E-Waste Disposal In India: A Critical Overview

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Abstract
Due to the rapid technological advancement India, faces a fast increasing load of Electronic waste, almost 10 million metric tons of e-waste generated per year. The current practices of e-waste management in India suffer from a number of drawbacks like the difficulty in inventory, unhealthy conditions of informal recycling; Electronic waste (e-waste) is one of the fastest-growing pollution problems worldwide. Much of the 2 million tonnes of electronic waste produced around the world, old smart phones, TVs, laptops and obsolete kitchen appliances finds its way illegally to India, which can contaminate the environment and threaten human health, if disposal are not properly managed.
Exporting e-waste to India worked out 10 times cheaper than processing it in within these countries. Since it is need to take necessary steps to avoid the future jeopardized situation because of e-waste. Inadequate legislation and policy, improper awareness and reluctance on part of the corporate to address the critical issues are the major factors worsen problems. This paper highlights the critical issues and strategies to address this emerging problem, analyses the policy and its faults.
*Key words: E-waste, India, Human health, Policy development.*

1- Introduction

E-waste is the discarded computers, office electronic equipment, entertainment device electronics, mobile phones, television sets and refrigerators, that runs on electricity/battery or has wires and completed its life. E-wastes are considered dangerous, as components of some electronic products contain materials that are hazardous, pose a threat to human health and environment [1, 2]. E-waste is not fit for their original intended use and is destined for recovery, recycling or disposal. The Indian subcontinent has turned into an important destination for European waste. Illegal move of e- waste towards India is driven by the relatively low costs of shipment and the high costs of treatment in the developed countries.

During the last decade advancement in information technology has radically changed people's lifestyle. Although this development has helped the human race, mismanagement has led to new problems of contamination and pollution. In India, only 25 to 30 percent is recycled and the rest of the waste is released in to landfills, rivers, drains lakes, canals, open spaces, which are very hazardous for the health and environment [3-5].
Bringing E waste in regulatory regime alone will not solve the problem of E-waste. Educating people about how to recycle reuse, and dispose electronics at all levels will teach them and their effective E-waste management by mitigating the role of scrap yard [6]

e-waste situation in India

Top 10 States
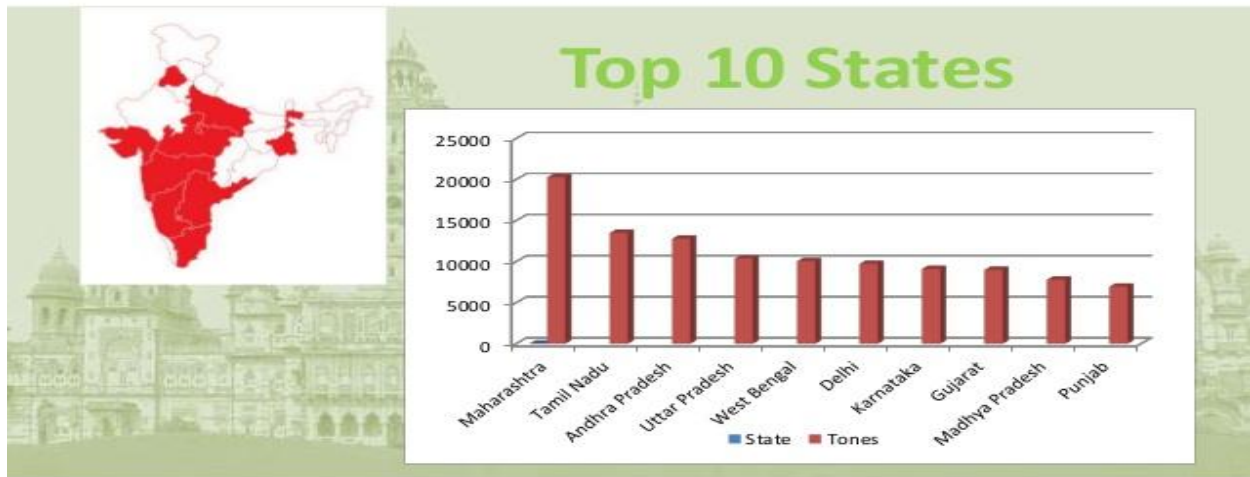
2- Methodology

Data collected from newspapers, magazines, journals articles and internet materials etc were evaluated for the purpose of this analysis. From such resources, attempt has been made to formulate an inventory of E-waste in global and Indian context, which in turn helped in identifying the wide range of diverse stakeholders in the E-waste generation. Data were preferred in order to accommodate the current scenario and research related to E-waste in India which are highly dispersed and diversified [7-9].

3- Indian Scenario

Indian information technology industry has been one of the major drivers of change in the economy in the last decade and has contributed significantly to the digital revolution being experienced by the world. New electronic gadgets and appliances have infiltrated every aspect of our daily lives, providing our society with more comfort, health and security and with easy information acquisition and exchange. India has generated about 0.2 million tons of E-waste in 2006 and in 2010 it is about 0.4 million tons and at present the quantity is increasing rapidly. Studies so far reveal that the total e-waste generation in India from both households and corporate will reach 0.5 to 0.6 million tons by 2013–2014.

The vast majority of illegal e-waste ends up in landfills, incinerators, and in ill-equipped recycling facilities. The waste is dumped in areas where local residents and workers disassemble the units and collect whatever is of value. What is not reusable is simply dumped as waste, creating immense problems and leading to what has been described as a 'toxic time bomb'.

While Europe and North America are by far the largest producers of e-waste, India's cities are fast catching up as consumers of electronic goods and as generators of e-waste. In India, for instance, 32.1 million computers, 0.12 billion mobile phones, and 35.1 million televisions were sold in 2014. It is predict that in last 2 years, the total quantum of e-waste generated around the world will be 50 million tonnes.

Sixty five cities in India generate more than 60% of the total E-waste generated in India; MoEF (2008) stated that ten states generate 70% of the total E-waste generated in India. Maharashtra ranks first followed by Tamil Nadu, Andhra Pradesh, Uttar Pradesh, West Bengal, Delhi, Karnataka, Gujarat, Madhya Pradesh and Punjab in the list of E-waste generating states in India.

Among top ten cities generating E-waste, Mumbai ranks first followed by Delhi, Bangalore, Chennai, Kolkata, Ahmadabad, Hyderabad, Pune, Surat and Nagpur.

Complementing this, a study conducted by MPCB (2007).

Table 1 – Registered Recyclers and E-waste Allotments [MoEF Recyclers]

Sr. No.	States	No. of Registered Recyclers	Total Quantity of E-waste Allotted for recycling by CPCB
1.	Andhra Pradesh	02	11800 MTA
2.	Karnataka	07	3140.6 MTA and 120000 nos. cartridges
3.	Gujarat	01	12000 MTA (Shredded PCBs and mother boards
4.	Maharashtra	03	8060 MTA
5.	Haryana	01	1200 MTA
6.	Rajasthan	01	450 MTA
7.	Tamil Nadu	06	38927 MTA
8.	Uttar Pradesh	01	1000 MTA
9.	Uttarakhand	01	12000 MTA

4- Health and environmental impact of E-waste

Electronic products are a complex mixture of several hundred tiny components, many of which contain deadly chemicals. These chemicals are a strain on human health and the environment. India is signatory to the Basal Convention, there is no clear policy and control of Transboundary Movement of Hazardous wastes and their disposal.

Most of the components in electronic devices contain lead, cadmium, polyvinyl chloride (PVC), brominated flame retardants, chromium, beryllium etc., TVs, video and computer monitors use CRTs, which have significant amounts of lead and the long term exposure to these substances can damage the nervous system, kidney and bones and the reproductive and endocrine systems and some of them are carcinogenic. These e-wastes will have long lasting effects on the environment, when improperly disposed with domestic waste, without any controls, can contaminate the soil, water and air, and have an adverse impact on human health and the environment if not handled properly. These hazards arise due to the improper recycling and disposal processes used. It can have serious repercussions for those in proximity to places where e-waste is recycled or burnt. In general the electronic goods/gadgets are classified under three major heads:

• White goods: Household appliances
• Brown goods: TVs, camcorders, cameras
• Grey goods: Computers, printers, fax machines, scanners etc.

Waste from the white and brown goods is less toxic when compared to grey goods. Even a personal computer contains highly toxic chemicals like lead, mercury, cadmium, etc.

As about 20% of the E-waste generated in India is being consumed by the informal sector. As a result we should know the ways and means of disposing the waste with the help of the available or new technology for a betterment of our environment.

5- Conclusion

Recycling is the key to reduce the E-waste and it has environmental benefits at every stage in the life cycle of a computer product, also reduces air and water pollution associated with making new products from raw materials to its final disposal. India have generated more E-waste in quantity, needs an urgent approach to tackle this issue. Technical and policy-level interventions, implementation and capacity building and increasing the public awareness can convert this challenge into an opportunity to show the world that India is ready to deal with future problems and can set global credible standards concerning environmental and occupational health.

E-waste policy development may require a more customized approach where, instead of addressing e-waste in isolation, It should be addressed as part of the national

development agenda that integrates green economy assessment and strategic environmental assessment as part of national policy planning.

Draft Hazardous Materials Rules, 2007, is a part of the Environment Protection Act, 1986 is already enacted to support the control of hazardous and toxic waste movements.

Future efforts to minimize illegal dumping will undoubtedly include a combination of aggressive legislation, new technological solutions, and increased public awareness through more education on e-Waste.

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