INDIA

2.1 *Introduction: E-Waste Management In India*

In India, the idea of recycling e-waste is essentially nonexistent. As a result, without proper recycling or treatment, the created electronic debris is frequently thrown in rivers or dump yards. This poses risks to the environment and to people's health on several different levels. The management of e-waste or computer garbage is not covered by any specific rules or regulations in India, despite the country's extensive environmental legislation. According to the Hazardous Waste Rules (1989), e-waste is not considered hazardous until a higher concentration of a particular element or compound can be demonstrated. The Hazardous Wastes (Management & Handling) Rules, 1989, as revised in 2000 and 2003, include electronic trash in List-A and List-B of Schedule-3. Therefore, the Ministry of Environment must give specific authorization for the import of this trash.

As the country's informal sector handles the recycling and collecting of electronic waste. The government has currently made the following steps to raise awareness.

The fundamental barriers to managing electronic waste properly and safely persist, notwithstanding a tremendous increase in readiness and awareness. These consist of

2.2 *Scenarios in top three major cities in India*

In India the four cities such Mumbai, Hyderabad and Bangalore have most centers of Information Technology industry and they are among the top 10 cities in generating E-waste in India.

1. Status of E-waste in Mumbai.

Mumbai ranks #1 among the top ten cities in India for producing garbage electrical and electronic equipment in this city, which is also the country's largest port (WEEE). Mumbai's information technology sector generates 20270.59 tonnes of electronic garbage annually. One of the nation's centres for the production of electrical goods is the industrial Mumbai-Pune region. Mumbai is therefore not only the import and export hub for new and used electronics, but it is also the location of major producers and consumers of e-waste.

2. Status of E-waste in Hyderabad.

Hyderabad is regarded as India's burgeoning Silicon Valley. Every year, Hyderabad produces 3,263,994 metric tonnes of electronic garbage from devices including computers, printers, TVs, and mobile phones. For this city with a population of 74.42 lakh, the projected total amount of e-waste in 2010 was 98,163 kg, which includes 42,869 laptops, 53,581 TVs, and 1,713 mobiles. The majority of recyclers and collectors just shred and separate materials based on size. In Telangana, the majority of the electronic trash is recycled in unofficial facilities run by M/s. Ramky E-waste Recycling Facility and M/s. Earth sense recycle Pvt. Ltd.

The informal industries are developing since there isn't the infrastructure to handle the massive amounts of e-waste. Since the industry is profitable in the unorganised sector, formal recycling hasn't really taken off yet. Therefore, the unorganised sector needs incentives to handle e-waste at authorised recycling facilities, which is the duty of the government.

3. Status of E-waste in Bangalore.

E-waste is collected in Goripalyam and Nayandahalli since there are multiple markets for recycling it. Every alternate day, the e-waste scrap dealers send the separated and disassembled e-waste parts to Delhi and Mumbai. These e-waste recyclers make between three and four lakhs per month by selling the disassembled e-waste to Delhi. In Karnataka, there are close to 50 licenced recycling businesses, including M/s. E-Wardd & Co., M/s. E-Prarisaraa Pvt. Ltd., M/s. Ash Recyclers, M/s. New Port Computer Services India Pvt. Ltd., M/s. E-R3 Solutions Pvt. Ltd and M/s. K. G. Nandini Recyclers. The Central and State Pollution Control Board has pushed E-Prarisaraa to be reproduced in all of the nation's main cities in the formal sector.

III. E-WASTE DISPOSAL METHODS

Landfilling: One of the popular ways to dispose of electronic waste is through landfills. As the soil is ploughed under and trenches are dug, the electronic garbage is buried there. To collect and transport the leachate from the e-waste to the treatment facility, a leachate basin is composed of clay or plastic and has an impenetrable lining. However, landfilling is not an environmentally friendly method of getting rid of the dangerous materials found in e-waste, such as cadmium, mercury, and lead, which damage the soil and groundwater.

Incineration: E-waste is burned at a higher temperature in specially constructed incinerators as part of incineration, a controlled method of trash disposal. The volume of the waste is much decreased with this procedure, and the energy produced is once more employed independently. Along with its benefits, it also has certain drawbacks, such as the release of dangerous gases that are highly carcinogenic.

Modern recycling techniques Additionally, some hazardously valuable metals found in e-waste can be recovered using a variety of processes. Some techniques are:

Hydrometallurgy: Chemical leaching process is another name for hydrometallurgy. This entails the use of an appropriate chemical reagent for the removal of metals from e-waste. Acqueous organic solvents, mixed acids, aqua-regia, and sodium chloride are some of the different compounds employed. For the recovery of precious metals from e-waste, various solvents including cyanides, thiourea, and thiosulfate are utilised.

Pyro-metallurgy is a process that creates rich energy liquid with a high calorific value while heating e-waste in an oxygen-free reactor with zero emissions. These liquid characteristics can be improved, and the finished product can be utilised as fuel for turbocharged engines or for internal combustion engines.

Electro metallurgy: An electro refining technique is electro metallurgy. In order to dispose of valuable

metals on the surface of the electrodes from e-waste, this approach entails creating an electrolyte and employing the appropriate electrodes.

IV. LITERATURE SURVEY

Samarkoon M.B. (2014) in this study it states that it can cause harm to the human health and environment because of its toxic components due to improper handling of e-waste. To improve a sustainable e-waste management system, upstream e-waste generation reduction through green design and cleaner production must be implemented. Although the current focus is on end-of-life management of e-waste activities, such as reuse, servicing, remanufacturing, recycling, and disposal.

E-waste is pervasive in our culture, according to Sai Lakshmi, Aishwarya Raj, and T. Jarin (2017). They are distinguished by a complicated chemical makeup and a challenge in estimating their flows on a local and global scale. Most notably in poorer nations that receive them for recycling and the recovery of important metals, the pollution brought on by their improper treatment has harmed the environment. Many technological modifications need to be made in order to minimise the environmental effects of the e-waste that is produced.

The public's awareness and manufacturers' cooperation are crucial for the development of the e-waste management system, according to Sivakumaran Sivaramanan (2013). The government must also provide adequate funding and ensure that the internationally recognised environmental laws are upheld within its borders. The security to stop unlawful smugglers and handlers of e-waste may be ensured by licencing of certifications like stewardship. E-waste management and disposal must be done properly in order to prevent disorders of the skin, respiratory, digestive, immunological, endocrine, and mental systems, including cancer. E-waste is known to be a major source of heavy metals, toxic compounds, and carcinogens.

According to a 2014 study by Shubham Gupta et al., commercial companies in developing nations like India, China, Indonesia, and Brazil tend to prioritise economic factors over environmental legislation governing the recycling of e-waste. Therefore, effective recycling of this trash has become essential for the lucrative recovery of recyclable resources and sustainable environment, and is seen as a challenge for today's society.

E-waste is growing daily more than reuse and recycling, according to professors Swati A. Patil and Neetu M. Sharma (2013). To collect electronic waste and to dispose of it properly, modern facilities must be created. Additionally, awareness campaigns need to be performed to promote proper e-waste handling. Manufacturers of electronic items are legally required to specify in their user manual how their products should be disposed of. To encourage people to return electronic devices, the government may offer some rebate programmes for the collection of solid waste. It is necessary to establish recycling facilities and reduce e-waste exports. The government must schedule seminars and workshops, and banners can be shown everywhere.

V. DISCUSSION AND CONCLUSION

To deal with the problems of E-waste below are some of the following suggestions:

1. Separate department in Urban local bodies
2. Collaborating with the industry
3. Refer methods adopted by other countries
4. Awareness Campaign
5. Strict vigilance of unorganized sector

In today’s generation, the people are very much influenced by the electronic devices, as their lives are not possible without these devices. This leads to the increase in the electronic waste. The e-waste produces lots of poisonous elements which effects both human health as well as environment. The workers who work under recycling the electronic waste work with the bare hands so they should take some necessary precautions so that they should not get effected through these elements. These elements enter into the body through breathing and then enter into the lungs and then effects the internal organs.

The E-waste when dumped in the ground can spoil the soil. These poisonous elements when get released into the soil can reduce the fertility of the soil. So, reduce the E-waste we should think twice whether to upgrade for a new device or use the old ones. If we want to purchase a new device the old one has to be recycled instead of throwing into the garbage. Another way of reducing the e-waste is by using the green technology.

Managing electronic waste is a big task in a developing country like India. As it is very difficult to manage e-waste due to strict rules and regulations for monitoring large volumes of e-waste.

Through proper infrastructure we can manage the process of e-waste and through effective training program of innovative recycling and recovery methods for electronic-waste management will strengthen the future generation technically to solve the burning issues. It is to be conclude that a beneficial alternative than disposal is recycling and reusing of electronic equipment.

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