

A Review Article of E Waste Management by Prediction Method in Jabalpur City

Shyam Patidar, Dr. Shailza Verma

Environmental Engineering in Civil Department,
Jabalpur Engineering College, Jabalpur MP.

Abstract- Environmental deterioration and health risk due to improper e-waste management has become a serious issue in India. The major portion of e-waste reaches an unorganized e-waste recycling sector and is then treated by using crude methods. This review article presents a brief highlight on e-waste management status, legislation, and technology uses in India. The present e-waste management needs to be more focused on environmentally sound management, by more active support from all the participants involved in the e-waste flow chain in India.

Keywords- Electronic-waste, environmental pollution, public health, environmentally sound management, India.

I. INTRODUCTION

Electronic waste, or e-waste, refers to all items of electrical and electronic equipment (EEE) and its parts that have been discarded by its owner as waste without the intent of re-use (Step Initiative 2014). E-waste is also referred to as WEEE (Waste Electrical and Electronic Equipment), electronic waste or e-scrap in different regions and under different circumstances in the world. It includes a wide range of products – almost any household or business item with circuitry or electrical components with power or battery supply. In this methodology, defined by the Partnership on Measuring ICT for Development (Baldé et al., 2015a), the definition of e-waste is very broad. It covers six waste categories:

- Temperature exchange equipment, more commonly referred to as cooling and freezing equipment. Typical equipment includes refrigerators, freezers, air conditioners, heat pumps.
- Screens, monitors. Typical equipment includes televisions, monitors, laptops, notebooks, and tablets.
- Lamps. Typical equipment includes fluorescent lamps, high intensity discharge lamps, and LED lamps.
- Large equipment. Typical equipment includes washing machines, clothes dryers, dish-washing machines, electric stoves, large printing machines, copying equipment, and photovoltaic panels.
- Small equipment. Typical equipment includes vacuum cleaners, microwaves, ventilation equipment, toasters, electric kettles, electric shavers, scales, calculators, radio sets, video cameras, electrical and electronic toys, small electrical and electronic tools, small medical devices, small monitoring and control instruments.
- Small IT and telecommunication equipment. Typical equipment includes mobile phones, Global Positioning Systems (GPS), pocket calculators, routers, personal computers, printers, telephones. Each product of the six e-waste categories has a different lifetime profile, which

means that each category has different waste quantities, economic values, as well as potential environmental and health impacts, if recycled inappropriately. Consequently, the collection and logistical processes and recycling technology differ for each category, in the same way as the consumers' attitudes when disposing of the electrical and electronic equipment also vary.

II. WHAT IS E WASTE?

Electronic waste, e-waste, e-scrap, or waste electrical and electronic equipment (WEEE) describes discarded electrical or electronic devices. "Electronic waste" may also be defined as discarded computers, office electronic equipment, entertainment device electronics, mobile phones, television sets and refrigerators which are made of sophisticated blends of plastics, metals, and other materials. This definition includes used electronics which are destined for reuse, resale, salvage, recycling and disposal. The European Union (EU) defines this new waste stream as Waste Electrical and Electronic Equipment. Since there is no definition of the WEEE in the environmental regulations in India, it is simply called 'E-waste'. According to Gui et al (2003), "WEEE is diverse and complex in terms of materials and components as well as the manufacturing process. Characterization of this waste stream is of paramount importance for developing a cost effective and environmental friendly recycling system". E-waste is categorized by the Government of India under the broad class of hazardous waste.

III. LITERATURE REVIEW

Georgios Gaidajis: In this paper the environmental problems related with the discarded electronic appliances, known as e-waste, are reviewed. Moreover, the current and the future production of e-waste, the potential environmental problems associated with their disposal

and management practices are discussed whereas the existing e-waste management schemes in Greece and other countries (Japan, Switzerland) are also quoted.

Sivakumaran Sivaramanan: Waste electrical and electronic equipment (WEEE) is becoming major threat to the whole world. Its toxic emissions mixed with virgin soil and air and causing harmful effects to the entire biota either directly or indirectly.

Direct impacts include release of acids, toxic compounds including heavy metals, carcinogenic chemicals and indirect effects such as bio magnification of heavy metals. Many private firms are involved in collecting, dismantling, separation and exporting e-wastes for recyclers. However, strict regulations are currently being followed as on approval of such firms such as e-steward certification by Basel action network in US, they also involved in public awareness programs; this review is based on collected information from various journal articles, websites including the technical note by Greenpeace international. Further, it analyzes the current progress on e-waste management worldwide.

P.Gomathi Nagajothi: The electronic industry is the world's largest and fastest growing manufacturing industry. It has become leverage to the socio - economic and technological growth of a developing society. The consequence of its consumer oriented growth combined with rapid product obsolescence and technological advances are a new environmental challenge - the growing menace of "Electronics Waste" or "e waste" that consists of obsolete electronic devices. The current practices of e-waste management in India suffers a number of disadvantages like inadequate legislation , difficulty in inventorisation, health hazards due to informal recycling, poor awareness and reluctance on part of the corporate to address the critical issues.

The impacts are intense when toxic materials enter the waste stream with no special precautions, creates adverse effects on the environment and human health and when economically valuable materials are dumped resources are wasted or unhealthy conditions are developed during the informal recycling. Current article gathers the current scenario of E waste generation, data on components and hazardous substances of e-waste that are creating environmental pollution and human exposure to these chemicals, resulting adverse effects due to recycling, incineration and landfill disposal of e-waste.

M.D. Jalal Uddin: The electronic industry is the world's largest and fastest growing manufacturing industry in the world. Discarded electronic and electrical equipment with all of their peripherals at the end of life is termed ewaste. The quantity of c-waste generated in developed countries equals 1% of total solid waste on an average and is expected to grow to 2% by 2011 and is one of the fastest

growing waste streams. E-waste consists of ferrous and non ferrous metals, plastic, glass, ceramics, rubber etc. E-waste is valuable source for secondary raw material but harmful if treated and discarded improperly as it contains many toxic components such as lead, cadmium, mercury, polychlorinated biphenyls etc. The presence of lead, mercury, arsenic, cadmium, selenium and hexavalent chromium and flame retardants beyond threshold quantities in e-waste classifies them as hazardous wastes.

Srimathi H, Krishnamoorthy A, Dharshini S: The evolution of electrical and electronic equipments (EEE) in 20th century made our life easy brought enormous changes in household, industry and economy. It is very difficult for us to function without electrical and electronic products. However, one serious problem is a massive amount of waste and hazardous generation from the products when they become obsolescence. India is one of the highest producers of e-waste. In addition, few of the Asian and African countries become dumping sites of e-waste to the first world countries including India. Most of the e-waste management in India is taking place in informal sector with limited infrastructure, technology and lack of awareness. The paper identifies the existing sector gap and public awareness on e-waste with specific study carried out in Chennai region and recommends suggestions to way forward.

MS. SUKESHINI JADHAV: The electrical and electronic waste (e-waste) is one of the fastest growing waste in India. The increasing "market penetration" in developing countries, and "high obsolescence rate" make ewaste as one of the fastest growing waste streams. The e-waste has become a matter of concern because of the presence of toxic and hazardous substances present in electronic goods and if not properly managed, it can have adverse affects on environment. Environmental issues and trade associated with e-waste has driven many countries to introduce interventions. Hence, there is strong need to adopt sustainability practices to tackle the growing threat of e-waste. This paper is based on secondary data which study the e-waste composition, Global and Indian E-waste scenarios and different hazardous materials found in the E-waste, Best Available Practices to find the hazardous materials, Guideline for the manufacturer and public awareness about the proper disposal of e-waste.

Shamsul Chowdhury: Electronic waste, commonly known as e-waste, comprises all sorts of electronic devices that are thrown away after their short useful time have been exhausted. Most electronic products contain toxic metals such as lead, cadmium, mercury and others, which contaminates the environment when they are dumped on the landscape. Toxic metals in the e-waste are usually non-biodegradable and they will create harmful long-lasting negative consequences on the environment in general and our health in particular. E-waste dumping is gradually polluting the environment and is a growing

problem worldwide. Proper management of e-waste pollution is a global issue. According to the United Nations, the world is facing an e-waste crisis. The main goals of this study are as follows:

- How to make electronic products more sustainable and environment-friendly.
- How to extend the life of used electronics through refurbishing/reusing and by other means.
- To provide a useful and flexible, cost-effective framework for worldwide e-waste management focusing on environmental protection by using appropriate methodologies, such as; recycling, refurbishing and reusing and by other appropriate means.

Shagun, Ashwani Kush, and Anupam Arora:

Electronic waste may be defined as discarded computers, office electronic equipment, entertainment device electronics, mobile phones, television sets and refrigerators. This definition includes used electronics which are destined for reuse, resale, salvage, recycling, or disposal. Because loads of surplus electronics are frequently commingled (good, recyclable, and non-recyclable), several public policy advocates apply the term "e-waste" broadly to all surplus electronics. Rapid changes in technology, changes in media (tapes, software, MP3), falling prices, and planned obsolescence have resulted in a fast-growing surplus of electronic waste around the globe. This paper presents an overview of the problem and suggests some concrete solutions to tackle the issue.

Arnav Chowdhury: Central issue of the present study is electronic-waste (e-waste) that is rising as a brand new environmental challenge for twenty first century. The rapid climb of the electronic and IT trade, gift client culture, increasing rates of consumption of electronic product have lead to fateful environmental consequences. E-waste, while recycling, is also risky due to toxicity of a number of the substances which contains several cancer-causing agents. The implications and toxicity is thanks to discharge of lead, mercury, cadmium, metallic element and alternative virulent substances. Developed countries export this waste within the type of donation to developing countries. China and some Asian nations, where environmental standards are low, are the most important recipients of e-waste which, in most cases, is processed illicitly.

Neethu Lukose: Electronics industry is the world's largest and fastest growing manufacturing industry. But the increase in sales of electronic equipments and their rapid obsolescence such as advancement in technology, change in fashion, style and status has resulted in generation of electronic waste which is popularly known as E-waste. E-waste contains many hazardous components that may negatively impact the environment and adversely affect human health if not properly managed. E-waste problem is of global concern due to the

production and disposal of waste in a globalized world. In India, e-waste management has greater significance not only due to the generation of its own e-waste but also because of the dumping of e-waste from developed countries. This is coupled with India's lack of appropriate infrastructure and procedures for its disposal and recycling. The challenge is to develop innovative and cost-effective solutions to decontaminate polluted environments due to E-waste, to make them safe for human habitation and consumption, and to protect the functioning of the ecosystems which support life. This paper discusses the different categories of E-waste, categorization of different hazardous components present in e-waste, methods of E-waste management and an innovative bioremediation technologies which have become an eco-friendly and fruitful method to conventional clean up technologies to decontaminate e-waste from the soil-water environment, the challenges in which India is facing for the management of E-waste and suggestion for a formal method of E-waste recycling in India.

Linh Thi Truc Doan, Yousef Amer, Sang-Heon Lee,

Phan Nguyen Ky Phuc: During the last few decades, with the high-speed upgrade of electronic products, electronic waste (e-waste) has become one of the fastest growing wastes of the waste stream. In this context, more efforts and concerns have already been placed on the treatment and management of this waste. To mitigate their negative influences on the environment and society, it is necessary to establish appropriate strategies for e-waste management. Hence, this paper aims to review and analysis some useful strategies which have been applied in several countries to handle e-waste. Future perspectives on e-waste management are also suggested. The key findings found that, to manage e-waste successfully, it is necessary to establish effective reverse supply chains for e-waste, and raise public awareness towards the detrimental impacts of e-waste. The result of the research provides valuable insights to governments, policymakers in establishing e-waste management in a safe and sustainable manner.

IV. CURRENT CHALLENGES FOR E-WASTE ELIMINATION

In many cases, the cost of recycling e-Waste exceeds the revenue recovered from materials especially in countries with strict environment regulations. Therefore, e-Waste mostly ends up dumped in countries where environmental standards are low or nonexistent and working conditions are poor. Historically Asia has been a popular dumping ground, but as regulations have tightened in these countries, this trade has moved to other regions, particularly West Africa. Most developing countries lack the waste removal infrastructure and technical capacities necessary to ensure the safe disposal of hazardous waste. And e-Waste has been linked to a variety of health

problems in these countries, including cancer, neurological and respiratory disorders, and birth defects. Therefore, the fight against illegal imports of WEEE has become one of the major challenges. From another perspective, some regulations, which have been established to handle e-Waste, are often limited since they exclude many hazardous substances that are used in electronics. Moreover, many regulations simply fail to address the management of e-Waste. Osibanjo states that in Africa, for example, there is a highly ineffective infrastructure for e-Waste management. More precisely, there is no well-established system for separation, sorting, storage, collection, transportation, and disposal of e-Waste.

Even worse, there is little or no effective enforcement of regulations related to e-Waste management and disposal. Under these circumstances, practical e-Waste management in Africa is unregulated, and rudimentary techniques are widely used. These techniques include manual disassembly of WEEE without concern of the hazardous chemicals, heating printed circuit boards (PCBs) to recover solder and chips, melting and extruding flame-retardant plastics, and burning plastics to isolate metals; generating an average of US \$6 worth of material from each computer (Basel Action Network). This value is not much especially considering the environmental and health costs of burning plastic, sending dioxin and other toxic gases into the air and the large volumes of worthless parts dumped in nearby landfills, allowing the remaining heavy metals to contaminate the area and harm life.

Solutions can be:

- Ban on total imports of e- waste.
- Domestic legal framework to address these gaps in import of E Waste
- Need to address safe disposal of domestic waste.
- Tie recycling in with take-back product
- The Framework should address the issue of E waste imports for reuse and recycling.
- Attract investment in this sector
- Link up activities of informal sector with formal sector
- Provide for appropriate framework for processes
- Promote adequate ESM technologies for recycling
- Incorporate precautionary principles and polluter pays
- Adopt Consultative process
- Picked over Junk, Obsolete and burnt
- Insist on domestic processing
- Then make sure the company you select has capacity to handle either type of E-Scrap.
- Promote recycling units to ease process and to encourage generators to have proper e-waste disposal
- Impart training to generators on e-waste handling
- Awareness program on recycling
- Fix duties and responsibilities to recyclers
- Tax incentives for scrap dealers
- Reward and reprimand schemes for performance and non-compliance of e-waste management.

V. CONCLUSION

E-waste is a serious issue at local as well as global scales. E-waste consists of a variety of materials, some of which contain hazardous substances which can lead to severe environmental influence and public health risks. Hence, managing e-waste in an environmentally friendly manner is a complicated issue for many countries in the world. This research reviewed some useful tools used in some countries for managing e-waste. Future perspectives on e-waste management are presented as well. This would assist governments, policymakers, firms in designing better e-waste management to mitigate e-waste impacts on the environment.

Based on the literature survey, the following are the salient conclusions:

- Modern Facilities are to be established for the collection of e-waste & for the disposal methods of e-waste.
- E-Waste is increasing day by day more than the reuse & recycle.
- Awareness Programmes about e-waste can be initiated nationwide, so that people may help in reducing it.
- 4) Electronic goods Manufacturing Companies must be legally ensured to mention the disposal methods of their product in their user manual.
- Some Refund schemes can be taken by the government for collection of solid waste, to encourage the consumers, while the consumers return the electronic devices.
- The Export of e-waste must be minimized & instead more number of recycling plants must be set up in India.
- Government has to arrange workshops, seminars for the people who live in villages.
- Banners can be laid in large quantity everywhere. Also Display Do's & Dont's on the banners.

REFERENCES

- [1] <http://www.niir.org/content.phtml?content=144>
- [2] Lakshmi Raghupathy et.al, e-waste recycling in india – bridging the gap between the informal and formal sector.
- [3] Agarwal R.(1998) india: the world's final dumpyard!, January, basel action news,vol. 1 at www.ban.org accessed on 14th september, 2006.
- [4] envis.maharashtra.gov.in/envis_data/files/ewastegeneration_scenario.html
- [5] SushantB.wath et.al, e-waste scenario in india,its management and implications, environmental monitoring assessment, 172, 249-262, 2011.
- [6] Saranyamohanbaba et.al, application of decision tree algorithm in e-waste land Filling, indian journal of education and information management,1(1): 2011.
- [7] Ammons J & sarah b,eliminating e waste:recycling though production at Dr.B.j.mohite,issues &

strategies in managing e waste in india,ijrmbss issn
no 2319-6918,vol 1,issue a,march 2013.[46-51]

- [8] Saranya Mohanbaba Et.al, application of decision tree algorithm in e-waste landfilling, Indian journal of education and information management,1(1): 2011.
- [9] E Yoeswaran,e waste management in India,volume 2,issue 4,april 2013,ISSN no-2277-8160