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An Examination on Systems in Place for Managing E-Waste with Procedures and Operations Involved in Collection, Treatment and Disposal of E-Waste

Raghavendra T S[1*], Dr. Nagaraja S R[2], Dr. Mohan K G[3]
[1]Research Scholar, Department of CSE, School of Engineering, Presidency University, Bengaluru, Karnataka, India
[2]Associate Professor, Department of CSE, School of Engineering, Presidency University, Bengaluru, Karnataka, India
[3]Professor, Department of CSE, GITAM University, Bengaluru, Karnataka, India

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ABSTRACT

E-waste is a catch-all phrase that refers to a wide range of products that contain electric and electronic components. Old electrical and electronic equipment is referred to as "e-waste" or "e-waste". Computers, televisions, mobile phones, printers, and white electronic appliances like refrigerators are a few examples. It is well recognised that e-waste contains a variety of toxic or hazardous components that, if released during processing, recycling, or disposal, constitute a major risk to both human health and the environment. This proposed research work examines on systems in place for managing and collecting E-Waste with the procedures and operations involved in collection , treatment and disposal of E-Waste.

Keywords : E-Waste , Electric products, Electronic products, Recycling, Disposal , Environment

I. INTRODUCTION

A product that uses electricity and has a printed circuit board (PCB) can be categorized as an electrical and electronic product. Although there has been much written on the issue of e-waste, the term "electronic waste" is difficult to define. According to academic research on the subject, there isn't yet a universal definition of e-waste because every nation has its own. "All components, sub-assemblies, and consumables, which are part of the product at the time of disposal" is how waste from electrical or electronic equipment is described. The term "e-waste" refers to abandoned or discontinued electrical appliances, which can range in size from big household items like refrigerators, air conditioners, cell phones, personal stereos, and consumer electronics to laptops.. Any appliance that uses an electric power source and has reached the end of its useful life is considered e-waste.

Several studies have found that a precise definition of e-waste is necessary since rapid technological improvements are reducing the lifespan of electronic devices. According to the EU WEEE Directive, "Electrical or electronic equipment (EEE) which is waste, including all components, sub-assemblies, and consumables, which are part of the product at the time of discarding" is what is meant by the term "e-waste," which is used in the majority of current e-waste research. The cost and durability of goods used for data processing, such as telecommunications or entertainment in households and businesses, are frequently used to explain e-waste.

1.1 PRODUCTION OF E-WASTE

The main issue with managing e-waste is the volume's constant growth. Yet, the amount of e-waste is still a minor portion of the total amount of municipal solid garbage. Data on the creation of e-waste may change between regions of a country due to differences in trash definitions, technical equipment used, consumer consumption habits, and disparities in living standards around the world . With an annual production of 3 million tonnes, the US leads the world in the generation of e-waste. China comes in at number two with 2.3 million tonnes produced annually. Among rising nations, Brazil produces the second-largest amount of e-waste.

1. E-WASTE COMPOSITION

E-waste frequently contains valuable and potentially harmful materials. The type of electronic equipment, the model, the manufacturer, the date of manufacturing, and the trash's age all have a big impact on the content of e-waste. More precious metals are found in scrap from home appliances compared to scrap from IT and telecom systems [6]. A cell phone, for instance, comprises roughly 40 different elements, including basic metals like copper (Cu) and tin (Sn), speciality metals like lithium (Li), cobalt (Co), indium (In), and antimony (Sb), as well as priceless metals like silver (Ag), gold (Au), and palladium (Pd) . E-waste must go through a specific process to prevent losing rare minerals and precious components.E-waste can be mined for elements like gold and palladium more successfully. As a result, e-waste recycling and disposal methods should adapt to the changing nature of e-waste. The content of e-waste is influenced by a number of factors, including the availability of a reuse market, the infrastructure of the recycling industry, trash segregation programmes, and the application of rules.

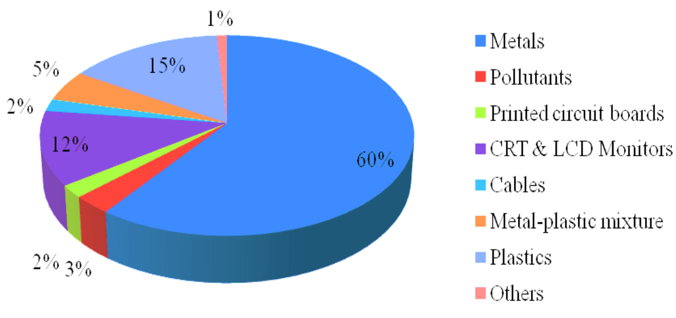

Figure 1. E-Waste Composition

II. COLLECTION AND TREATMENT OF E-WASTE

Typically, functional equipment that has been generated as e-waste from a variety of sources is collected as a whole unit or sub-unit. Whole units of e-waste have frequently been labelled as such around the world. The primary electronic products include computers, mobile phones, landlines, televisions, radios, and together they made up 11.7 million tonnes of trash ICT (information and communication technology) devices in Europe in 2007.

The quantification of the e-waste gathered is not given much thought in emerging and transitional nations. The reason is that during the pre-reprocessing stages, the unorganised sector of scrap dealers/traders or peddlers collects the majority of the e-waste. The statistics gathering system cannot see this data, which makes it very challenging to quantify e-waste in developing and transitional nations. Achieving sustainable development goals related to waste management would require the successful establishment of baseline information levels from which more informed decisions about e-waste management and policy can be made, according to research studies based on current knowledge of e-waste management. It may also be necessary to develop new, environmentally friendly collection techniques in order to manage e-waste successfully.The amount of e-waste created and its detrimental effects on the environment may be reduced as a result .

Targets for collection, recovery, and recycling are specifically imposed on EU member states under the EU WEEE directive. As a result, it sets a minimum annual collecting objective of 4 kg/capita for all member states.

By reducing the amount of hazardous waste dumped in landfills and increasing the supply of recyclable materials, these collection- and weight-based recycling targets hope to promote the creation of new goods that use fewer virgin resources [11]. Compared to the EU's target of 4 kg/capita, Switzerland is the first nation in the world to have designed and implemented a robust e-waste management system. According to reports, one-third of the EU's electrical and electronic waste is collected separately.

According to the ElektroG system, Germany gathered and processed around 754,000 tonnes of e-waste in 2006, compared to 19,000 tonnes collected by other EU members. Also, it was estimated that 315,000 tonnes of IT and telecom equipment would be sold, and that the system would collect and handle around 102,000 tonnes of garbage (of which 7,000 tonnes would come from outside the EU). This demonstrates how efficiently e-waste is collected and dealt with in the EU. In South Korea, the most significant move was the adoption of the extended producer responsibility scheme in 2003, which resulted in producers collecting around 70% of e-waste. E-waste reused and recycled during the same time period made up 12% and 69%, respectively. 19% of the remaining material was disposed of at landfills or incinerators .

III.SYSTEMS FOR COLLECTION, TREATMENT, AND DISPOSAL

E-waste collection, handling, and disposal systems are crucial elements. Conventions, rules, and laws have been developed by the majority of developed nations to encourage efficient e-waste collection, management, and recycling as well as safe disposal of the non-recyclable components. In an effort to cut down on the quantity of garbage that ends up in landfills, has adopted two directives that require manufacturers of e-goods to accept back EOL or waste products without charging consumers. However, e-waste is treated in backyard operations in developing and transitional nations using open sky incineration, cyanide leaching, and simple smelters to recover precious metals, primarily copper, gold, and silver — with comparatively low yields — and discarding the rest with municipal solid waste at open dumps, into surface water bodies, and at unlined and unmonitored landfills . This has an adverse effect on both ecosystem health and human health.

IV. WASTE DISPOSAL

Landfilling is the main technique of e-waste disposal. Discarded electronic equipment frequently burns outdoors or ends up in landfills with other municipal waste, where it releases toxic and cancer-causing substances into the air. Little material recovery results from the informal disposal of e-waste in developing and transitioning countries, which uses generally unsafe techniques and practices. Developed nations the developing world combustion of MSW scorching opening Disposal in landfills Open dumping

These obstacles include the difficulty of implementing/enforcing current regulations and clean technologies, which are supported by a lack of capacity building and awareness In contrast, developed nations have created expensive systems and complex garbage disposal plans that are less dangerous to manage. The lack of data prevents a complete analysis of the problem, nevertheless. This means that e-waste management in developing and transitional nations is constrained by the disparities in the socioeconomic and legal contexts between typical developing and developed country scenarios.

Residential, commercial, and industrial garbage collection are the three main categories. A single trash truck can service between 100 and 1,000 private houses per day as part of residential collection. Daily pickup is common, though frequencies will vary from city to city. Contrarily, commercial collection offers trash removal for clients including malls, eateries, and office buildings; these clients may be given a pickup window. Each commercial route can visit a transfer station or disposal site two or three times each day to serve between 60 and 400 consumers. Lastly, industrial collection services are available for factories, construction sites, and other sizable building projects. Industrial waste containers are often four to five times larger than commercial garbage containers, and frequently only one can be emptied per pickup, setting it apart from commercial collection. When compared to the issue faced by commercial collection services, this presents a vehicle routing difficulty that is quite different. The goals of garbage collection routing challenges vary greatly; typical examples include reducing the number of trucks, reducing the distance travelled, finding compact routes, or reducing wear and tear on the vehicles.

E-WASTE DISPOSAL

E-waste must be disposed of in an environmentally responsible and scientific manner. Past research on the management of e-waste has shown that rapid expansion and quick product obsolescence are the main causes of wasted e-products, which make up 8% of all municipal garbage in the EU and are one of the fastest rising waste fractions. If not disposed of appropriately, it could have serious detrimental effects on the environment. In 2010, the average for emerging and transitional nations rose to 2% of the total amount of solid trash . Despite the fact that these nations lack even the most basic technology or facilities for disposal, developing and transitional nations, particularly those in Africa and Asia, remain the main locations for the dumping of e-waste . More than 70% of the electronic garbage that was collected globally in 2012 was actually exported or thrown away by affluent nations. Every day, 130,000 laptops and more than 300,000 cell phones are thrown away in the US alone, and an estimated 80% of the e-waste produced is exported to less developed nations. In the US in 2007, 410 thousand tonnes (13.6%) were recycled, and the remaining amounts were either incorrectly dumped in landfills or burned. Between 2003 and 2005, American landfills received between 80 and 85 percent of the e-waste that was ready for EOL management. According to a related study on the management of e-waste in the US, massive amounts of e-waste (82.3%) were disposed of in landfills and incinerators in 2009, while only 17.7% was recycled. An important case study on e-waste management emphasised the point that because legal definitions and e-waste stream classifications differ across different countries, even those on the same continent, it is hard to make an overall comparison between them. Yet, it is well recognised that industrialised countries are the primary producers of e-waste .

V. CONCLUSION

The recycling process for electronic waste entails the tasks of collection, segregation, and disassembly. Large-scale upgrades and repairs, which are crucial for major electrical and electronic appliances, also contribute to the objects' longer lifespans. Little electronic waste equipment and non-metallic parts are frequently thrown away since recyclers don't care about them. To solve this problem, efforts may be made to find viable replacement uses for the non-metallic fractions, particularly plastics given their widespread availability.

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