



Electronic waste management in India

Dr. Anju Bala

Associate Professor in Geography, Govt. P.G. College for Women, Rohtak, Haryana, India

Abstract

Electronic industry, world's fastest growing manufacturing has provided some leverage to the socio-economic and technological growth of India but it has created a new environmental challenge i.e., electronic waste that consists of electronic devices. One study identified that computer equipment account for almost 70 % of e-waste followed by telecommunication equipment like phones 12%, electrical equipment 8 % and medical equipment 7 % with remaining from household e-waste. Electronic products are a complex mixture of several hundred tiny particles which contains deadly chemicals threatening human health and environment. These components in e-devices contain lead, cadmium, mercury, chromium etc that can damage nervous system, kidney, bones and endocrine systems. These wastes when disposed improperly can contaminate soil and water. Therefore, the 3R Principle (Reduce, Reuse and Recycle) needs to be implemented. The present paper is an attempt to analyze the current situation of e-waste in India with some effective solutions for e-waste management.

Keywords: waste, pollution, management, environment

Introduction

Electronic waste (also referred to as e-waste), mainly consists of equipment used in data processing, communication, entertainment and businesses. E-waste is the electronic components after their usage and it is growing rapidly due to the increasing use of electronic products globally. India is among the top five e-waste producing countries in the world with estimated annual production of 2 million tons. E-waste contains several precious metals, ferrous and non-ferrous metals, plastic, wood and glass. Unscientific practices in the processing of e-waste are associated with several environmental and health externalities. The usage of electronic components is increasing due to decreased prices, growing usage of internet advancements in Information and Communications Technology. More than half of the globally generated e-waste is exported for recycling mainly in the Asian countries like China and India due to the cheap labour. E-waste in India is not only increasing in amount but also in its toxicity due to the rapid growth in productivity and consumption in the electronics' sector. About 50,000 tons of e-waste is imported to India each year. The electronic and electrical components manufacturing industries are the largest growing sectors in India producing 40,000 tons of e-waste itself every year. Electronic waste contains hazardous substances such as cathode ray tube (CRT) consisting of lead oxide, lead, mercury, tin and other harmful metals. E-waste is greatly hazardous for human as well as the environment if a proper management system is not followed for its treatment. Therefore, the 3R Principle needs to be

implemented. The Rs in the 3R Principle stand for Reduce, Reuse and Recycle. This paper also describes the management system and recycling methods for handling E-waste in India and the challenges faced in the task,

Effects on Air, soil and water

Electronic products are a complex mixture of several hundred tiny components which contain deadly chemicals threatening human health and the environment. Most of the components in e devices contain lead, cadmium, mercury, prominated flame retardants (BFR), chromium, beryllium etc. TV, video and computers use CRTs which have significant amount of lead that can damage nervous system, kidneys, bones and endocrine systems.

When electronic items containing heavy metals such as lead, mercury, lithium are improperly disposed, then heavy metals leach through to reach ground water channels and contaminate water sources. Resultantly, the local communities depending on these water sources suffer from many diseases. Burning of e-waste in local landfills for obtaining gold and other precious metals produce fine particulate matter and causes cardio-vascular and pulmonary ailments in children. The wind carries toxic particulates and affects both human and animal. The motherboards have high level of mercury and their improper disposal may cause skin and respiratory diseases (Table1). Drinking contaminated water affects the central and nervous system and causes poor brain growth, hearing disability and impaired formation and function of blood cells.

Table1: Effects of E- Waste

Material	Location	Effects
Lead	Acid battery, CRT	Kidney failure, central and peripheral nervous system, damage to reproductive system
Cadmium	Battery, CRT, Housing	Long term cumulative poison, bone disease
Mercury	Battery, Switches, Housing	Damage to liver and brain
Chromium	Decorative-hardners, Corrosion protection agents	DNA damage, lung cancer
Plastic	Computer moulding cablings	Generates dioxins and furans

Source: <http://www.ncbi.nlm.nih.gov/>

E-waste Management System

Computers contributed about 70 per cent of the total e-waste generated in India, while telecommunication equipment accounted for 12 per cent. Among the India cities, Mumbai topped the list as it generated an estimated 1, 20,000 tons of e-waste annually. Delhi and Bengaluru ranked second and third, with 98,000 and 92,000 tons of e-waste generation respectively (The ASSOCHAM-KPMG study).

Table 2: Percentage contribution by states to annual e- waste generation

Maharashtra	13.9
Tamil Nadu	9.1
Andhra Pradesh	8.7
Utter Pradesh	7.1
West Bengal	6.9
Delhi	6.7
Karnataka	6.2
Gujarat	6.1
Madhya Pradesh	5.3
All other states	30

Source: Electrical and Electronics manufacturing in India, ASSOCHAM & NEC Technologies 2018

State-wise Maharashtra ranks first in contribution to annual e- waste generation (13.9%) followed by Tamil Nādu (9.1%), Andhra Pradesh (8.7%), Utter Pradesh (7.1%) respectively (Table2). India is among the top five e-waste generating countries in the world besides China, the US, Japan and Germany. In context of e- waste management, only 1.5 % waste is recycled in India.

Challenges of Waste Management in India

Major Challenges of waste management in India are as follows;

1. Rag pickers not properly integrated in the waste management cycle. Rag pickers have to face occupational hazards while collecting, no social security for them
2. No separate department for waste management in Urban Local Bodies
3. Corruption leads to not proper installation of dustbins and e-waste collection mechanism
4. Financial constraints, institutional weaknesses, improper choice of technology and public apathy towards municipal solid waste
5. No polluter pays principle invoked rather we give incentives to treat, NGT and judicial activism adds confusion to legislative and executive decisions
6. Urbanization directly contributes to waste generation, and unscientific waste handling causes health hazards and urban environment degradation
7. Waste is scattered widely in every part of the country, making it difficult to collect it from every corner
8. Lack of workforce needed for waste collection and processing
9. Industries dump their waste in rivers for petty profits which get back into homes of people via water they use
10. No proper implementation of punishment provision for defaulters in India Challenges to Policy makers are: Lack of resources at civic bodies, old equipment and technology and societal apathy
11. Laws for waste management are very old which need to be aligned with present

Suggestions

Followings are the important suggestions to deal with the problems of e-waste

1. Targets are implemented in a phased manner: Electronic waste collection targets are implemented in a phased manner with the lower and practically achievable target limits. Further, detailed implementation procedures for collection of electronic waste from the market need to be followed
2. Separate department in urban local bodies: The government should rework on laws for waste management and creation of separate department in urban local bodies to deal with the e-waste situation is the need of hour.
3. Strict vigilance of unorganized sector: The unorganized sector should also be brought under proper supervision and monitoring for systematically recycled of e waste.
4. Collaborating with the industry: The government should have collaborating with the industry to draw out formal/standard operating procedures and a phased approach towards the agenda of reducing e-wastes to the lowest.
5. Refer methods adopted by other countries: The government may also refer methods adopted by other countries for efficient collection and recycling of e-wastes. For example, South Korea, one of the largest producers of electronics managed to recycle 21 per cent of the total 0.8 million tons of e-waste that it produced in 2015. Korea recycles all the e-waste that it produces.
6. Privatization of recycling: The government may also evaluate privatization of recycling like in the United Kingdom (UK) for effective waste management.
7. Awareness campaign: The government and NGOs should organize awareness camps about the consequence of improper electronic waste management, and include them as part of the solution to e-waste related issues.

Conclusion

India generates about 20 lakh tones of electronic waste annually that contains several precious metals, rare earth metals, ferrous and non-ferrous metals, plastic, wood and glass. The usage of electronic components is increasing due to decreased prices, growing usage of internet advancements in Information and Communications Technology Unscientific practices in the processing of e-waste are associated with several environmental and health externalities. If e- waste is not handled and managed properly, it can lead to occupational hazards, environmental toxicity and economic non- viability. Therefore, the 3R Principles (Reduce, Reuse and Recycle) need to be implemented. We should adopt a new approach in the fight against e- waste pollution by the shared and cooperative participation of the people, the government, the industrial sector and NGO's. The best way to protect ourselves is to adopt suitable preventive measures.

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