E-Waste Management – A Suggested Model

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Abstract-Electronic waste or e-waste is one of the rapidly growing problems in the digital world. E-waste comprises of a huge number of components like discarded Televisions, Computers, Cell phones, CRT's and other electronics, some containing poisonous substances that can have bad impact on human health and the environment if not handled properly. Because of this reasons E-waste should handled properly to minimize its bad impact on human body and environment. Putting the responsibility of re-cycling of E-waste on the producers, the Ministry of Environment and Forest (MoEF) has for the first time notified E-waste management rules (2011). Keeping this in mind, our paper describes a E-waste Management model which will help manufacturing company to manage and re-cycle their E-waste.

***Index Terms*-**: E-waste, Formal Sector, Informal Sector

1 INTRODUCTION

1.1 What is E-Waste?

E-waste means waste electrical and electronic equipment, whole or in part or rejects from their manufacturing and repair process, which are intended to be discarded. This include used electronic like Televisions, Computers, Cell-phones, CRT's etc. which are intended for reuse, resale, recycling or disposal and secondary scrap like copper, steel, plastic, etc. which is dumped by the buyer rather than recycled, including residue from reuse and recycling operation.

E-waste is one of the fastest growing problems in developing countries. Due to the fact that the life span of computers has dropped in developed countries from six years in 1997 to just two years in 2005, and mobile phones have a lifespan of even less than two years, the amount of generated e-waste per year grows rapidly.[3]

E-Waste disposed to municipal waste releases hazardous toxin materials into environment causing Environment pollution. Our model suggests the e-waste management model to eliminate landfill, to save Earth by preventing air, water and pollution. [2]

1.2 Reasons of E-waste

New purchase:-The one of the reason of the E-waste is everyone purchasing the new devices with improved technologies hence old devices are keep a side.

Expansive to repair: - the device is very costly to repair and people thinking instead of repairing they purchase new device and those faulty device is considered as e waste.

Life ends:-Every device has some life and after that it is not usable then it is considered as e waste. Suppose computer has 5-6 years lifetime then after 5-6 years later it is not usable same with mobile phones, it has 2-3 years lifetime.

1.3 First try to decrease the percentage of E-waste by applying following ways.

- Purchase appliances from **reliable** manufactures so less possibility of malfunction.(certified by ISO/ISI mark)

- **Maintain** it properly.

- After new purchase of electric equipment, **donate or sell** the Functioning electronic equipment to someone who can still use it.

- **Recycle** those products that cannot be repaired. To find an organization that will manage your electronics for recycling.

2. EFFECTS ON ENVIRONMENT AND HUMAN HEALTH

Roughly 40 million metric tons of electronic waste (e-waste) is produced globally each year, and about 13 percent of that weight is recycled mostly in developing countries. Informal recycling markets in China, India, Pakistan, Vietnam, and Philippines handle anywhere from 50 percent to 80 percent of this e-waste, often shredding, burning, and

dismantling the products in "backyards." Emission from these recycling practices are damaging human health and the environment.(our model suggest the way to recycle this e-waste)[2] E- wastes can cause huge environmental damage because of the toxic materials present in the electronic goods. Land filling of e-wastes can lead to the leaching of lead into the groundwater. If the CRT is crushed and burned, it emits toxic fumes into the air. These products contain several rechargeable battery types, all of which contain toxic substances that can contaminate the environment when burned in incinerators or disposed of in landfills. The cadmium from one mobile phone battery is enough to pollute 600m3 of water. [1].

Beyond CRT monitors, plastics, including polyvinyl chloride (PVC) cabling are used for printed circuit boards, connectors, plastic covers and cables. When burnt or land-filled, these PVCs release dioxins that have harmful effects on human reproductive and immune systems [6]. Mercury (Hg), which is used in lighting devices in flat screen displays, can cause damage to the nervous system, kidneys and brain, and can even be passed on to infants through breast milk [7].

Electrical goods contain a range of other toxic substances such as lead (Pb), beryllium (Be), brominated flame retardants and polychlorinated biphenyls(PCB) just to name a few. Lead plays an important role in the overall metal production processes and while attempts to design-out lead from EEE does not necessarily mean that it is no longer used. Even the lead-free solder elements are co-produced with lead. This illustrates the need for a holistic view to be taken in analyzing the e-waste situation for working out possible solutions.

3. WAYS TO COLLECT E-WASTE

There are two ways to collect the E-waste

1. Informal Sector:

Informal sector consists of peoples below poverty level, who don't have any knowledge about electric equipment. The country's having Informal recycling

markets which are China, India, Pakistan, Vietnam, and the Philippines handle anywhere from 50 percent to 80 percent of this e-waste. In Informal sector, this e-waste is dismantled and sorted manually. The peoples which are involved in informal sector don't even know the risk of handling this e-waste. It is a way of earning for these peoples and due to lack of awareness; they are risking their health and the environments as well. No machinery or personal protective equipment is used for the removal of different materials .All the work is done by uncovered hands and only with the help of hammers and screwdrivers. Children, teenagers and women are routinely involved in the operations on some negligible wages. Environment will badly get affected because of such kind of e-waste collection method. It pollute the air, water as well as land.[4]
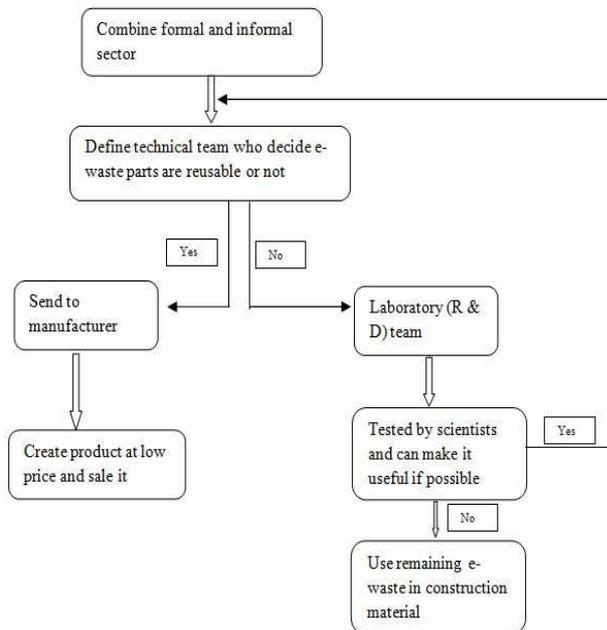

2. Formal sector

This sector is well organized as compared to Informal sector. It contain proper infrastructure, some technical staff to dismantle e-waste. It is a Combination of manual disassembly and refinery to upgrade materials limited reuse. This sector works with controlled detoxification and disposal environment, health and safety system as compared to informal sector.[4]

4. E-WASTE MANAGEMENT MODEL

1. Combine formal and Informal e-waste collection sector: In this step our model suggests combine the e-waste collection sector by giving proper infrastructure and safety to peoples who are from Informal sector. If this people trained properly so then can be the part of Formal sector. This will increase the employment too.

2. 2nd step suggests from the e-waste collected by above method now this e-waste is checked by technical team. Technical team will separate out the usable part and unusable part. Usable part can be given to manufacturer..

3. Manufacturer would use this parts to create a new product and sell this products at lowest prize. These products would purchased by the economically weak peoples. This will help manufacturers to recycle their e-waste and generate the revenue too.

4. If the parts are not useful in manufacturing would send to R and D team for further testing. If it would be made usable so again it will be send to technical team to decide it can be useful for recycling or not. part:

5. After all this process still some e-waste would remain it can be used in construction material.[8]

Chen[6] reported the scope for utilization of waste glass in concrete in several forms ,including fine aggregate and coarse aggregate. E-waste can be used in Road construction aggregate and building applications like Bricks, Tiles, Wall panels etc.[7]

5. CONCLUSION

Our paper suggesting the way to divert the E-waste collection flow from the informal channel to formal system by giving proper infrastructure as well as safe environment to informal sector. Our model suggested that using this model we can minimize the pollution of the environment and landfill. This model also suggests how to recycle and reuse the e-waste and create the product with low cost so economically weaker peoples can buy these products. After all this process still any e-waste remains it can be used in construction material. So our paper tying to reduce the bad impact of e-waste on human body and on environment.

REFERENCES

[1] B.J. Mohite "Issues and Strategies in Managing E-Waste in India" ISSN No. : 2319-6998 I Vol. 1 I Issue 1 I Mar. 2013
[2] http://www.prb.org/Publications/Articles/2013/e-waste.aspx
[3] http://www.unep.org/gpwm/FocalAreas/E-WasteManagement/tabid/56458/
[4] http://www.transwaste.eu/file/001440
[5] http://en.wikipedia.org/wiki/Electronic_waste
[6] C.H.Chen, R.Hwang, "Waste Eglass
[7] particles used in cementious mixtures" Cement and Concrete Research, vol 36 (2006) pp 449456.
[8] SecungBum Park, Bong Chun Lee, "Studies on expansion properties in mortar containing waste glass & fibering. Cement and Concrete Research, vol 34 (2004) pp 1145-1152.
[9] http://www.livescience.com/2770-computers-recycled-construction-material.html