

# Sustainability and E-waste Management Scenario in India

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**Abstract-** Electronics industry is one of fastest growing manufacturing industry in India. But the increase in sales of electronic goods and their rapid obsolescence has resulted in generation of electronic waste, which is popularly known as e-waste. The e-waste has become a matter of concern because of the presence of toxic and hazardous substances present in electronic goods and if not properly managed, it can have adverse affects on environment and human health. In India, the e-waste market is mostly unorganized and companies are neither registered nor authorized and operate informally. At most of the places e-waste is treated as municipal waste because India does not have any dedicated legislation for management of e-waste. Currently, e-waste handling is regulated under “The Hazardous Materials (Management, Handling and Transboundary Movements) Rules, 2008”. However, there are some companies which are authorized by government for the scientific and environmental friendly management and treatment of e-waste. But due to the involvement of unorganized sector in

management of e-waste, there is improper handling of e-waste due to involvement of unskilled workers and absence of adequate technologies. Moreover, companies are more focused on financial profits rather than social or environmental concerns. Hence, there is strong need to adopt sustainability practices to tackle the growing threat of e-waste. This paper reviews e-waste generation, e-waste management scenario in India, global sustainability practices and sustainability issues in management of e-waste due to personal computers (PCs) and mobile phones.

**Keywords-** E-waste, India, PCs and mobile phones, Sustainability.

## I. INTRODUCTION

Indian electronics and IT industry has grown very fast and it not only resulted in more consumption of raw materials but also in problems due to waste generated and e-waste is one of them [3]. E-waste stands for electronic waste, which is a branch of Waste Electrical and Electronic Equipment (WEEE). According to European Union (EU 2002), e-waste is, “Electrical or electronic

equipment, which is waste, including all components, subassemblies and consumables, which are part of the product at the time of discarding.” [11]. There are different electronic equipments which are responsible for e-waste generation but this paper mainly focuses on the e-waste generation due to computers and mobile phones. The objectives of this study are: firstly, to know about different sources of e-waste and Indian e-waste market followed by reasons for e-waste generation; secondly, to compare Indian e-waste management scenario with developed countries and lastly, to discuss various issues related to sustainability and best practices that may be adopted for sustainable management of e-waste. The paper concludes with some suggestions and future plan of Indian Government regarding management of e-waste.

## II. E-WASTE AND INDIAN MARKET

In view of Pierre Desrochers (2004), the Indian market for e-waste management is “self-organized” [9] and e-waste is a serious issue because of the informal recycling activities. Therefore, quantification of e-waste in India is very difficult [7] and, there is no mechanism and policy to check the flow of e-waste in the system [9, 13]. In India, it is estimated that the e-waste is 0.1-0.2% of the total municipal waste. In case of PCs, 22% of the e-waste is generated by households and it is the business sector which accounts for the 78% the e-waste, because 83% of household customers are first time buyers. So business sector is mainly responsible for the waste generation. In addition to this, about 1050 tonnes per year of computer waste comes from retailers and manufacturers. This is important to note that in spite of global agreements, e-waste from developed nations is imported to developing nations like India [7, 8, 13]. In India, estimated e-waste generation was 1, 46,180 tonnes/year in 2005, which is expected to grow at 8, 00,000 tonnes by 2012. The west region in India generates

highest amount of e-waste i.e., 35%, whereas north, south and east regions generate 21%, 30% and 14% respectively [9, 4, 12]. As far as sales of computers and mobile phones are concerned, sale of computers and laptops has been grown at 18% in 2009-10 as compare to 2008-09 [5]. Whereas, mobile subscriber base is concerned, the total wireless subscribers (CDMA & GSM) have reached 391.76 million. There were only 261.07 million subscribers in 2007-08 but in 2008-09 additional 130.69 million subscribers were added with annual growth rate of 50.06% [10]. In growing economy like India these sales are estimated to grow in future but facilities are not being developed accordingly. Proper facilities have to be developed accordingly which is an impending challenge.

## III. REASONS FOR E-WASTE GENERATION

There are different assumed life spans of computers and mobile phones. The average life span of computers is three to five years and in case of mobile phones, it is only two to three years. Due to innovative products and offers, the life cycles of products are shrinking. Attractive market offers push customer to buy new product rather than upgrading new one. The customers, who like to replace their computer and mobile as they see a new product with improved and innovative features, known as early adopter of technology, contribute to more e-waste generation [7, 3, 13]. Indian people generally use pirated operating systems and software. The new computer is purchased sometimes not due to improper functioning but for upgrading system or software [13]. Customers these days don't upgrade the computer; they prefer to replace it and very few customers like to send products for repair and service. Moreover, some of the new software present in the market can be run smoothly on new operating systems. They also require high Random Access Memory (RAM) as well as more space on

hard disks. Therefore new operating systems and changing software in computers are also a major reason for more e-waste generation. The components of the mobile and computers are so costly that customers prefer to buy new products. For example, the cost of battery in case of mobiles and laptops, and cost of cartridge in case of printers, etc. So, customers don't think to replace the component and prefer to replace the product with new one [3].

#### **IV. E-WASTE MANAGEMENT: INDIAN AND GLOBAL SCENARIO**

In India, Ministry of Environment and Forests (MoEF) is responsible for proper management of hazardous waste. The e-waste management was first included in the List-A and List-B of Schedule-3 of "Hazardous Wastes (Management & Handling) Rules, 1989". Then the law was amended in 2000 and 2003 [8]. Finally, after amendments in 2007 and 2008, e-waste has been included in "The Hazardous Materials (Management, Handling and Transboundary Movements) Rules, 2008" [1]. As far as global e-waste management is concerned, Switzerland is the first country to implement the organized e-waste management system in the world. Extended Producer Responsibility (EPR) and Advance Recycling Fee (ARF) are the backbone of e-waste management system in Switzerland and other developed countries [9, 4, 12]. There are many countries that have already started the 'take back' system for electronic products and they also have dedicated laws on e-waste management [13]. In USA, National Electronics Action Plan has been initiated by US Environment Protection Agency to address the various issue related to electronic waste [12]. Two very important frameworks for protecting environment from e-waste have been put forward by European Union i.e., WEEE Directives and Restriction of use of Certain Hazardous Substances (RoHS), which are also implemented by other countries. According to EU directives (2003), it is mandatory for all 27 countries of

European Union to recycle their e-waste. Basel Convention is also nice step taken by UNEP to control the international trading of hazardous waste and India is also signatory to this [8, 13].

The story of current Indian e-waste management is different from the worldwide practices. In India, rag pickers pay some amount to the customer from whom they are collecting the waste and on the other hand, recycling fee is charged from customers to manage waste effectively in developed countries. Most of the activities, like collection, transportation, segregation, dismantling, recycling, disposal, etc., are carried out by informal sector. The rag pickers (also known as kabadiwala) collect all kind of waste like papers, books, newspapers, plastic, cardboard, polythene, metals, etc. including e-waste, and earn their livelihood by selling it to middlemen or scrap dealers. This is a very good source of income not only for rag pickers but also for middlemen and scrap dealers. E-waste is mostly handled by unskilled workers and they do not take proper safety measures. Moreover, proper place is not used for e-waste handling. The operations to treat e-waste are carried out within the cities and slums. At some places, operations are carried out without proper ventilation and lighting facilities. Recycling and disposal is not properly done due to lack of appropriate technology [7, 12]. Also, very few companies are there which have implemented 'take back' system voluntarily. Hence, there is an urgent need of implementation of proper e-waste management system in India.

#### **V. SUSTAINABILITY PRACTICES FOR MANAGEMENT OF E-WASTE**

For sustainable management of e-waste, a country has to develop such a flexible and adaptive system that can handle the variability in quantity and quality of e-waste flow [9]. The best available practices from different countries can be adopted to

manage e-waste effectively [12]. First of all, “Close the loop” practice can be implemented for proper disposal of the product i.e., not only forward supply chain but also the reverse supply chain should be analyzed [3, 13]. Producers i.e., manufacturers have to take responsibility to handle the waste so that proper management and disposal of e-waste can be done. Public-private partnerships can also play very important role in management of e-waste [12]. Some steps have already been taken in India in this regard. As on 5th October, 2010, eighteen companies are registered with MoEF/CPCB for environmentally sound recycling and reprocessing of e-waste [2]. It is also important that legislation should ensure the recycling and reuse of the e-waste. For example, in USA, there is a voluntary practice called ‘Electronics Recycler’ Pledge of True Stewardship [3]. The extra benefits or incentives can be given to people engaged in informal recycling so that they would sell their e-waste to organized e-waste handling units [13, 14]. Moreover, basic sustainability practices i.e., reduce, reuse and recycle, should not be ignored. Sustainability management should be started from the product manufacturing stage [12]. Raw material selection, product and process design can be the important factors for the ‘Designed for Environment (DfE)’ practices, which can facilitate the recycling and reuse [13]. The various reuse options can be: Second hand product, modified product after repair, and reuse of old parts in new product. The products must be reused after recycling as these processes result in saving of raw material as well as energy. The customers who can’t afford the new product in countries like India, they will have the option to buy products after reuse and recycling. The manufacturers should take the responsibility of recycling. After recycling process, the materials should be properly land filled or incinerated [7, 12, 14].

## VI. CONCLUSION

Problems, due to e-waste, are likely to become serious in near future in India. Whenever a customer replaces computer or mobile phone, the product may go away from the customer but it never goes away from the environment. Therefore, there should be regular improvement, through research and development, in the products so as to enhance reuse and recycling. Moreover, there is need of a framework that can show the path for the management of e-waste. No doubt India is being dominated by informal sector in management of e-waste at present but India has also started thinking on sustainable management of e-waste. The draft has been prepared for e-waste handling and rules, which is available at website of Ministry of Environment and Forests [4]. The responsibilities of collection centers, producers, recyclers, dismantlers, consumers, etc., are included in it. These rules would be known as “E-waste (Management and Handling) Rules, 2010” and will be implemented from 1st January, 2012. The story does not end at formulation of legislation, but it requires proper implementation and control also. It will be interesting to see that how successfully these rules may help in the sustainable management of e-waste.

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E-waste in india. Research unit (larrdis) rajya sabha secretariat. New delhi. In the current scenario, it is always possible that human health and environment would be drastically endangered if concerted legislations and actions were not taken for efficient management and disposal of e-waste. This Paper attempts to provide a brief insight into this relatively new concept of e-waste, its generation in India and the environmental and health concerns attached to it. 2 Performance Audit on "Management of Wastes in India", Report No. PA 14 of 2008, [www.cag.gov.in/html/reports/civil/2008\\_PA14\\_SD.../chap\\_1.pdf](http://www.cag.gov.in/html/reports/civil/2008_PA14_SD.../chap_1.pdf). 2. E-waste is growing in India at the rate of 10%. Major recycling of e-waste is carried out in the non-formal sector using primitive and hazardous methods. Adequate legislative measures and cost-effective, environmental friendly, technological solution would be needed to address the issue. This article provides the basic information on electronic waste management in India. 1. Introduction. The discarded and end-of-life. E-waste is not hazardous if it is stocked in safe storage or recycled by scientific methods or transported from one place to the other in parts or in totality in the formal sector. The e-waste can, however, be considered hazardous if recycled by primitive methods. This paper reviews e-waste generation, e-waste management scenario in India, global sustainability practices and sustainability issues in management of e-waste due to personal computers (PCs) and mobile phones. Discover the world's research. 19+ million members. In India, e-waste management assumes greater significance not only due to the generation of its own e-waste but also because of the dumping of e-waste from developed countries. This is coupled with India's lack of appropriate infrastructure and procedures for its disposal and recycling.