E-Waste Practices And Regulations

Anisa Shaikh, Jayashree Khandare

Abstract: Many countries of the world and their environmental agencies are being forced to work on the problem of e-waste. They are working to develop and innovate strategies for e-waste management. Many developed countries have given priority to e-waste management system. In India, it is very difficult because of insufficiency of infrastructure, social and economic conditions, lack of trained people and absence of legislation for e-waste. Switzerland is the first country to established and implemented e-waste management system. For ensuring environment safety and health, India needs to impose concurrent legislation for e-waste management.

Index Terms: E-waste management, recycling, extended producer's responsibility, sustainability, developed countries, waste management.

1. INTRODUCTION

THE growing levels of e-waste are increasing the risk to environment and human health. Improper and unsafe disposal of electronic waste is resulting into several challenges to sustainable development. [1] This article will be focusing on goals of sustainable development agenda (2030) and sound management of electronic waste to create new avenues of employment. Half of the population of the world is using internet for information devices. Simultaneously with the rapid technological development with innovation and efficiency, it is generating more electrical waste. Most of the countries are on the verge of adopting legislation on e-waste. 67 countries all over the world covered national e-waste laws. [2] India has adopted legislation in 2016. Most of the countries fail to follow effective policies for e-waste recycling. Coordination of collection and recycling of e-waste differs considerably throughout the countries. With the economic development and increase in e-waste generation, various rules and regulation has been adopted under Environment Protection Act (1986).

2 THEORETICAL BACKGROUND

2.1 E-waste

Electronic waste or e-waste includes all electronic equipment. It also includes electronic parts used by the owner with no intention to reuse. Electronic waste is also called as "waste electrical and electronic equipment (WEEE) [3] or E-scrap. E-scrap is categorized differently, which are as follows:

- Dryers, Washing machines, Printing machines
- Televisions, Monitors, Laptops, Tablets
- Air-conditioners, Refrigerators, Heaters
- Lamps, Tubes, High intensity lamps
- Microwaves, Toasters, Cameras, Calculators, Radio, Toys
- Mobile phones, personal computers, printers, telephones

Each product has different impact on environment and health. Collection process varies according to the category in the same way as the customer's attitude. India is the largest among top five importing countries in the world. Three major cities in India, [4] i.e. Mumbai, Delhi and Bangalore are generating e-waste in tones 96000, 67000 and 57000 as shown in fig. 1.

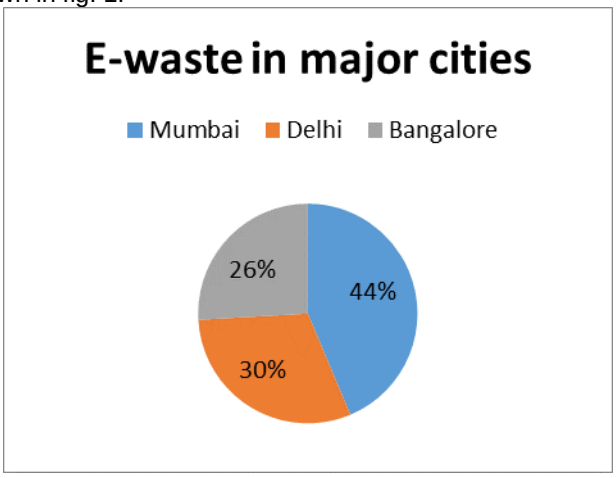

***Fig. 1**. E-waste in major cities in India*

2.2 Impact of E-Waste On Public Health & Environment

E-waste is combination of various toxic substances which has irreparable impact on nature. Some of the toxic substances are: Mercury, Americium, Sulphur, Cadmium, Lead, BFRs, Beryllium oxide and Hexavalent chromium. Computer electronic waste which is used for land filling eventually by way of melting from chips as acid, pollute underwater. Water storage gets contaminated by household garbage and electronic e-waste which directly affects to environment [5]. Table 1 shows hazardous substances and its impact on health.

Table 1: Hazardous substances and its impact on health

Hazardous substance	Its impact on health
Lead	Affects Kidney, reproductive system and mental development of children
Plastic	Harms immune system, burning plastic generates dioxins BFR
Mercury	Affects central nervous system and impairs fetus growth
Acid	Cause respiratory problems, corrosive to eye and skin
Beryllium oxide	Causes lung diseases
Cadmium	Severe pain in joints & spine, affects kidney & bones
Chromium	Can damage the liver & kidney or lungs cancer

2.3 E-Waste and Sustainable Development Goals

Increasing level of e-waste pose challenges to the environment and human health. United Nations adopted sustainable development agenda with 17 goals to ensure

- *Shaikh A. G., Asst. Prof. Bharati Vidyapeeth Deemed University, New Law College, Pune, India E-mail: shaikhag.3210@gmail.com*
- *Jayashri Khandare, Asst. Prof. Bharati Vidyapeeth Deemed University, New Law College, Pune, India E-mail: khandarej21@gmail.com*

prosperity for next 15 years. [6] Sustainable development goals are as follows:

- No poverty
- Zero hunger
- Good health and well being
- Quality education
- Gender equality
- Clean water and sanitation
- Affordable and clean energy
- Decent work and economic growth
- Industry innovation and infrastructure
- Reduced inequalities
- Sustainable cities and communities
- Responsible consumption and production
- Climate action
- Life below water
- Life on land
- Peace justice and strong institutions
- Partnerships for the goals

E-scrap contains a hazardous component which contaminates air, water, soil by putting health at risk. In India management of waste is based on the "sustainable development, [7] precaution and polluter pays principles". These principles forces commercial institutions to act in responsible manner.

3 FINDINGS

The main purpose is to analyze the provisions and legislations relating to waste in India.

- Environment protection Act was enacted to establish protection to the environment by empowering the central government for regulating all forms of waste. This is the primary legislation to tackle specific problems. Section 17 provides that any person cannot discharge any pollutants in excess of prescribed standards.
- India has drafted the E-waste (management and handling) rules 2011 for reducing and recycling e-waste by imposing legal liability upon producer. These rules are drafted under the Environment Protection Act. These rules are applied to manufacturer and purchaser of electronic equipment. According to the manufacturer only 19000 tones e-waste is recycled out of 400000 tones. So there is no systematic management for disposal of e-waste.
- Government enacted rules which covered storage and disposal of e-waste but it does not include collection mechanism.

The duties and responsibilities of E-waste producer are as follows:

- Every producer will be responsible for collection of e-waste and appropriate treatment or disposal method.
- Public awareness programs should be implemented.
- Importing the electronic instruments and maintain the records for it.

4 RESULTS AND DISCUSSIONS

a. Recycling and dismantling procedure that do not employ with sufficient means and facilities or trained people, it poses threat to human health.
b. In India, there are legislations to regulate the e-waste management but proper implementation of these statues are lacking. Government of India has enacted following rules:[8]

- E-waste management & handling rules (2011)
- Hazardous wastes management & handling Amendment rules (2003)
- Environmentally sound management of e-waste guidelines (2008)

c. E-waste management rules has ignored the small sector industries where e-waste is processed. It has not provided regulation for collection of e-waste from consumers.
d. Recycling sectors: In India, people are not trained for recycling management. In developed countries are trained, active and well trained. [9]
e. Online management system: developed countries have centralized system for waste management and developing countries have no online system of e-waste.
f. Absolute responsibility: In developed countries, concept of e-waste producer's responsibility is absolute and in India, producer's responsibility is controversial. [10]

5 CONCLUSION

The digital information society is growing faster with faster networks. So new equipment and applications are growing at a higher speed. So level of disposal industrialization are increasing at high speed with electrical equipment to e-waste. Producer must come with 'take back' system for the collection of e-waste. It is necessary to enact strict regulatory laws for disposal of e-waste. E-waste management requires proper guidelines and to ensure proper implementation of such guidelines.[11] Apart from framing the rules, the government should initiate by networking to all stakeholders. Multinational agreement among nations and collective coordination is needed for handling e-waste management, transportation and recycling. Worldwide comprehensive policies and awareness programs for e-waste technological waste will help to achieve sustainable development. [12]

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