

A Discussion of Causes & Effects of E-Waste

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Abstract— "E-waste" can be defined as electronic wastes that are thrown after their life. E-wastes contain chemicals that are hazardous to human as well as to the environment. Mobile phones, TV's, computers, tube lights, bulbs, battery, house hold appliances etc. that are disposed off after usage constitutes e-waste. Thus, e-wastes can be minimized by reusing, repairing or recycling it in an eco-friendly manner. This paper throws light on the effects of e-waste and how it can be managed effectively.

Key words: E-Waste, Hazardous, Reuse, Recycle

I. INTRODUCTION

Electronic industry is the fastest growing industry in the present scenario. Without no doubt electronic devices pave way for growth of many other industries. On the other hand, this growth has resulted in e-waste. That is, innovation and up-gradation of new devices made humans to move to the higher end models of electronic devices. It is to be noted here that, in olden days people had values towards their things; they used all the electronics until its working and even reused it after repairing. But now, people don't carry any values towards their gadgets or any other electronic goods. This is also a reason for increase in e-waste. The changing lifestyle, globalisation, and industrialization all these have made lot of changes in the economy positively. Negligence of these has adversely affected the environment as well as the human species.

There is a strong relationship between old electronics and e-waste. Consider smart phones, once a new model is introduced, people tend to switch over to the new model throwing away the new ones. This approach continues in all type of electronics like TV, laptop, tablets etc., Thus, it is in responsibility of the public, manufacturers and sellers of electronic goods and as well as the government to take necessary measures to minimise e-waste.

II. LITERATURE REVIEW

Violet N. Pinto (2008), has quoted that an urgent approach to the e-waste hazard should be adopted by technical and policy-level interventions, implementation and capacity building and increase in public awareness such that it can convert this challenge into an opportunity to show the world that India is ready to deal with future problems and can set global credible standards concerning environmental and occupational health.

S. B. Wath et al. (2010), discussed about composition of E-waste, categorizing, scenarios of E-waste in India and Global context, prospects of recoverable, recyclable and recovery processes followed, and their environmental and occupational hazards.

Ramachandra T.V., & Saira Varghese K. (2004), has pointed out in their study that using proper e-waste management techniques aids in the reduction of e-waste. And

also notes that, proper government policies and inventory management can help in e-waste management.

D. Sinha-Khetriwal et al. (2005), presents a comparison of the end-of-life treatment of the life treatment of electronics in two countries, Switzerland and India and stated potential ideas for improvement.

P. Kiddee et al. (2013), discusses about the toxic substances that are present in the E-waste, and their impact on environment and human health and also discusses about various e-waste management techniques that are used currently.

III. OBJECTIVES OF THE STUDY

The following are the objectives of the study are:

- To examine the effects of e-waste
- To discuss various e-waste management techniques

IV. EFFECTS OF E-WASTE

Improper disposal of electronic goods pollute the soil. The acid, chemicals, plastics materials, glasses from the electronic goods pollute the soil. This in turn pollutes the ground water and adversely causes health issues in humans and animals. The following are the effects of e-wastes on air, water, soil and humans.

A. Effects on Air

Toxic metals and chemicals that exist in the e-waste gets into the natural resources that exploits its purity. These e-wastes when gets warmed up, it release toxic chemicals into the air, polluting the atmosphere. Wires which are burnt in order to take the copper in it releases hydrocarbon in air, which pollutes the air.

B. Effects on Water

E-wastes contain chemicals like mercury, lithium, barium when are not properly disposed seeps through the soil and pollute the ground water, which exploits the streams and small ponds around. These chemicals that get into the groundwater results in the death of plants and animals that live in water. As most of the local public depend on water that is available in ponds and streams, people consuming this water also get health issues.

C. Effects on Soil

These toxic chemicals from the electronic goods enter the soil from which they get into the crop and pass those to crop, which is finally consumed by humans and animals. As these chemicals aren't biodegradable they exist for a very long time in the atmosphere. The soil becomes ineligible for cultivation resulting in food shortage and increase in cost of food products.

D. Effects on Human

The effect of toxins in humans includes deficiencies in birth, heart, kidney, brain, liver and skeletal system. It also affects the nervous and reproductive systems of the human body.

Source of e-wastes	Constituent	Health effects
Solder in printed circuit boards, glass panels and gaskets in computer monitors	Lead (PB)	<ul style="list-style-type: none"> - Damage to central and peripheral nervous systems, blood systems and kidney damage. - Affects brain development of children.
Chip resistors and semiconductors	Cadmium (CD)	<ul style="list-style-type: none"> - Toxic irreversible effects on human health. - Accumulates in kidney and liver. - Causes neural damage. - Teratogenic.
Relays and switches, printed circuit boards	Mercury (Hg)	<ul style="list-style-type: none"> - Chronic damage to the brain. - Respiratory and skin disorders due to bioaccumulation in fishes.
Corrosion protection of untreated and galvanized steel plates, decorator or hardener for steel housings	Hexavalent chromium (Cr VI)	<ul style="list-style-type: none"> - Asthmatic bronchitis. - DNA damage.
Cabling and computer housing	Plastics including PVC	<ul style="list-style-type: none"> - Burning produces dioxin. It causes Reproductive and developmental problems; - Immune system damage; - Interfere with regulatory hormones
Plastic housing of electronic equipments and circuit boards.	Brominated flame retardants (BFR)	<ul style="list-style-type: none"> - Disrupts endocrine system functions
Front panel of CRTs	Barium (Ba)	<ul style="list-style-type: none"> - Short term exposure causes: - Muscle weakness; - Damage to heart, liver and spleen.
Motherboard	Beryllium (Be)	<ul style="list-style-type: none"> - Carcinogenic (lung cancer) Inhalation of fumes and dust. - Causes chronic beryllium disease or berylliosis. - Skin diseases such as warts.

Table 1: Effects of E-Waste Constituent on Health

Source: <http://wgbis.ces.iisc.ernet.in/energy/paper/ewaste/ewaste.html>

V. E-WASTE MANAGEMENT

E-wastes should be properly managed in order to protect the soil, water and environment which helps to minimise diseases caused to humans. Some of the best ways to manage e-waste are discussed below:

- 1) Inventory management: Managing the materials used in manufacturing units of electronic goods helps in the reduction of e-wastes. Purchasing of goods that are hazardous to the environment should be reduced by looking for alternatives that are not hazardous or have minimum polluting chemicals.
- 2) Volume reduction: Reduction of units produced can highly contribute to reduction of e-wastes. By removing hazardous portions of wastes in manufacturing the electronic goods and segregating the wastes can also contribute in e-waste minimisation.
- 3) Recovery and Reuse: Recovering the wastes from the public by setting up units and reusing the parts that are in good condition helps in reducing e-wastes.
- 4) Creating electronic components and peripherals of biodegradable material: making all the possible electronic goods using biodegradable materials help in less pollution and helps in protecting the environment.
- 5) Responsible consumers: not only the manufacturers and the government is responsible in reduction of e-wastes,

- but we public must also act highly responsible in treating the electronic products.
- 6) Binay Kumar in his study suggests a strategy of "Reduce, Reuse, Recycle" for e-waste disposal. Where
 - Reduce indicates reduction of e-waste through smart procurement and good maintenance.
 - Reuse the electronics by donating or selling it to someone who can still use it.
 - Recycle those components that cannot be repaired.

VI. SUGGESTIONS

Some of the best ways to avoid or minimise e-wastes is discussed below:

- 1) Recycling: Recycling the old electronics can help in reduction of e-wastes. This would be done by using the parts, plastics in the old electronics.
- 2) Donation: Used good conditioned electronic goods can be donated to the needy or to charitable organisations, so that it is used in some way rather than throwing it away thus reducing the amount of electronic waste.
- 3) Taking it back policy: companies selling electronic goods must also take it back when it's of no use to the customers by paying some amount, so that they can recycle or repair if possible or dispose it off efficient. This would be great as people won't throw away the electronics if it can yield some amount.

- 4) Creating new out of old: old electronic products can be used to create some creative products as almost everything is available online.
- 5) Reuse: Reusing the old gadgets or electronics for some other purpose can also help in minimising e-waste. For example CD's can be made it home decorative.

VII. CONCLUSION

The disposal of e-waste is an important and serious issue to be addressed in the current scenario. Improper disposal of electronic goods may risk the life of humans, animals and the environment. Thus it is essential to reduce the amount of e-waste by taking proper measures.

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