E-Waste Management in India

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AB ST R ACT

E-waste or Electronic wastes are referred to the electronic goods that are discarded or unwanted. Each year, around more than 50 million ton of e-wastes are created Depending upon their nature of response, there are possibilities for dangers depending upon the condition. Discarded computers, batteries and other electro chemical wastes may outcome in unwanted results. So it is essential to be awake of e wastes in addition to the other physical wastes. The condition is alarming as India creates about 1.5 lakh tones of e-waste annually and almost all of it finds its way into the informal sector as there is no organized alternative accessible at present. This paper discusses the present scenario of e-waste management, sources of e-waste management, future e-waste estimates and possible e-waste handling strategies in India.

Keywords: ***E-waste, Environment, Hazardous, E-waste Management.***

INTRODUCTION

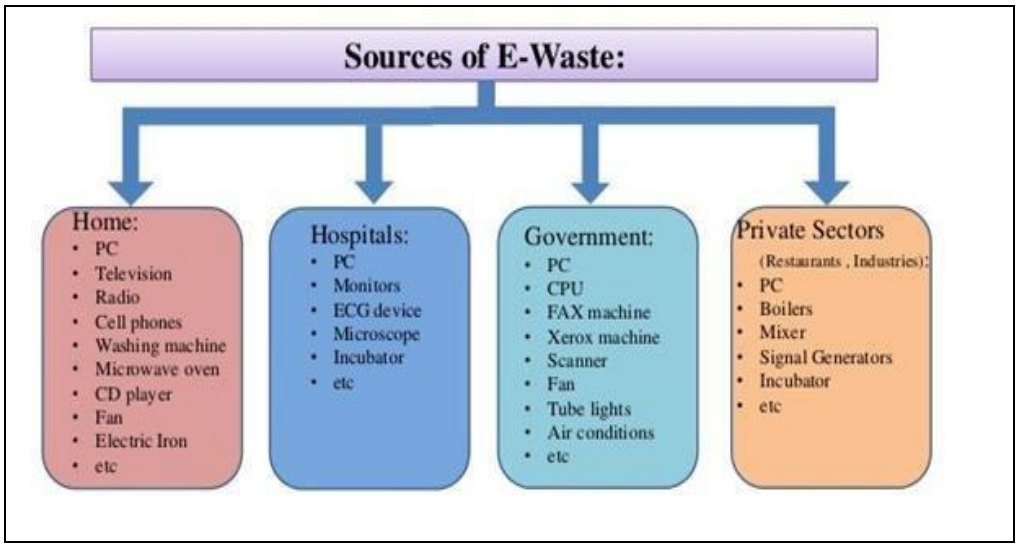
E-waste comprises of waste created from used electronic devices and household appliances which are not fit for their original future use and are intended for recovery, recycling or disposal. Such wastes encompasses large range of electrical and electronic devices such as computers, mobile phones, personal stereos, including large household appliances such as refrigerators, air conditioners, television etc. E-waste contain more than 1000 diverse substances many of which are toxic and potentially hazardous to environment. The last decade has seen a terrific growth in the manufacturing and consumption of electronic and electrical equipment all over the world. As a consequence of this, combined with quick product obsolescence, and lower costs, discarded electronic and electrical equipment or 'E-waste' is now the most rapidly growing waste difficulty in the world. The majority companies today design their products for planned or perceived obsolescence. This is reinforced through marketing and retailing methods and affordability and convenience have taken over from product durability as primary drivers (Jennifer, 2005)[1]. E-waste is increasing the problem as well as a business opportunity of increasing significance, given the volumes of E-waste being generated and the content of both toxic and valuable materials in them. The portion including iron, copper, aluminum, gold and other metals in E-waste is over 60%, while pollutants comprise

[1] Jennifer, C. (2005). Distancing the waste: Overconsumption in a global economy. Retrieved september 30, 2014, from htt://www.learningace.com

2.70% (Widmer et al., 2005)[2]. So, recycling of E-waste is an significant subject not only from the point of waste treatment but also from the recovery aspect of valuable materials. However the procedure of take-back and disposal of E-waste is very difficult, which involves various kinds of products, many people and enterprises, extensive areas, and long time span, it is a huge and complicated system. Electronic waste particularly computer waste is growing exponentially in volume because of rising demand of information technology and its application in the national growth process. Various government department, public as well as private sectors are fast feeding old electronics appliances such as computers, mobile phones, etc., into the waste stream.

SOURCE OF E-WASTE IN INDIA.

E-waste is being created by a variety of sources in the country like Govt. sectors, institutional sectors, research and developments, household and manufacturing sectors of the country.



Source: (UNEP, DTIE, 2007)

[2] Widmer R.,Heidi O.K.,Deepali S.M. Heimz B. _Global perspective on e-waste'. Environ. Impact Assess. 25, 436, 2005.

Individual household and small business as far as PCs emanating from individual households are concerned; it is difficult to know the correct quantity. Individual households are not major contributors in India. They account for near about 22% of total computers in India. The rest of share, that is 78%, comes from the business development sector.

• Large business, institutions, government house and foreign embassies were the initial users of electronic products; today they account for 78 per cent of total installed PCs. Hence, they are the main producers of outdated technology in India. It is seen that the total number of obsolete PCs emanating from business as well as from individual households will be around 1.38 million.

• PC manufacturers and retailers are next on the list of contributors to the e- waste section in India. The waste form this division comprises defective IC chips,PCB's motherboards and other peripheral items produced during the production process. It also includes faulty PCs under guarantee procured from consumer as replacement items. It is expected that around 1050 tons per year of waste comes from this sector.

• E waste from imports has been major sources of PC scrap are imports. enormous quantities of e-waste such as monitors, printers, keyboards, CPU's, mousses, projectors, mobile phones, PVC wires, etc. are imported. The computers thus imported are of all ranges, models and sizes, and functional as well as rubbish materials.

• Secondary market waste includes TV, computers, refrigerators, mixers, mobiles, electric boards etc.

E-WASTE MANAGEMENT IN INDIA.

India is the fifth biggest creator of e-waste in the world; discarding 1.7 million tonnes (Mt) of electronic and electrical equipment in 2014 (Economic Times, 2015). In India e-waste gathering, transportation, segregation, dismantling, recycling and disposal is done manually by untrained labors in informal way in informal sector. Due to low consciousness and sensitization, e-waste is terrified along with garbage which is collected and segregated by rag collectors. E-waste contain reusable and valuable material. Rag collectors sell this e-waste to scrap dealers and run their livelihood. The scrap dealers provide the e-waste to recycling industries. The recyclers use old and hazardous technologies and equipment, to recycle/treat the e-waste (Gupta & Kumar, 2014). India produces nearly 12.5 lakh MTs of e-waste every year, (ASSOCHAM, 2014)[3]. India position 155 out of 178 nations in environmental performance index. It also ranks badly in various indicators like 127 in health hazards, 174 in air quality, 124 in water and sanitization (EPI, 2014). environmentally sound management (ESM) of e-waste will also improve position of India in these areas. India is

[3] ASSOCHAM.(2014, April 21). Retrieved September 21, 2014, from www.assocham.org: http://www.assocham.org/newsdetail

being used as dumping ground of e-waste by many developed nations.

FUTURE ESTIMATE OF E-WASTE IN INDIA.

As per the report of UNEP, by 2022, the e-waste from old computer would grow by up to 500% from 2007 levels in India while South Africa and China will witness a 200-400% rise in computer connected waste. The e-waste from discarded phone in India will grow by eighteen times from 2007 levels, while in China it is estimated to see a seven time rise in electronic waste from mobile phones.

An assessment conducted by the Manufacturers Association of Information Technology (MAIT) Indian hardware trade organization state that India created almost 4, 00,000 tonnes of e-waste every year. Out of the country's total e-waste only 5 percent is recycled and about 40 percent of outdated and unused computers and electronic products decay in homes and warehouses. Due to 7 faster rate of newer model of electronic entering in the market, the e-waste is rising in Indian market at an alarming rate.

EFFECTS ON ENVIRONMENT

Disposal of e-wastes is a meticulous problem faced in many regions across the globe. Computer wastes that are land filled produces contaminated leachates which ultimately pollute the groundwater. Acids and sludge obtain from melting computer chips, if disposed on the ground causes acidification of soil. For example, Guiyu, Hong Kong a thriving area of illegal e-waste recycling is facing acute water shortage due to the contamination of water reservoirs. This is due to removal of recycling wastes such as acids, sludges etc. in rivers. Now water is being transported from faraway towns to cater to the demands of the population. Incineration of e-wastes can produce toxic fumes and gases, thereby polluting the nearby environmental air. Improperly monitored landfills can cause environmental hazards.

Mercury will leach when certain electronic devices, like circuit breakers are destroyed. Not only does the leaching of mercury poses specific harms, the vaporization of metallic mercury and dimethylene mercury, both part of Waste Electrical and Electronic Equipment (WEEE) is also of concern. The most hazardous form of burning e-waste is the open-air burning of plastics in order to recover copper and other metals. The toxic fall-out from open air burning affects both the neighboring environment and broader global air currents, depositing highly toxic byproduct in many places throughout the world.

MANAGEMENT OF E-WASTE

It is estimated that 75% of electronic items are stored due to doubt of how to manage it. These electronic junks lie unattended in houses, offices, warehouses, labs etc. and normally mixed with household wastes, which are lastly disposed off at landfills. This necessitates implementable management measures. In industries management of e-waste should start at the point of generation. This can be complete by waste minimization techniques and by sustainable product design. Waste minimization in industries involves adopting:

- Inventory Management,
- Production-process Modification,
- Volume Reduction,
- Recovery and Reuse.

➢ INVENTORY MANAGEMENT

Proper control over the raw materials used in the manufacturing process is an important way to reduce waste generation (Freeman, 1989). By minimizing both the quantity of hazardous materials used in the process and the amount of surplus raw materials in stock, the quantity of waste created can be reduced. This can be done in two ways i.e. establishing material-purchase review and control actions and inventory tracking system. Developing review procedures for all material purchased is the primary step in establishing an inventory management program. Procedures should need that all materials be permitted prior to purchase. In the sanction process all production materials are evaluated to examine if they have hazardous constituents and whether alternative non-hazardous materials are accessible.

➢ PRODUCTION-PROCESS MODIFICATION

Changes can be made in the production procedure, which will cut waste generation. This drop can be accomplished by changing the materials used to create the product or by the more well-organized use of input materials in the production process. Potential waste minimization techniques can be divided down into three categories:

i) Improved operating and maintenance measures,

ii) Material modify and

iii)Process-equipment alteration.

➢ VOLUME REDUCTION

Volume reduction includes those techniques that eliminate the hazardous portion of a waste from a non-hazardous portion. These techniques are usually to decrease the volume, and thus the cost of disposing of a waste material. The techniques that can be used to cut waste-stream volume can be divided into 2 general categories: source separation and waste concentration. Separation of wastes is in many cases a easy and cheap technique for waste reduction. Wastes containing various types of metals can be treated separately so that the metal worth in the sludge can be recovered. Concentration of a waste stream may amplify the likelihood that the material can be recycled or reused. Methods contain gravity and vacuum filtration, ultra filtration, reverse osmosis, freeze vaporization etc. For instance, an electronic component manufacturer can utilize compaction equipments to reduce volume of waste cathode ray-tube.

➢ RECOVERY AND REUSE

This technique can be eliminate waste disposal costs, decrease raw material costs and provide income from a salable waste. Waste can be recovered on-site, or at an off-site recovery facility, or through inter industry exchange. A number of physical and chemical methods are existing to reclaim a waste material such as reverse osmosis, electrolysis, condensation, electrolytic recovery, filtration, centrifugation etc. For example, a PCB manufacturer can use electrolytic recovery to reclaim metals from copper and tin-lead plating bath.

SUSTAINABLE PRODUCT DESIGN

Reduction of hazardous wastes should be at product design stage itself keeping in mind the following factors.

- ***Revise the product design:*** Efforts should be made to design a product with less amounts of hazardous materials. For example, the efforts to decrease material use are reflected in some new computer designs that are flatter, lighter and more integrated. Other companies propose centralized networks like to the phone system.

- ***Make use of renewable materials and energy:*** Bio-based plastics are plastics made with plant-based chemicals or plant created polymers rather than from petrochemicals. Bio-based toners, glues and inks are used more frequently. Solar computers also exist but they are at present very expensive.

- ***Make use of non-renewable materials that are safer:*** Because many of the materials used are non-renewable, designers could ensure the product is built for re-use, restore and/or upgradeability. Some computer producer such as Dell and Gateway lease out their products thereby ensuring they get them back to further upgrade and lease out another time.

CONCLUSION

It is fact that the e-waste generation is rising very quick due to obsolescence of the electrical and electronic equipment (EEE). People either hold the obsolete equipment in their home or sell it to the local collectors for monetary benefits. Currently there is no legislative binding framework for e-waste management. In view of that there is no e-waste gathering method at places. E-waste collection, transportation, segregation, dismantling, recycling and disposal is done physically by untrained labors in informal way due to low consciousness and sensitivity. With a view to bridge the digital divide, there is exponential growth in the use of electrical and electronic equipment (EEE) and so there is an alarming result on the environment when the ICT wastes are not disposed of scientifically. The legislative work regarding e-waste had been doing lately in time and is not performing well. Therefore the awareness of people about e-waste need to be improved and the regulations should be properly implemented to control the rise in e-waste in future. There is an emergent require to have a proper information method through standardized mechanisms and existing policies, guidelines in line with the international standards and practices for a healthy e-waste management organization.

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