



ELECTRONIC WASTE CONSCIOUSNESS AND PREVAILING DISPOSAL PRACTICES IN INDIA

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ABSTRACT

In India each year more than 5, 00,000 tonnes of e-waste is generated and some developed countries also ship their waste in India. But most of the e-waste is not being handled properly and is threatening the environment and human health. This is only because we are not implementing appropriate and effective methods for the collection of e-waste. Considering the intensity of the issue the Government of India, The Ministry of Environment and Forest (MOEF), Central Pollution Control Board (CPCB) has notified the e waste management rules (2011) for the first time. In this research authors attempted to study the e-waste awareness and disposal practices prevailing in India. It was revealed through survey and analysis that in general, the consumers were not fully aware, but at the superficial level; however, when it comes to the

disposal practices the residents are not aware of the collection centers, the E- waste rules, and correct disposal practices. Residents therefore mix-up the E-waste generated along with municipal solid waste thereby leading to unsustainable way of disposal practices.

KEYWORDS: *CPCB, Disposal, E-waste, Environment pollution, Government, Hazardous substances, Human health, MOEF.*

INTRODUCTION:

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 faces 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.

ELECTRONIC WASTE IN INDIA:

In India, estimated e-waste generation was 1,46,180 tonnes/year in 2005, which is expected to grow at 9, 00,000 tonnes by 2015. 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. As far as sales of computers and mobile phones are concerned, sale of computers and laptops has been grown at 26% in 2014-15 whereas, mobile subscriber base is concerned; the total wireless subscribers (CDMA & GSM) have reached 491.76 million. In growing economy

like India these sales are estimated to grow alarmingly in future but e-waste management is not being developed accordingly. Proper facilities have to be developed accordingly which is an impending challenge.

REVIEW OF LITERATURE:

In 2003 the EPA found that E-waste was responsible for 1% of all the disposed solid waste in the United States. Although recycling continued to be encouraged, only 9% of computers were recycled with the majority disposed into landfills (Li, Richardson, & Walker, 2009). Additionally, large amounts of obsolete computers have remained in storage, awaiting disposal. In California, six million obsolete personal computers (PCs) and televisions were stored for disposal and the number has increased by 10,000 each day (Li, Richardson, & Walker, 2009).

The EPA proposed a rule in 2002 on the proper handling of CRT monitors. Other states have implemented regulations out of environmental concerns as well. California, in 2000 and 2002, banned the disposal of computer monitors in landfills. The state of Minnesota passed a law in 2005 to the same effect, with Maine following with legislation in 2006.

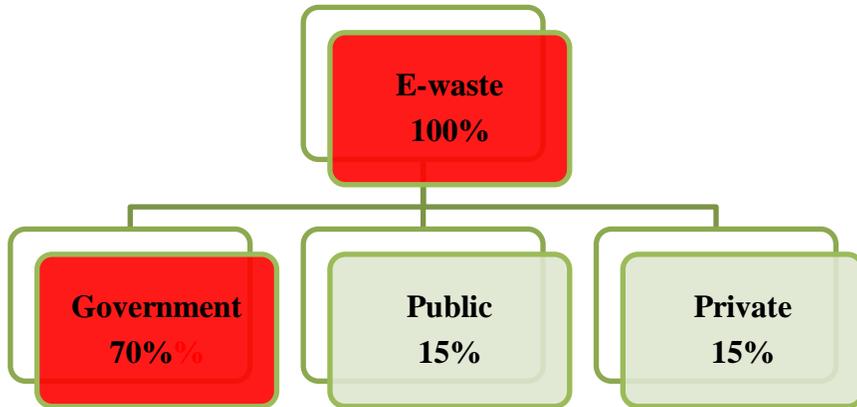
With the increasing use of technology, e-waste was seen as a global problem, according to McConnell (2009). In the United States, the Natural Resources Defense Council reported 130,000 computers discarded each day (McConnell, 2009). Electronic equipment contained hazardous materials. The hazardous types of materials make recycling cost prohibitive. The breakdown and separation of useful materials from electronics often was worth more than the salvaged materials' resale value (McConnell, 2009). In the United States, fifteen dollars was the net expense to recycle a single computer monitor, after deducting what the parts were worth.

In 1989 United Nations Basel Convention restricted hazardous waste transfers and was ratified by all the developed countries. The European Union as well as other nations further expanded banning all exports of hazardous waste to developing countries (Agoramoorthy, 2006).

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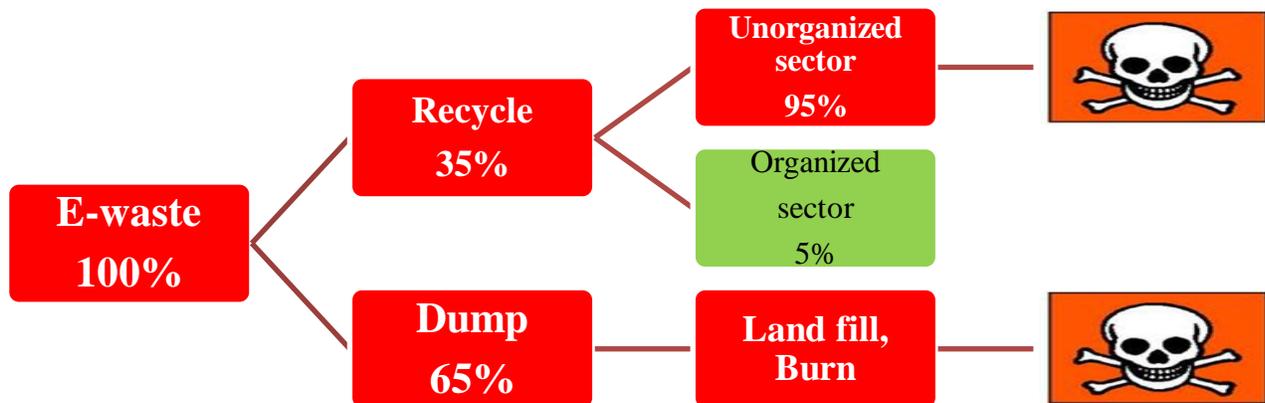
Electronic waste awareness is one of the major challenges in the electronic waste management. India is the largest creator of electronic waste and number of stakeholders are associated with it, so it very difficult to define clearly the role of each stakeholders.

SOURCES OF ELECTRONIC WASTE:



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.

REASONS FOR URGENT RECYCLING OF E-WASTE IN INDIA:



The informal recyclers are not serious about the guidelines issued by CPCB (Central Pollution Control Board) and using hazardous methods of e-waste disposal like open burning for the recovery of targeted metals like copper, aluminum, iron and steel from equipment peripherals and acid leaching for the recovery of copper and precious metals from PCB (Printed Circuit Boards), mother boards and leave all hazardous metals like Pb, Hg, Cd etc at the treating sites in open causing an explosion of pollutants in the environment.

However, CPCB has registered 23 recyclers for treating e-waste by environmentally sound methods also, the CPCB has encouraged informal recyclers to be part of formal recycling which can be carried out with compliance under single umbrella of guidelines issued in 2008(MoEF, Guidelines, 2008). Presently, there is no separate law for e-waste (Management and Handling) for restricting the informal recycling in the country. However a rule for e-waste management and handling is in force since 1st May 2012 to restrict the environment unfriendly methods. Apart from above reasons following factors also contribute in proper recycling and urgent recycling process.

PUBLIC HEALTH FACTOR:

Discarded electronics contain a variety of toxic metals, including lead, cadmium, mercury, chromium, and polyvinyl chlorides, and thus the disposal of electronics poses a significant environmental and health risk when not properly handled. Although e-waste represents less than 2% of landfill mass, it contains 70% of the hazardous waste in heavy metals.

ENVIRONMENTAL/RESOURCE FACTOR:

In addition to recovering precious metals, recycling electronics also reduces the environmental impact associated with primary production of electronic products. The primary production of precious and special metals, including energy intensive stages such as mining and smelting, has a significant impact on carbon dioxide emissions. Reuse and recovery of electronics reduces the environmental impact of these products, as well as the impact from primary production of metals and fractions found in electronics.

DATA SECURITY FACTOR:

Privacy protection concerns have also fueled the processing of electronic waste. Confidential and personal data must be destroyed properly in order to ensure the safety of organizations and individuals information.

ECONOMIC FACTOR:

Electronic devices contain up to 60 different elements, many of which are valuable, such as precious and special metals, and some of which are hazardous. Precious metals are rare, naturally occurring metallic elements which traditionally have a higher melting point, and are more ductile than other metals. They have a high economic value, as demonstrated by the two most well-known precious metals; gold and silver. Special metals include nickel, nickel base alloys, cobalt base alloys, titanium and titanium base alloys. Electronic equipment is a primary consumer of precious and special metals and therefore it is imperative that a circular flow is established in order to recover these metals and valuable elements. Investments are being made to treat e-scrap and reclaim the valuable metals, especially as raw materials become more scarce and expensive.

E-WASTE CONTROLLING AGENCIES IN INDIA:

MINISTRY OF ENVIRONMENT AND FORESTS (MOEF):

MOEF of Government of India is responsible in identification of hazardous wastes and provides permission to exporters and importers under the Environment (protection) Act, 1986.

CENTRAL POLLUTION CONTROL BOARD (CPCB):

CPCB was constituted under the Water (Prevention and Control of Pollution) Act, 1974. CPCB coordinates activities with the State Pollution Control Boards and ensures implementations of the conditions of imports. It also monitors the compliance of the conditions of authorization, import and export and conduct training courses for authorities dealing with management of hazardous wastes and to recommend standards for treatment, disposal of waste, leache and specifications of materials and recommend procedures for characterization of hazardous wastes.

STATE POLLUTION CONTROL BOARDS (SPCB):

SPCB constituted under the Water (Prevention and Control of Pollution) Act, 1974 to grant and renew authorization, to monitor the compliance of the various provisions and conditions of authorization, to forward the application for imports by importers and to review matters pertaining to identification and notification of disposal sites.

DIRECTORATE GENERAL OF FOREIGN TRADE:

DGFT was constituted under the Foreign Trade (Development & regulation) Act 1992 to grant/ refuse license for hazardous wastes prohibited for imports under the Environment (protection) Act, 1986.

PORT AUTHORITIES AND CUSTOMS AUTHORITIES:

Under the customs Act, 1962 verify the documents and inform the Ministry of Environment and Forests of any illegal traffic and analyze wastes permitted for imports and exports and also train officials on the provisions of the Hazardous Wastes Rules and in analysis of hazardous wastes.

METHODOLOGY:

OBJECTIVES OF RESEARCH:

1. To improve understanding and create awareness regarding electronic waste.
2. To know thoroughly impact of electronic waste on human health and environment.
3. To study government policies and implications towards electronic waste.
4. To study prevailing electronic waste disposal practices.
5. To suggest some remedial measures for proper disposal of electronic waste.

HYPOTHESES:

The main purpose of this research was to analyze levels and characteristics of electronic waste and its effect on the environment and human health. The intended result and outcome of this study was to determine if there was a need to control, reduce, and properly dispose of obsolete or unwanted electronic devices.

H1: For overall sustainable development proper awareness and management of electronic waste is essential.

H2: Electronic waste causes number of problems in relation to health and environment which needs to be encountered and prioritized.

UNIVERSE AND SAMPLE:

There are 10 States that contributes very heavily up to 70 % of the total e-waste generated in the country. Among the 10 largest e-wastes generating States, Maharashtra state is the largest generator of electronic waste. The present research study deals with the various aspects of consciousness of Electronic waste and prevailing disposal practices in India and its impact on Human Health and Environment. The present research study was conducted in the major metro

cities of Maharashtra India (Mumbai, Pune, and Nagpur) as they are the largest generator of electronic waste. The data was collected by using Convenient Simple Random Sampling Method with a sample size of 300 respondents which comprises of different income, age, education from Government Agencies, Industries, Consumers, Recyclers (Organized, Unorganized), Scrap Vendor (Kabadiwala, Pickers, Transporters). For the research study purpose Convenient Simple Random Sampling Method (CSRSM) is going to be used.

PRIMARY DATA:

Primary data was collected through structured questionnaire through online and of line mode. The questionnaire and personal interviews mainly focuses on various aspects of awareness of Electronic waste and its impact on Human Health and Environment.

SECONDARY DATA:

Secondary Data is going to be collected through Annual Report of Companies, Books, Journals, Magazines and other related government literature, MOEF guidelines, PCBI guidelines etc.

SCOPE OF STUDY:

The scope of the study revolves around one prime factor which focuses heavily on human health and environment. Moreover other factor like minimization of waste, recycling, proper use of electronic equipment, waste transportation were also given due importance.

LIMITATIONS OF STUDY:

1. The study comprises of awareness of electronic waste and its impact on human health and environment related aspects only.
2. The other types of waste will not be measured and evaluated.
3. For research purpose only selected government offices, public (consumer), private industries and NGO were identified for research.
4. The study relies heavily on primary as well as on secondary data.
5. I assumed that the data received from the government offices, public (Consumer) and private companies was reliable and valid.
6. The result arises from research may or may not be applicable to other parts of the state or country.

RESULT AND DISCUSSION:

Table No.1: Awareness regarding E-waste.

Sr. No.	Factor	E-waste	%
01	Aware	32	10.67
02	Not aware	254	84.67
03	No Idea	14	04.66
Total		300	100%

(Source: Primary Data)

The survey was administered in metros and asked different stakeholders regarding the awareness of electronic waste, it was highly noticed that 84.67% respondents were totally unaware of the electronic waste. Most of the respondents were assuming it as a simple municipal waste. When communicated in details about electronic waste is a hazardous waste, most of the respondents expressed shocking reactions.

Table No.2: Awareness regarding Government E- waste policy.

Sr. No.	Factor	Government E-waste policy	%
01	Aware	26	08.67
02	Not aware	262	87.33
03	No Idea	12	04.00
Total		300	100%

(Source: Primary Data)

During the course most of the respondents were unaware about electronic waste at the same time shows total unawareness regarding government electronic waste policy. 87.33% respondents expressed that they were unaware of government policy.

Table No.3: Impact of e-waste on health and environment.

Sr. No.	Factor	Health and environment	%
01	Aware	23	07.67
02	Not aware	266	88.67
03	No Idea	11	03.66
Total		300	100%

(Source: Primary Data)

Respondents when asked about electronic waste and its impact on health and environment it was highly noticed that majority of the respondents i.e. 88.67% were totally unaware of the same. When further interrogated they were really shocked to know about the health impact of electronic waste.

Table No.4: Prevailing E-waste disposal system.

Sr. No.	Factor	Disposal system	%
01	Mixed with municipal waste	197	65.67
02	Separate E-waste	-	-
02	Exchange	53	17.67
03	Donate	19	06.33
04	Kabadiwala	14	04.67
05	Scrap vendor	17	05.66
Total		300	100%

(Source: Primary Data)

In India electronic waste is totally new concept. People often mixed municipal waste with electronic waste. According to the respondents no separate waste collection facility is available. In India most of the time it is found that older product is exchanged with the newer product.

Table No.5: Satisfaction received from E-waste collection services.

Sr. No.	Satisfaction	Respondents	%
01	Satisfied	17	05.66
02	Not satisfied	283	94.34
Total		300	100%

(Source: Primary Data)

Most of the respondents expressed deep dissatisfaction regarding services offered and communicated that this is totally new concept and no such collection services were found. As many as 94.34% respondents were totally shows deep dissatisfaction.

Table No. 6: Awareness regarding E-waste as an economic resource.

Sr. No.	Economic resources	Respondents	%
01	Aware	13	04.33
02	Not aware	287	95.67
Total		300	100%

(Source: Primary Data)

Majority of the respondents expressed that they were not aware about this fact.

CONCLUSION:

Electronic waste accumulation in the country if not disposed-off properly may become a serious challenge for the human health and environment in the coming future. From the Government side the enforcement of the laws needs to be stricter than ever with an intention to reduce this problem as soon as early before it becomes a threatening hazard for the country. This emphasize the immediate efforts on the part of Government ,corporate ,consumers, environmentalists to manage the Electronic waste through implementing a proactive and protective protocol for the agencies working in E waste reuse, recycle and disposal properly. Need is also felt to educate the general public about this critical issue which can become a major threat for the health of the public and the environment if not handle with care and consciousness.

SUGGESTIONS:



In modern day, our life and living standard, all are going to digitalized, which on one hand, is making our life much simpler but then it is creating a different kind of problem. So there is an urgent need for proper handling and disposal of e-waste with utmost sincerity. The most common practices adopted for disposal of e-waste are acid baths, land filling and open air burning. When electronic equipments are burned, they release abundant fumes which are dangerous for environment way beyond our imagination and estimation.

The principle of “Reduce, Reuse and Recycle” applies here. Reduce the generation of e-waste through smart procurement and good maintenance. Reuse still functioning electronic equipment by donating or selling it to someone who can still use it. Recycle those components that cannot be repaired.

Public education and outreach may well be the most important component. That is because no matter what infrastructure is available and developed, what the laws are, and what the option are, no one will be aware of it without public education.

Authorized separate E- waste collection must be started by the government at the earliest. E-bin must deposit and kept wherever possible for e waste collection. All the e-waste collected must be recycle in an environmentally protective manner.

The laws should be framed in such a manner that all the electronic waste must be take back by the producer and product must be designed in such a manner so that it can be used for long period of time.

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