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AN ANALYTICAL STUDY ON E WASTE AND ITS IMPACT ON ENVIRONMENT

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ABSTRACT
E waste is a most hazardous for environment. WEEE (waste from electrical and electronic equipment's) comes under a special category of waste which is the result of industrialization and ever increasing demand of electronic products in daily life. With increasing usage waste production is also increasing. Now, the situation is alarming as a huge quantity of waste is generated by India as well as other countries. E waste is a big issue because using Electronic device is very easy but after throwing the E waste in the environment may lead to serious problem .The condition in India is much worse because about 80 present of the e-waste generated . The rest of it is handled by workers who work with bare hands, without masks under unhygienic conditions, informally recycling tons of e-waste for about 11-14 hours a day. It causes both environmental as well as health problems. No. of laws are framed but none is able to stop this informal recycling. In this paper, national and international e-waste scenario is discussed along with hazards caused by e-waste and bit about its recycling.

Keywords: WEEE, Informal recycling, hazards , E waste.

INTRODUCTION
According to the OCED (Organization for Economic Cooperation and Development) any appliance using an electronic power supply that has reached its end-of-life would come under WEEE. WEEE (waste from electronic and electrical equipment's) is a special category of waste that has received great deal of attention over past 15 years. WEEE is diverse and complex in terms of the material and component make up as well as in terms of original equipment manufacturing process. The electronic industry is the world's largest and fastest growing manufacturing industry 1, 2. The Indian information technology (IT) has a prominent global presence today largely due to software sector. More recently, policy changes have led to tremendous influx of leading MNC's into India to set up manufacturing facilities, R&D centers and software development facilities. Starting with 13 IT companies in 1991, about 3000 IT companies as of now in Bangalore are providing world class infrastructure. This phenomenon of Bangalore is getting replicated in several other cities of India viz., Chennai, Mumbai, Hyderabad, Pune, Gurgaon etc. This asymptotic growth in IT industry has brought its share of waste disposal problem. Economic Growth and Digital Revolution: 1980 was the year when the great digital revolution started and has not ceased till date. The digital revolution provided variety of products which were not only economical but also easy to use therefore they invaded our households completely. They are now easier and convenient to replace rather than getting them repair.

REVIEW OF LITERATURE
International E- Waste Scenario according to studies about 4000 tons per hour of E-waste is generated worldwide7 . E-Waste generated by different countries is given in table-2. The use of electronic devices, such as PC's has proliferated in recent decades and the quantity of electronics disposed off is growing rapidly throughout the world16 . Note: The table gives only an overview of the quantities of ewaste generated in different countries. It is difficult to make direct country-to-country comparisons regarding e-waste quantities, because each country has as different categories of appliances counted in e-waste and different methodologies of estimation. (*) This is the quantity of e-waste generated in Switzerland that is physically weighed and accounted for.

E- WASTE SCENARIO IN INDIA:
In present times if we study closely e-waste is one of the fastest growing pollution problems which is increasing almost three times than that of municipal waste globally. With the increase in consumption of electronic goods and also with their usage pattern the generation of e-waste also increases. As there is no separate collection of e-waste in India, no reliable figures are available as yet to quantify the e-waste generation. The current data shows that by 2012 global e-waste will reach 53 million tons from 42 million tons in 2008 thus growing at a CAGR(Compound Annual Growth Rate) of 6 percent4 . E-Waste is continuously growing in developed countries by 2010 it has grown to 2% in comparison to previous 1%. While in developing countries e-plastic waste contribute 0.01% -1% of total solid waste generation.

India with population of over 1 billion17, is one of the fastest growing economies of the world18 . The growing economy and increasing consumption is estimated to be generating approximately 4, 00,000 tons of waste annually (computers, mobile phone and television only) and is expected to grow at a much higher rate of 10-

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15%. The situation is alarming as India generates about 1.5 lakh tones of e-waste annually and almost all of it finds its way into the informal sector as there is no organized alternative available at present 19 . E-waste generated in few cities across the nation show an alarming picture. Mumbai generates 11,000 tons of E-waste, Delhi 9000 tons, Bangalore 8000 tons and Chennai 5000-6000 tons each year. Maharashtra State (including Mumbai city) alone produces 20270 tons of E-waste annually20. These figures have been shown through the table 3 and table 4. Toxics link, a Delhi-based non-government organization (NGO), says that India annually generates 1.5 billion worth of e-waste. As per a study done by Bangalore-based NGO, Saahas, the city generates around 8,000 tons of e-waste every year. It is true that the e-waste spectrum is broad, but IT companies are the single largest contributors to the growing mountains of it. This is because 30% of their equipments are rendered obsolete every year. Reason being is that the life cycle of some electronic goods as short as about 15-20 months. This average age of computer is only 3 years and is progressively decreased because of the demand for accelerating speeds in the processing capability of the telecommunication infrastructure. According to Manufacturer's Association for Information Technology (MAIT) report India in 2007 generated 3, 80,000 tones of e-waste from discarded Computers, Televisions and Mobile Phones. This is projected to grow to more than 8, 00,000 tones by 2012 with a growth rate of 15 %. According to this estimate about 50, 000 tones of such e-waste which is imported from developed countries as a gesture of charity for reuse is basically recycled informally either immediately or after discarding the reused product. It has become difficult for custom department to put a stop to illegal inflow of ewaste because of no availability of specific measures and policies21 .Take back policy in India: Some of the well renowned companies like Apple, Sony, PCS, Philips, Microsoft, Panasonic, Sony Ericsson and Toshiba, HCL have adopted take back policy option at their production plant. HCL and WIPRO have the best take back policy in India. Even Nokia, Acer, Motorola are follow the policy at a good pace. But with such large population only one collection centre is not sufficient. Even a big company like Samsung claim to have a take back service but only one collection centre in India23 . Sources of e-waste Manufacturer: According to surveys conducted about 50% of PC's which are sold all over the country are basically from the secondary market and are reassembled on the old components. The rest of market share cover by MNC's (30%) and Indian brands (20%)24 . Besides manufacturers are major contributors of e-waste. The waste consists of defective IC chips, motherboards, CRTs and other peripheral items produced during the production process. It also includes defective PCs under guarantee procured from consumers as replacement items. Consumer: About 22% of junk computers are generated from Indian household25 . The routine process of getting rid of obsolete computers include exchanging from retailers or pass on the same to friends or relatives. The business sector accounts for 78% of all installed PC's in India25. The junk computers from business sector are often sold during auction or sometimes donated to educational institutes or charitable institutions for reuse. Import of e-waste: Import of e-waste is legally prohibited no doubt the reports prove that lots of e-waste is imported from abroad. The ministry of environment has no data related to import of e-waste but above says that 100% control of the borders is not possible. Hazardous waste (management and Handling) rules 1989, amended in 2003: Schedule 2 of this act can be applied for the disposal of e-waste. The Basel Convention 32: Regulating the E-Waste Trade: The 1992 Basel Convention is an international treaty signed by 169 countries to regulate the international trade of hazardous waste. The Convention's central goal is "environmentally sound management" (ESM), which involves controlling hazardous waste from its production to its storage, transport, reuse, recycling, and final disposal. In addition, the Basel Ban Amendment was adopted in 1995 to outlaw the transfer of hazardous waste from developed to developing countries.

The Amendment has not yet entered into force, but several countries have already implemented the ban, including the European Union and China. However, illegal trading is pervasive and those who benefit from the waste trade continue to strongly oppose a global ban with European Union`s (EU) directives such as WEEE and restriction of Hazardous substances (ROHS) coming into effect from 2006 in Europe. E-waste recycling is increasingly receiving a major trust. The motive of defining such guidelines is efficient recovery of useful components but also to safeguard the environment from harmful toxic substances such as lead, cadmium, mercury, asrsenic hexavalent chromium and other brominated flame retardants (BFRs)33 that are present in WEEE. These poisonous substances not only have harmful effect on the people recycling them but they also are the main source of environmental and ecological degradation.

E-waste Hazards Lots of toxic metals and chemicals can be found in e-waste. If they are not treated properly or not recycled in a proper way even disposed off in landfills they can cause adverse effects on human health and environment as they can leach into the surrounding soil, water and the atmosphere. Waste contains poisonous substances like Pb, Sn, and Hg etc. which can hazard the environment.

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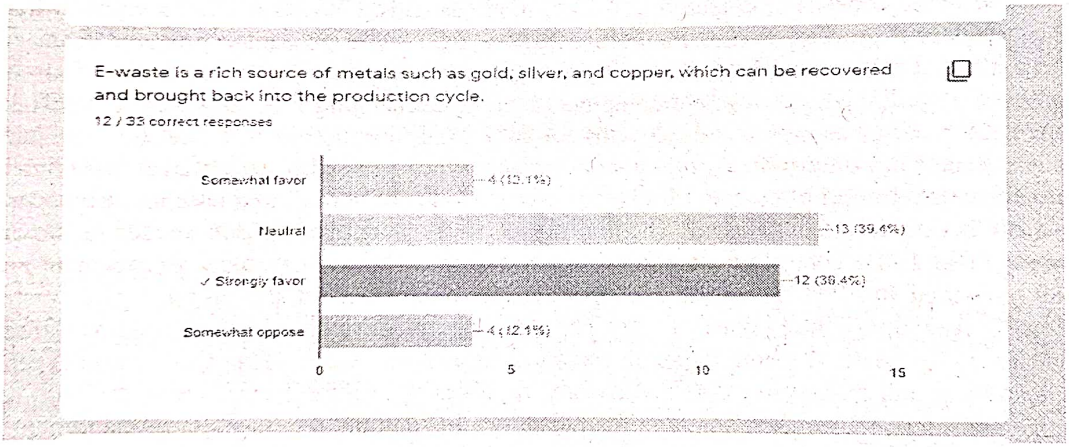
RECYCLING OF E WASTE

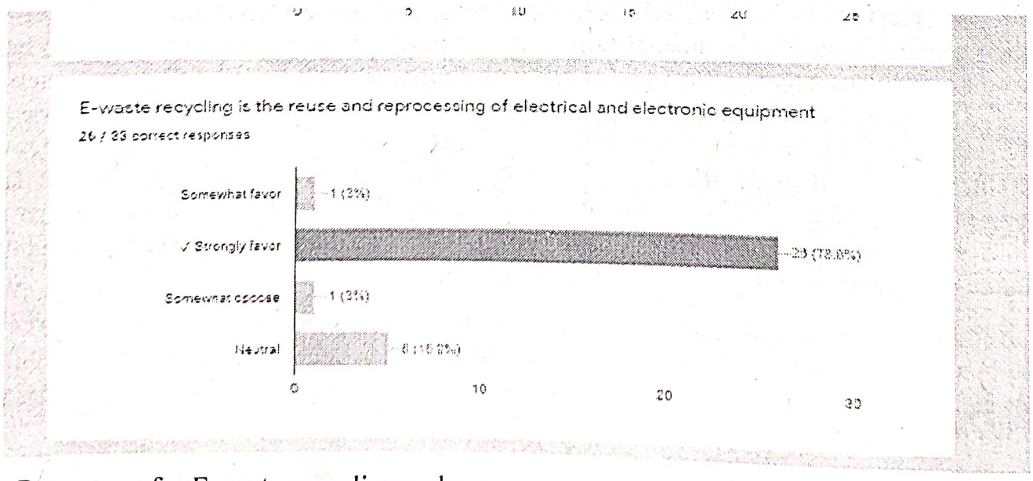
The challenges of managing E-waste in India are very different from those in other countries, both the developed and developing. No doubt, there can be several shared lessons; the complexity of the E-waste issue in India, given its vast geographical and cultural diversity and economic disparities, makes WEEE management challenges quite unique. A few of these are: Rapidly increasing E-waste volumes, both domestically generated as well as through imports. Imports are often disguised as second-hand computer donations towards bridging the digital divide or simply as metal scrap. No accurate estimates of the quantity of E-waste generated and recycled. Low level of awareness amongst manufacturers and consumers of the hazards of incorrect E-waste disposal. Widespread E-waste recycling in the informal sector using rudimentary techniques such as acid. E-waste workers have little or no knowledge of toxins in E-waste, and are exposed to serious health hazards. Inefficient recycling processes result in substantial losses of material value. The major problem we face in India there is no such technology or clear policy/guidelines to check the disposal of e-waste. E-waste is mostly recycled by backyard practioners. Recycling of e-waste: Recycling WEEE is an important subject not only from the view point of waste treatment but also in terms of recovery of valuable waste materials. Mechanical/physical processing provides an alternative means of recovering valuable materials but several difficulties exist. The main difficulty, industries have to afford is the separation of the different material in WEEE. This problem leads to several approaches to optimize the process. One of the most successful is the definition of separation systems based on the physical – chemical properties of materials to make recycling of material constituting WEEE economically profitable.34,35 Amount of plastics in e-waste obtained from computer: The data available shows that the major portion of WEEE comes from computer bodies and computer monitors.

DATA ANALYSIS :

For this research paper we had created a Google form and received 33 responses for the same result analysis is shown below ,hypothesis for this particular research was that people don't aware about E waste but after performing the data analysis it is justified that people should know about E waste recycling process and further it is suggested E waste recycling should be done and awareness to the people about E waste and recycling should be given.

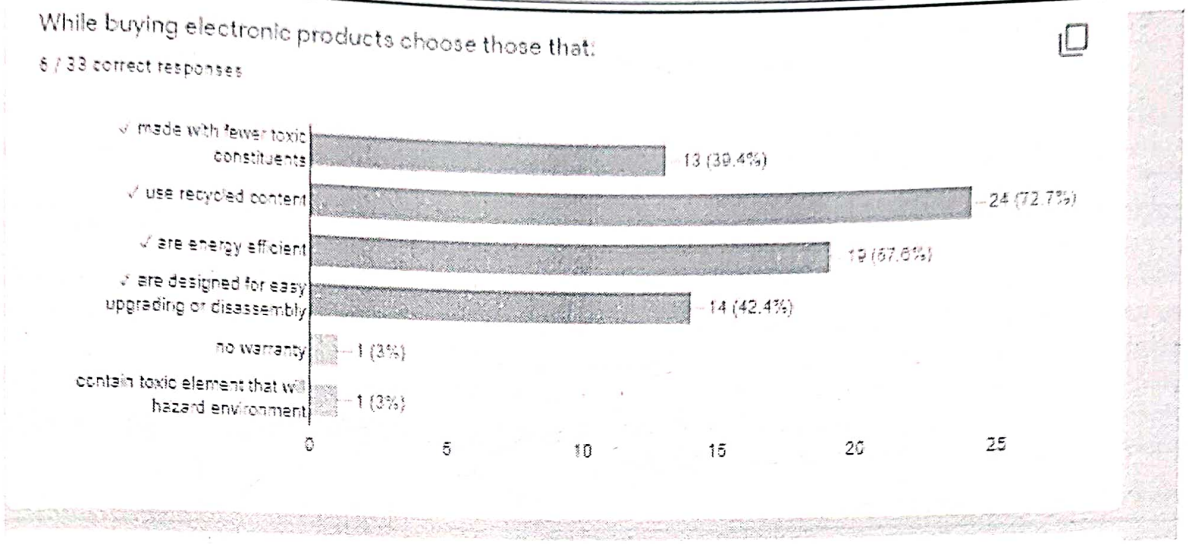


Screenshot1. Data analysis on E waste component



Scaeenshot2. Responses for E waste recycling and reuse

ISSN 2394 - 7780



Screenshot3 . analysis on what consumer think before buying any Electronic Product

CONCLUSION

The challenges of managing E-waste in India are very different from those in other countries, both the developed and developing. E waste is a challenge across the world because people are using this Electronic devices but like two side of a coin it is having various disadvantages as E waste contain many harmful substances and that can be very dangerous to human as well as environment. No doubt, there can be several shared lessons; the complexity of the E-waste issue in India, given its vast geographical and cultural diversity and economic disparities, makes WEEE management challenges quite unique. A few of these are: Rapidly increasing E-waste volumes, both domestically generated as well as through imports. Imports are often disguised as second-hand computer donations towards bridging the digital divide or simply as metal scrap. No accurate estimates of the quantity of E-waste generated and recycled. Low level of awareness amongst manufacturers and consumers of the hazards of incorrect E-waste disposal. Widespread E-waste recycling in the informal sector using rudimentary techniques such as acid. E-waste workers have little or no knowledge of toxins in E-waste, and are exposed to serious health hazards. Inefficient recycling processes result in substantial losses of material value. The major problem we face in India there is no such technology or clear policy/guidelines to check the disposal of e-waste. E-waste is mostly recycled by backyard practioners. Recycling of e-waste: Recycling WEEE is an important subject not only from the view point of waste treatment but also in terms of recovery of valuable waste materials. Mechanical/physical processing provides an alternative means of recovering valuable materials but several difficulties exist. The main difficulty, industries have to afford is the separation of the different material in WEEE. This problem leads to several approaches to optimize the process.

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