

Electronic Waste Management in Indian Context

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Abstract: *Electronic waste (E - waste) is one of the fastest wastes splurging around the world. E - waste consists of all waste from electronic and electrical appliances which have reached their end - of - life period or are no longer fit for their original intended use and are destined for recovery, recycling or disposal. The main sources of electronic waste in India are the government, public and private (industrial) sectors, which account for almost 70 per cent of total waste generation. India, in the last couple of decades, has also been vastly influenced by the culture of consumerism. The application of electronics related technology has been very wide spread in all sectors. Electronic waste in managed in a proper systemic manner albeit with many loopholes.*

Keywords: Electronic Waste Management, E-Waste, recycling

1. Introduction

Electronic waste is one of the fastest growing eco - toxicological problems in the world because many electronics contain both toxic metals and toxic organics. Most scientists believe that exposure to such dangerous wastes poses serious health risks, particularly to pregnant women and children. Moreover, the WHO reveals that even small amounts of lead, cadmium, and mercury (which can be found in old phones) are able to generate irreversible neurological damage and threaten the development of a child. Electronic waste is quickly flooding Asia, especially China, and it inevitably results in a large volume of toxic components to the environment if not handled properly. Electronic waste (e-waste) or waste electronic and electrical equipment (WEEE) is considered the fastest growing waste stream in the developed world. The waste is the result of advancing technology that leaves behind old computers, laptops, televisions, and other electronic devices that require specialized methods of recycling because of toxic by - products. A major concern regarding end - of - life products (EOL) is environmental contamination and seepage into the food chain. The high expense of recycling responsibly has made e-waste an expensive venture for industrialized countries. As a result, the burden of recycling has been transferred to the developing world, where environmental protection is lax and the necessary technologies to safely extract material do not exist. Stockpiles of high - tech trash are open to the public for scavenging by low- income families and their children. The result is environmental contamination and negative health effects. Guiyu, China, the e-waste capital of the world, receives the majority of technological refuse, but there are many other cities that have become WEEE havens, including Wenqiao in China; Accra in Ghana; Bangalore, Chennai, Delhi, and New Delhi in India; Lagos in Nigeria; and Karachi in Pakistan.

Like hazardous waste, the problem of e - waste has become an immediate and long term concern as its unregulated accumulation and recycling can lead to major environmental problems endangering human health. The information technology has revolutionized the way we live, work and communicates bringing countless benefits and wealth to all its users. The creation of innovative and new technologies and the globalization of the economy have made a whole range of products available and affordable to the people changing their lifestyles significantly. New electronic

products have become an integral part of our daily lives providing us with more comfort, security, easy and faster acquisition and exchange of information. But on the other hand, it has also led to unrestrained resource consumption and an alarming waste generation. Both developed countries and developing countries like India face the problem of e-waste management. The rapid growth of technology, up-gradation of technical innovations and a high rate of obsolescence in the electronics industry have led to one of the fastest growing waste streams in the world which consist of end of life electrical and electronic equipment products. It comprises a whole range of electrical and electronic items such as refrigerators, washing machines, computers and printers, televisions, mobiles, i- pods, etc., many of which contain toxic materials. Many of the trends in consumption and production processes are unsustainable and pose serious challenge to environment and human health. Optimal and efficient use of natural resources, minimization of waste, development of cleaner products and environmentally sustainable recycling and disposal of waste are some of the issues which need to be addressed by all concerned while ensuring the economic growth and enhancing the quality of life.

E-waste consists of all waste from electronic and electrical appliances which have reached their end- of- life period or are no longer fit for their original intended use and are destined for recovery, recycling or disposal. It includes computer and its accessories monitors, printers, keyboards, central processing units; typewriters, mobile phones and chargers, remotes, compact discs, headphones, batteries, LCD/Plasma TVs, air conditioners, refrigerators and other household appliances.⁵ The composition of e-waste is diverse and falls under 'hazardous' and 'non - hazardous' categories. Broadly, it consists of ferrous and non- ferrous metals, plastics, glass, wood and plywood, printed circuit boards, concrete, ceramics, rubber and other items. Iron and steel constitute about 50% of the waste, followed by plastics (21%), non - ferrous metals (13%) and other constituents. Non- ferrous metals consist of metals like copper, aluminum and precious metals like silver, gold, platinum, palladium and so on. [6] The presence of elements like lead, mercury, arsenic, cadmium, selenium, hexavalent chromium, and flame retardants beyond threshold quantities make e-waste hazardous in nature. It contains over 1000 different substances, many of which are toxic, and creates serious pollution upon disposal. Obsolete computers pose the most significant environmental and health hazard among the e-

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India, in the last couple of decades, has also been vastly influenced by the culture of consumerism. The application of electronics related technology has been very wide spread in all sectors. Coupled with the rapid pace of industrialization, Personal Computers (PCs)- desktops and notebooks, televisions and mobile phones and other manufacturing items like refrigerators have experienced high growth and even faster replacement cycle. The electronics manufacturing industry has emerged as one of the most innovative industries in the world over. It is constantly engaged in creating and utilizing new technologies. This has also partly contributed to what is called inbuilt product obsolescence. This has resulted into an ever increasing quantity of electronics and electrical appliances being discarded, as it is often cheaper to buy new product than to repair or upgrade a broken or obsolete one. [8]

a) Electronic Waste Generation in India

All over the world, the quantity of electrical and electronic waste generated each year, especially computers and televisions, has assumed alarming proportions. In 2006, the International Association of Electronics Recyclers (IAER) 8 projected that 3 billion electronic and electrical appliances would become WEEE or e - waste by 2010. That would tantamount to an average e-waste generation rate of 400 million units a year till 2010. Globally, about 20 - 50 MT (million tonnes) of e - wastes are disposed off each year, which accounts for 5% of all municipal solid waste. [7] Although no definite official data exist on how much waste is generated in India or how much is disposed of, there are estimations based on independent studies conducted by the NGOs or government agencies. According to the Comptroller and Auditor - General's (CAG) report, over 7.2 MT of industrial hazardous waste, 4 lakh tonnes of electronic waste, 1.5 MT of plastic waste, 1.7 MT of medical waste, 48 MT of municipal waste are generated in the country annually. [4] In 2005, the Central Pollution Control Board (CPCB) estimated India's e-waste at 1.47 lakh tonnes or 0.573 MT per day. [1] A study released by the Electronics Industry Association of India (ELCINA) at the electronics industry expo - "Componex Nepcon 2009" had estimated the total e - waste generation in India at a whopping 4.34 lakh tonnes by end 2009.3 The CPCB has estimated that it will exceed the 8 lakh tonnes or 0.8 MT mark by 2012. There are 10 States that contribute to 70 per cent of the total e - waste generated in the country, while 65 cities generate more than 60 per cent of the total e - waste in India. Among the 10 largest e - waste generating States, Maharashtra ranks first followed by Tamil Nadu, Andhra Pradesh, Uttar Pradesh, West Bengal, Delhi, Karnataka, Gujarat, Madhya Pradesh and Punjab. Among the top ten cities generating e - waste, Mumbai ranks first followed by Delhi, Bengaluru, Chennai, Kolkata, Ahmedabad, Hyderabad, Pune, Surat and Nagpur. [5]

The main sources of electronic waste in India are the government, public and private (industrial) sectors, which account for almost 70 per cent of total waste generation. The contribution of individual households is relatively small at

about 15 per cent; the rest being contributed by manufacturers. Though individual households are not large contributors to waste generated by computers, they consume large quantities of consumer durables and are, therefore, potential creators of waste. An Indian market Research Bureau (IMRB) survey of 'E - waste generation at Source' in 2009 found that out of the total e - waste volume in India, televisions and desktops including servers comprised 68 per cent and 27 per cent respectively. Imports and mobile phones comprised of 2 per cent and 1 per cent respectively. As a large - scale organized e - waste recycling facility, the Attero Recycling Plant in Roorkee opened in January 2010. Despite 23 units currently registered with the Government of India, Ministry of Environment and Forests/ Central Pollution Control Board, as e-waste recyclers/reprocessors, having environmentally sound management facilities, the entire recycling process more or less still exists in the unorganized sector. The Cobalt - 60 radiation tragedy at Mayapuri in Delhi in which one person lost his life and six persons were admitted to hospital served as a wakeup call drawing attention to the mounting quantity of hazardous waste including e-waste in the country while revealing systemic problems on the issue of waste disposal. [16] The Ministry of Environment and Forests (MoEF) has notified the Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008 for effective management of hazardous wastes, including e-waste in the country. But these rules do not apply to the radioactive wastes such as Cobalt - 60 which are covered under the Atomic Energy Act, 1962.

b) Management of Electronic Waste in India

The issue of electrical and electronic equipment disposal, import and recycling has become the subject of serious discussion and debate among the Government organizations, environmentalist groups and the private sector manufacturers of computers and consumer electronic equipments. The Department- related Parliamentary Standing Committee on Science & Technology, Environment & Forests in its 192nd Report on the 'Functioning of the Central Pollution Control Board (CPCB)', has concluded that e - waste is going to be a big problem in the future due to modern life style and increase in the living standards of people and augmentation of economic growth. The Committee has suggested a more proactive role for the CPCB by stating that it "should conduct studies to make future projections and devise steps to check the menace".

With the progressive stride that the country has made in the information technology sector and the electronic industry, the issue of import of e - waste and its handling and disposal has assumed significance. The issue was brought to the notice of Parliament and Government when on 23 December 2005, a Private Member's Bill on 'The Electronic Waste (Handling and Disposal) Bill, 2005' was introduced in Rajya Sabha by Shri Vijay J. Darda, Hon'ble Member from Maharashtra. The Bill had recognized that while there was no proper law or guideline on the handling and disposal of electronic waste in the country, every home had a number of electronic products. And once these goods became obsolete or discarded, they were either thrown in the garbage or found their way to scrap dealers through the *Kabariwalas*

who then dismantled the gadgets, kept what was useful and threw the rest in landfills. Criticizing the improper way of disposal as the electronic products contain many components which are hazardous to health and environment, the Bill called for a regulation of electronic waste disposal before the situation reached alarming proportions. The Bill sought to provide for proper handling and disposal of millions of tonnes of electronic waste being generated by discarded electronic devices by prescribing norms and fixing responsibilities and duties on manufacturers, recyclers and consumers with regard to the disposal of electronic waste and for all matters connected to it. The Bill, however, lapsed in July 2010 with the expiry of the tenure of the hon'ble member in the Rajya Sabha.

e) Guidelines for Environmentally Sound Management of E - waste, 2008

Considering the growing concern on the issue of e-waste, the Government of India has supported several initiatives, particularly the assessment conducted by the CPCB on the management and handling of e-waste which led to the preparation and the publication of the Guidelines for Environmentally Sound Management of E-waste in March 2008. The Guidelines have been formulated with the objective of providing broad guidance for identification of various sources of e - waste and the approach and methodology for handling and disposal of e-waste in an environmentally sound manner. These Guidelines include details such as e-waste composition and recycle potential of items of economic value, identification of possible hazardous contents in e-waste, the recycle, re- use and recovery options, treatment and disposal options and the environmentally sound e-waste treatment technologies.

The Guidelines also emphasize the concept of Extended Producer Responsibility (EPR), a concept on which the Western countries base their disposal practices. The EPR is an environment protection strategy that makes the producer responsible for the entire life cycle of the product, especially for take back, recycle and final disposal of the product. Thus, the producers' responsibility is extended to the post - consumer stage of the product life cycle. The Guidelines state that inclusion of the EPR in the legislative framework would make it a mandatory activity associated with the production of electronic and electrical equipments over a period of time. Such a move would also oblige the producer to set up collection centers for e - waste either individually or jointly. The CPCB has insisted on putting the onus of enforcement on the State Pollution Control Boards (SPCBs). The State Department of Environment or the SPCB may prescribe more stringent norms as deemed necessary. Apart from publishing the Guidelines on various aspects of the hazardous waste management, the Ministry of Environment and Forests has also provided financial assistance for strengthening the SPCBs for facilitating implementation of the Rules. Financial assistance has also been provided for setting up Common Treatment, Storage and Disposal Facilities for hazardous wastes management. In addition, the Ministry and the CPCB from time to time sponsor training programmes for creation of awareness about the provisions laid down in the Rules.

d) The draft E - waste (Management and Handling) Rules, 2010

Considering it necessary in the public interest to enable the recovery and/or reuse of useful material from e - waste, thereby reducing the hazardous wastes destined for disposal, and to ensure the environmentally sound management of all types of waste electrical and electronic equipment, the Government introduced the draft E - waste (Management and Handling) Rules, 2010. After inviting objections/suggestions from the stakeholders, the Ministry of Environment & Forests has finalized the draft modified e - waste (Management and Handling), Rules 2010 in September 2010 and put it on their website. These Rules have not been notified and are likely to come into force *w. e. f.* 1 January 2012 and implemented through the State Governments/State Pollution Control Boards. Meanwhile the Department related Parliamentary Standing Committee on Industry functioning under the jurisdiction of the Chairman, Rajya Sabha, has exclusively taken up the subject of electronic wastes and Medium, Small and Micro Enterprises (MSMEs). It has heard the Secretary, MSME on the draft rules in its Meeting held on 20 December, 2010. It was felt by the Committee that the views of the MSME on the aforementioned rules are important as large numbers of medium enterprises are involved in the management and recycling of e - waste.

2. Conclusion

All types of waste are not only imported but generated in India - hazardous industrial waste, municipal solid waste and e - waste. The quantum of wastes generated over the past several years have posed an ever increasing threat to environment and public health. Over eighty - eight critically polluted industrial zones have been identified by the CPCB. Pollutants from such zones contaminate water bodies and rivers and even pollute the ground water in many places. Studies have also shown that crops are contaminated through industrial effluents but the scale of such an impact has yet to be identified. As far as e-waste is concerned, it has emerged as one of the fastest growing waste streams worldwide today. The sheer amount of electronic equipments reaching end- of- life poses a huge challenge. Computers and electronics equipments are designed without giving sufficient attention to the aspects such as downstream impacts, and the ease of recycling. Thus, their dismantling is also extremely labour - intensive. As long as electronic products continue to contain an assortment of toxic chemicals and are designed without recycling aspects, they would pose a threat to environment and public health at their end - of - life. As electronic products are currently constituted, e - waste recycling operations in any country will generate polluting residues and emissions. Toxics Link has reported that India has over 1.38 million obsolete computers with manufacturers adding about 1, 050 tonnes of electronic scrap every year. It is currently estimated that India produces some 3.8 lakh tonnes of e-waste annually. E-waste now forms over 70 per cent of landfills. When developing countries like India start tightening and enforcing stricter legislation on transboundary movements of e-waste, developed countries may find it harder to avoid the issue of recycling and disposal through export. Environmental activists opine that environment protection

laws in India are not stringent enough to address the issues relating to either domestic waste or imports of hazardous waste including e-waste. We do not have appropriate technology to ascertain the quantum and quality of wastes in the imported items. For instance, it has been reported that the problem of toxic waste imports cannot be addressed properly as none of the Indian ports (except the Jawaharlal Nehru Port at Nhava Sheva) has scanners to detect the actual contents of the consignments.¹⁸⁴ There are expectations that the proposed E - waste (Management and Handling) Rules, 2010 will lay down explicit laws concerning e - waste and systematize various aspects of the e - waste recycling sector.

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