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# IMAPACT OF E- WASTE ON ENVIRONMENT, HUMAN HEALTH AND EMPLOYMENT- A REVIEW

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**Abstract:**
*Growth of Information and Communication Technology sector has enhanced the usage of the electronic equipment exponentially. Electronic waste is a common, informal name for electronic products approaching the end of their useful life. Electronic waste or e-waste is one of the rapidly growing problems of the world. E-waste comprises of a multitude of components, some containing toxic substances that can have an adverse impact on human health and the environment if not handled properly. 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. Adequate legislative measures and cost-effective, environmental friendly, technological solution would be needed to address the issue in most developing countries, e-waste is viewed as a resource and income-generating opportunity. Labour is still the major driver of the informal recycling chain as it maintains the chain's low operating costs. E-waste management can generally be divided into that which takes place in the formal or informal sectors..This article provides the basic information on impact of e- waste on environment, human health and employment.*

**Key words**: *E- waste, electronic waste, recycling, waste management*

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## INTRODUCTION:

Electronic industry is the world's largest and innovative industry. In the last two decades, the global growth in electrical and electronic equipment production and consumption.. Every year tons of electronic items are shipped over oceans, Electronic products has been defined as 'equipment which is dependent on electrical currents or electro-magnetic fields to be fully functional'. Growth of Information and Communication Technology sector has enhanced the usage of the electronic equipment exponentially. Faster obsolescence and subsequent up-gradation of electronics product, are forcing consumers to discard old products, which in turn accumulate huge e-waste to the solid waste stream. Most of the developing countries are suffering with the rapidly growing problems of e-waste. There is no standard definition of e-waste. The Organization for Economic Co-operation and Development (OECD) defines e-waste as "any appliance using an electric power supply that has reached its end-of-life" . The most widely accepted definition of e-waste is as per European Commission Directive "electrical or electronic equipment, which is waste … including all components, subassemblies and consumables, which are part of the product at the time of discarding" E-Waste concept can be defined in a number of ways in a broader perspective; it is the term for electronic products, Electronic products have become unwanted, non-working or obsolete, and have essentially reached the end of their useful life. Because technology advances at such a high rate, many electronic devices become "trash" after a few short years of use. In fact, whole categories of old electronic items contribute to e-waste such as VCRs being replaced by DVD players, and DVD players were being replaced by blu-ray players. E-waste is created from anything electronic: computers, TVs, monitors, cell phones, PDAs, VCRs, CD players, fax machines, printers, etc. Electrical and electronic equipment (EEE) contain valuable as well as hazardous materials and if at end of life of EEE, the hazardous materials are not disposed of scientifically it may cause serious damage to the environment and public health. The presence of heavy metals (like Arsenic, Cadmium, Barium, Lead, Lithium, Mercury, Nickel, Zinc Sulphide) and other toxic substances like PCB (Polychlorinated biphenyls)etc. may cause extreme harm, if not disposed of in environment friendly manner.

**Sources of e-waste:**

Almost every used electronic items are considered as e-waste such as discarded cell phones, cameras, CD players, TVs, radios, drillers, fax machines, photocopiers, printers, toners, ink cartridges, batteries, re-chargeable batteries, digital calculators and clocks, CRT monitors, electric solders, computer mother boards, key board, industrial and house hold electronic machinery such as oven, fridge, sewing & washing machines, fan, air-conditioner, grinder, iron, heater, military and laboratory electronic equipment's, etc.

**Global scenario for e-waste:**

E-waste and environmental pollution is a global problem. The United Nations suggests that global e-waste is set to exceed 40 million tons per year. End of product life recycling is highly polluting, non-cost effective and unregulated in many countries. The burden of e-waste not only pollutes the land-fill it is having serious health implications due to chemical leaching into the water table, eventually making its way to agricultural produce and into people. According to a recent report by the BBC, e-waste pollution is causing severe health concerns for millions of people around the world, mostly in the developing nations of Africa, Europe and Asia. Approximately 23 percent of deaths in these nations are linked to pollution and other environmental impacts. The report also concluded that more than 200 million people worldwide are at risk of exposure to toxic waste.

**Indian scenario for e-waste:**

Last few years India has emerged as one major IT hub and the consumer electronic market has grown in an exponential rate. According to Manufacturers Association of Information Technology (MAIT) the Indian PC industry is growing by 25% compound annual growth rate. Study reports that in 2007, 2.2 million computers were made obsolete and 14 million mobile handsets replaced .The e-waste generated was estimated to be 3,32,979, tons out of which 144,000tons was recyclable and actually e-waste recycled was 19,000, tons. The e-waste processed contained 12000 tons of computers and 7000 tons of TV. It was also estimated that around 50,000 tons of e-waste was generated through import besides 3,32,000 tons generated domestically. Developed countries find it profitable to send e-waste for reuse/ recycling to developing nations because of economic disparities e.g. cost of recycling of a computer in US is $ 20 whereas in India it is $2. So the import of e-waste to India has got enough chance to jump high. 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

**Effects of e-waste on human health and environment:**

| S.No. | Hazardous components | Effect of Hazardous components of e-waste |
|---|---|---|
| 01 | Arsenic | Can affect skin and can decrease nerve conduction velocity. |
| 02 | Lead | May affect kidneys, reproductive systems, nervous connections.May cause blood and brain disorders, sometimes may be fatal. |
| 03 | Barium | Can affect heart muscle. |
| 04 | Chromium | Candamage liver, kidneys and may cause asthmatic bronchitis and lung cancer. |
| 05 | Beryllium | May cause lung diseases |
| 06 | Mercury | Affects the central nervous system, kidneys and immune system, it impairs foetus growth. May cause brain or liver damage |
| 07 | Cadmium | May cause severe pain in the joints and spine. It affects the kidneys and softens bones |
| 08 | Brominates | Can harm reproductive and immune systems, may cause hormonal disorder. |
| 09 | Chlorofluorocarbon | May affect the ozone layer. It may cause skin cancer in human and genetic damage in organisms. |
| 10 | Polychlorinated Biphenyl (PCB) | May cause cancer in animals, can affect the immune system, reproductive system, nervous system, endocrine system . PCBs persistently contaminate in the environment and cause severe damage . |
| 11 | Polyvinyl Chloride (PVC) | PVC contains upto 56% chlorine and when burnt, produces Hydrogen chloride gas which in turn produces hydrochloric acid that is dangerous to respiratory system. |
| 12 | Dioxin | These are highly toxic to animals and can lead to malfunction of foetus, decreased reproduction and growth rates, affect immune system. |

**Current disposal methods of e-waste:**

Currently following methods are used to get rid of e wastes they are Incineration, Acid baths, Landfills

- ***Landfills***

E-wastes ending up as landfills are described as toxic time bomb. They may release to the environment after several years by natural means, and there is a possibility of leaching of wastes such as batteries releases acids and heavy metals mercury, nickel and cadmium, electronic circuits have lead, zinc, Nickel, Copper, Mercury and cadmium. These may reach the land water and reaches animals and humans, and mixes with other fresh water sources such as rivers and streams. Almost half the e-wastes of US and Australia are dumped as landfills while the rest are exported to Asia and Africa.

- **Acid baths**

Acid bath method is used to extract Copper, here the circuit board is submerged in to Sulfuric acid for about 12 hours to dissolve Copper then solution is boiled, precipitated Copper Sulfate is taken and remaining solution is added with scraped particles, subsequently Copper smudges are removed. Acid baths also used to dissolve the lead and in the extraction of Gold and Silver.

- **Safe methods for disposal of e waste**

Most safe method is recycling materials including metals and reusing them, which includes industry wide system for the collection of e-wastes. Implementing proper rules to make following as mandatory wearing protective masks and gloves and safety glass when dismantling and avoid easy methods of extraction such as incineration which results harmful fumes, avoid dumping and avoidusing acid baths, and implementing strict rules against dumping e-wastes in landfills as it couldleach out towards ground water or may be released after long time. Implementing proper storage system for collected and extracted e-wastes until it is reused as products, strengthen the implementation

**E-waste is viewed as a resource and income-generating opportunity:**

In most developing countries, e-waste is viewed as a resource and income-generating opportunity. Labour is still the major driver of the informal recycling chain as it maintains the chain's low operating costs. E-waste management can generally be divided into that which takes place in the formal and informal sectors.

Ninety-five percentage of the e-waste in India is being recycled in informal sector and five percentage of the e-waste volume are handled in formal unit. The informal e-waste recycling sector generally employs the poor, who have little or no formal training and are marginalized within their countries. The extent of their organization varies greatly; in some countries such business activities are prohibitedwhile in others they are authorized by the public authorities. In some countries these people operate in a legal grey zone where their activities are illegal in principle but accepted in practice The marginalized include social groups from ethnic or religious minorities, rural migrants and immigrants. Women and children also constitute a significant proportion of the workforce. Such groups frequently rely on informal employment for basic survival. Generally, it is found that workersonly stay for a few years in the job and as soon as they are offered better jobs in other sectors they abandone-waste recycling In and around of metropolitan cities in India, there are over 3000 units engaged in informal sector for e-waste recycling. informal units of e-waste recyclers are distributed all over India. A large cluster of industries are in Delhi, Tamil Nadu, U.P., Karnataka, Maharashtra, Gujarat, Kerala, Andhra Pradesh, West Bengal, Rajasthan, etc.Informal units generally follow the steps such as collection of the e-waste from the rag pickers, disassembly of the products for their useable parts, components, modules, which are having resell value. The rest of the material is chemically treated to recover precious metals. Due to inadequate means, it may cause leaching of hazardous substances to the air, soil, and water. This recycling method has low efficiency and recovery is carried out only for valuable metals like gold, silver, aluminum, copper, etc. Other materials such as tantalum, cadmium, zinc, palladium etc. could not be recovered.

Few formal recyclers are operating in India. The processes followed in formal sector are mainly limited to the segregation, dismantling of e-waste till the size reduction stage of printed circuit boards (PCBs). A shredder is employed for PCBs size reduction. The pre-processed PCB is exported to smelting refineries in developed countries for further recovery of precious metals like copper, silver, gold, aluminum, palladium, tantalum, ruthenium, platinum etc. and also treating the slag byproduct in an eco-friendly manner. The end-to-end solution of e-waste recycling is still not available in India

The recycling/ recovery of valuables substances by units in formal sector is carried out in protected environment and with due care to minimize any damage to the environment or society. The use of advanced processes and technologies leads to efficient recovery of metals. Recovery technology by units in formal sector will be economically viable as the high cost of capital equipments and needed techniques could be shared by the volume of products. Efficiency of recovery in the formal recycling is high and metals at the trace level can also be recovered. Some technology works with zero-landfill approach.

Most of the e-waste in India is channelized to non-formal sector, whereas, the formal sector is facing problem of not having sufficient input materials. In order to address the issue, MoEF had introduced adequate clauses in the Hazardous Wastes (Management, Handling & Transboundary) Rules, 2008. The MoEF had advised all the Government Departments/ Offices that e-waste generated in various offices is essentially to dispose of in an environmentally sound manner in accordance with these Rules. The occupier has now responsible for safe and environmentally sound handling of such wastes generated in their establishments. It was further advised that the units handling and engaged in activity like collection, segregation, dismantling and recycling of e-wastes are required to register with Central Pollution Control Board (CPCB).

## CONCLUSION:

Most of the e-waste is recycled in India in unorganized units, which engage significant number of manpower. Recovery of metals from PCBs by primitive means is a most hazardous act. It is confirmed that the public awareness and cooperation of manufactures are essential for the advancement of e-waste management system. Proper education, awareness and most importantly alternative cost effective technology need to be provided so that better means can be provided to those who earn the livelihood from this. And also it is the responsibility of governments to allocate sufficient grants and protecting the internationally agreed environmental legislations within their borders. Licensing of certification like stewardship may ensure the security to prevent illegal smugglers and handlers of e-waste. Basel Action Network is now working at their best to stop or control trans boundary e-waste movements, they also involved in conducting public awareness programs to enlighten the world community and opening research areas to find better methods or alternatives. As e-wastes are the known major source of heavy metals, hazardous chemicals and carcinogens, certainly diseases related to skin, respiratory, intestinal, immune, and endocrine and nervous systems including cancers can be prevented by proper management and disposal of e-waste.

**REFERENCES:**

1.The global impact of e-waste Addressing the challenge- Karin Lundgren
*2.Central Pollution Control Board- Implementation of e waste rules, **2010**.*
*3.en.wikipedia.org/wiki/Electronic_waste*
*4.E-waste in India, Research Unit, Rajya Sabha Secretraiat, June, **2011***
*5.ITC,* www.itcportal.com
*6.Ministry of Environment and Forests- notification dated 12th May,**2011**,*
*7.http://moef.nic.in*