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Effect of E-Waste on Environment and Living Beings- A Literature Review

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Abstract: This article reviews the problem of effects of E-waste on Environment and Living beings. Selected papers published in the English language including the phrase "E-waste" in the title, abstract, or key words were searched in science direct and Google scholar databases and reviewed. The literature provides evidence that in recent years the problem of E-waste has attracted the interest of many researches. Development was used to ensure E-waste is managed in a strategic way that leads to an E-waste management approach that could exist in a sustainable society. The effect of E-waste on the environment and living beings is discussed in the article.

Keywords: E-waste, Electronic waste, Waste management, Hazardous waste.

I. INTRODUCTION

Globally, the rates of waste production are increasing, with electronic waste comprising a large portion of the total. Electronic-waste is also known as E-waste, very trendy yet casual name given to electrical and electronic appliances & gazettes, either discarded or of no further use. Kohler, A., Erdmann, L.,(2004) [12] explained that the home appliance like automatic ovens, fridge or chilling machines and many others which also work on programming and computer related activities are very difficult to differentiate from WEEE as they are also part of either electrical or electronic family. Wang et al., (2010) [15], write in detailed that electronic & electrical waste is actually a family and it has many branches which includes all personal, commercial, educational, transportation, private or public products which mainly work on power and have some at least sort of automation to function to meet the requirement.

The main reasons behind the problem of E-waste are:

1) Rapid technology changes and slow adaptation to changes
2) Increase in consumers electronic purchases
3) Lack of the knowledge of E-waste management & handling.
4) More waste more toxic.

A. SOURCES OF E-WASTE

1. E-waste from in person Darby, L., Obara, L., (2005) [9] narrated as far as personal computers originating from separate families related data they are not major donor, they only responsible for around 23% where as the rest is given by commercial activities i.e. 77%.

2. E-waste from Business Sectors Dalrymple et al. (2007) [8] explained the corporate segments (Government sections, Non-government sections, trans national organizations, etc.) are the major participants in this problem as their percentage is almost 77% which is very high as compare to individual and in number it is almost near to 139,00,000.

3. E-waste from Manufacturer and Retailers Guo J, Guo J, Xu Z, (2009) [7] explained other than public, private and other end users their two more categories viz. producers i.e. manufacturers and sellers are also responsible for pilling of e-waste every day and year. During their routine process many faulty and low quality wise parts as well as entire products also send to the garbage and ultimately to dumping sites or for land fillings. Annually approximately 1100 tons of waste comes from this part.

4. E-waste from Importers Ongondo, F.O (2011) [13] explained that the developed nations are not only dumping their e-waste in dumping sites of their own countries but they also dump this waste to other areas, budding nations, under developed nations. Developed nations not only dump second hand products but also their parts like mouse, keyboards, printers, wires, motherboards etc. into under developed nations. And this dump part is of different variety as well.

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5. Derived sell of Old PCs Derived sell is nothing but an area where used electronic and electrical parts and products are easily available, like television, PCs, mobile phone, electric boards etc.

B. CATEGORIES OF E-WASTE

ETC, Electronics Take Back Coalition, (2010) [10] narrated the electronic and electrical equipment's are separated into below types:

1. Big domestic equipments (Coolers, fridge, cooking machines, Cleaning M/c).
2. Undersized domestic equipments (watches, Home Cleaning M/c., Mixers).
3. ICT tools (Computers, phones, copiers).
4. Customer Appliances (Tele-Vision, Frequency Transmitters, Cam).
5. Illumination Systems (Tube Lights, Bulbs, Halogen lamps).
6. Automatic Mechanical tools (drilling M/c, Stitching M/c, Cutters).
7. Sports instruments, Recreation tools (Battery games, Consoles, Playing M/c).
8. Apparatus use for Medical Purpose.
9. Observation and Disaster detection devices.
10. Electrical devices for consumables like tea maker or coffee maker.

II. LITERATURE REVIEW

A. HUMAN HAZARDS

Kohler, A. et al. (2004) [12], ATSDR (2007) [4] explained Lead: IT is very prominent and dangerous material found in e-waste creates problem for CNS and Peripheral NS, Functioning of Kidneys and on Blood circulation. It is essential substance used for varied purpose like for on PCB or for soldering of many components.

ATSDR (2012) [5] Cadmium: It is also not less than lead in its poisonous activities as it damages human health upto maximum extend from where recovery is almost not possible if exposed to it. It is used in infra-red detectors, chip resistors; devices surface mount devices (SMD), and semiconductor chips.

ATSDR (1999) [1] Mercury: It is as fatal as anything else can, it directly attacks to next generation of human beings even it causes severe problems to fetus or new born babies. It also damages to brains and kidneys. It is used in thermometer, buttons, transmission, PCBs, Power houses and in Cellular devices.

ATSDR (2012) [6] Hexavalent Chromium or simply Chromium or simply Chrome protection from rusting when exposed to environmental conditions. It is used as a protection layer or coating on steel or iron parts. It can directly reacts with tissues and reacts with cells and starts damaging those. Plastic which is manmade synthetic material used for varied purposes like protection, carrying, cabling. It creates developmental and reproductive problems interfere with regulatory hormones and Immune system damage. It comprises dioxins.

B. ENVIRONMENTAL HAZARDS

Hilty L.M., (2005) [11] explained dangerous effects of burning metal parts of discarded electronic products creates severe health and environmental hazards. These metals or components cannot be oxidized at low temperature but required very high end furnace systems and which ultimately releases very high amount of toxic substances in the environment. These marts contains high amount of plastic, mercury, lead and brominated components which are very harmful even exposed to environment or fire.

Schluep, M (2009) [14], explained due to use e-waste material for filling land sites: Whatever materials use for land filling purposes it reacts with soil and other components of environment as and when exposed to it. And this leaking creates life time effects on exposed environment. The historical dumping sites form is very bad and irreversible.

ATSDR (2012) [1], Schluep, M. et al (2009) [14] wrote it is very well known that metals are reacts with environment but many a number of times these metals also contains liquid substances it in which leaks and creates severe health hazards. The open landfills are also source of water and these metals can easily reacts and mix with water source which ultimately used for agricultural or domestic purposes. The discarded parts contain, plastic, CRTs, Circuits, wires, acid waters.

Hilty L.M., (2005) [11] explained recycling repercussions: Recycling even though as compare to other available processes is advantageous but it also has many disadvantages and limitations. Recycled products cannot be use for life

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long as their working life is very less and they cannot cope up with recent developments and can't fulfil current demands. During the recycling process again the existing waste has to go through a particular process where many parts exposed to different conditions and there they can react easily and create serious ill effects. Only relief with recycling is that the entire part is not discarded which up to certain extent reduces amount of generation of e-waste.

ATSDR (2012) [5] Written additional trouble about heavy metals is that these metals are released into environment without any pre-process or activities on them and destroyed in their original forms. It is being expected to provide proper process before going for final destruction specially printed circuit boards, CRTs and power systems or batteries.

C. EFFECTS ON OVERALL ENVIRONMENT

Widmer, R (2005) [16] narrated during the manufacturing processes these metals gone through varied actions and treatment but when it comes to disposal activities they are just thrown away into environment. These components contains liquid or semi liquid materials also which rapidly discharged from dumping sites and get mix or reacted with water sources or ground water available in that area and reaches to domestic or to residential areas.

Kohler, A (2004) [12] explained Not only liquid water can gets contaminated due to illegal dumping but there are other matters which reacts with air in gaseous state and creates serious breathing problems. Air is one of the fastest moving medium from one place to place and it is very difficult to convert air conditions into its original state.

ATSDR (2012) [5&6] mentioned Mercury is mostly found in liquid or semi liquid state, it is not only poisonous but one of the potent carcinogen and damage CNS and Peripheral NS, functioning of brains and Blood circulation when exposed to human conditions. It is presented in very hollow devices and when any such parts get damages due to crushing or hammering it gets releases and reacts with environment. It easily reacts with soil and water sources it also reacts with open air and other metals present in dumping sites. CRTS and PCB contain polychlorinated biphenyls (PCBs) which also contains mercury.

Bastiaan C (2010) [7] narrated Mercury is not only present in the liquid or semi liquid state but it is also present in vaporization state which creates similar threats to all biological system. This reaction of metals and hazardous substances with gaseous state not only pollute local air conditions but global too. IT leads to many allergic reactions and suffocating problems and it has not boundary as such. And entire global biological system suffers due to it.

III. CONCLUSION

This article gives an overall idea related to the problem of E-waste. Like every waste affect the health of the human being & environment directly or indirectly, E-wastes also affect the health of both of human & environment directly & indirectly. Almost every pert of electronic waste has effect on the human health directly or indirectly like it affect nervous system, development of the children, disturb the natural ecology which is not good from everyone in the world point of view because it direct & indirect effect is on the human being.

The proper management e-waste is very new and upcoming concept even in an IT specialist country like India. Our nation is producing e-waste in a large amount. Moreover, our country is on receiving end to accept e-waste from many developed nations which increases this problem many folds. The reviews of various research focus on variety of aspects of research under study. According to reviews maximum proper practices are accepted and adopted by many developed nations and it is very important to understand and find out what sort of practices and up to what extend these practices are carried out in our own country where environmental related laws and rules are not observe that effectively. We have to undertake different practices to tackle this problem.

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