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"E-Waste: Potential Source Of Revenue Generation"

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ABSTRACT *The generation of e-waste is at a tremendous rise. The increasing chaos to discard the E-waste is havoc for the environment. In spite of hues and cries much needs to be done. Generation of profit from scrap here can be a win-win situation under such conditions. The need to focus on recycle and reuse is increasing as resources are on the verge of depletion. The export of e-waste to developing countries worsens the situation as the e-waste is directly dumped without being treated. This negative impact can be made into a positive one by employing people for recycling of e-waste in a well organized manner, and reusing the junk, by extracting the useful resources and creating profit from it.*

This paper brings forth major steps required to be taken to take the charge of e-waste. How and what all resources can be brought out from e-waste to use. Also, it would help in employment of many unemployed. This paper talks about the potential of e-waste as a business; need to enforce laws which inhibit the use of toxic substances, written from both environmental friendly and social point of view.

Introduction:

As technology evolves problems associated with technology also evolve. Growth of E-waste is the best example of the same. And with increasing technology the previous ones are getting outdated. Thereby more and more amount of deposition of waste like computers, televisions, calculators, washing machines, etc. Disposal is important. More so important is, smart and logical disposal. Though obviously this might not be as easy as it seems but channelizing energies the energies to extract maximum possible resources from E-waste open up a profitable generation of revenue, from E-dump yard, but also help in avoiding the mixing of components into the soil and cause poisoning.

Reuse of the resources from the E-waste in a better and environment friendly manner is required. It should not just be treated as just junk. It not only contains toxic elements but also many useful, important and in many cases heavy metals. These metals and re-usable resources can be extracted along on the circuit boards.

Use of better techniques, like use of appropriate integrated smelter processes for the extraction of heavy metals efficiently and other such techniques has to be brought into light and more so much into production, along with a systematic approach to sort the E-waste.

Chemicals present in e-waste:

Bulk elements include lead, tin, copper, silicon, carbon, iron and aluminium. Elements in small quantity are cadmium and mercury. The trace elements are germanium, gallium, barium, nickel, titanium, indium, vanadium, terbium, beryllium, gold, europium, titanium, ruthenium, cobalt, palladium, manganese, silver, antimony, bismuth, selenium, niobium, yttrium, rhodium, platinum, arsenic lithium, boron and americium.[1]

Recycling and Potential Resources:

As is mentioned above, the E-waste is a complex mixture of many chemical and metals. Increase of these metals, glass and plastics can lead to significant environmental damage. To avoid this we need to extract maximum possible resources, also to save many of useful and valuable secondary resources. To start of the extraction process of these need to undergo a proper protocol being; collection, dismantling and Shredding / preprocessing which needs to be done at the local / regional level. End processing needs global level to recover the compositions effectively. It is important to keep in mind that majorly toxic substance and important resources are concentrated on the circuit board. Proper collection, dismantling and preprocessing is a necessity. Mixing of two different qualities can severely affect the recycling returns. The composition of e-waste also is important as it is determines the technical procedures e-waste will have to go through according to the concentrations of particular metal / substance to be extracted. Changes in the concentration would imply the change in the techniques being used concentrations of extracting chemicals and all other parameters like the emission control. The process of recycling is complex mainly because of the interdependence of the processes in recycling of e-waste. The process is additive at each step, in the sense that in its each step of collecting, dismantling and preprocessing efficiency is demanded, till the end of the process.

Directive on the restriction of the use of certain hazardous substance in electrical and electronic equipment, adopted by the European Union in 2003, should be thanked to initiate a directive to restrict the use of six hazardous substances in the manufacture of electrical and electronic equipments working in collaboration with the WEEE (waste electric and electronic equipment) directive 2002/96/EC stating the recycling of e-waste and recovery of useful resources to solve the problem of huge amounts of toxic e-scrap.

Directive 2002/95/EC restricted six main substances being; lead (Pb), mercury (Hg), cadmium (Cd), hexavalent chromium (Cr6+), polybrominated biphenyls (PBB), polybromi-

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nated dipheny ethers (PBDE).

ROHS is often inaccurately stated as "lead free directive". ROHS set maximum permitted use of these substances in non-exempt products- 0.1% or 1000 ppm except cadmium which is allowed at a lower still rate i.e., 0.01% 0r 100 ppm. Such a legislative did cause ripples in the industries like that of batteries and medical industries where the use of lead and mercury. But it did the favor of reducing accumulation of six very harmful substances and allowing the dependence greatly on use of Tin (Sn), Copper (Cu), Bismuth (Bi), and Silver (Ag)[2].

Such steps if adopted and taken very seriously will help not only in reducing the toxins but also influence the growth of revenue from the e-waste pushing much of the man power towards this sector. It is also of importance to keep in mind that any major loss of a precious loss would directly affect the revenue from e-waste.

This can be a promising business and help in involving many small scale and large scale industries and involving the man power, also a win-win situation.

It should also be brought in light that only $1/5^{th}$ of all the e-waste produced is brought to be processed. This means $4/5^{th}$ portion of the waste is actually filled in the dump yard along with other wastes. Backyard treatment brings more harm than it is anticipated that it can bring.

Therefore, a systematic methodology is required to extract the useful resources.

Useful resources:
The useful resources that can be extracted are: Glass, Lead, Aluminium, Copper, Plastics, Zinc, Iron, and other metals including precious metals like Silver, Gold, Platinum, Palladium, and Rhodium etc.

The extraction of metallic and non metallic substances occurs differently starting from the level of separation to the end processing levels. Extraction of metals also occurs at two major levels being: Base metal operations and Precious metal operations. Obviously no smelter can recover all the metals; the recovery depends on thermodynamics, technology an economy. It is important to pre-treat the materials.

Similar pretreatment techniques are used for glass and plastic. Glass is usually extracted from CRTs. CRTs are dismantled manually, separating the glass and the metal. The glass from e-waste can be sent to glass manufacturing units.

The e-waste is actually so full of resources that it should be used as a raw material for extraction of essential resources and treated not as waste but a potential profit generator. There are some large scale industries like; Umimore (Hoboken, Belgium) which deal with extraction of metals from e-waste, and achieving high turnovers.

Recovery of plastics would be beneficial but as of now no economical method of recycling is accepted at a wide scale. Though there are small developments in this sector also, those are yet to be used on an industrial level.

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