THE STUDY OF E-WASTE MANAGEMENT IN M/S. RAMKY E-WASTE RECYCLING FACILITY, HYDERABAD, STATE OF TELANGANA, INDIA.

Dr. M. Geetha Priyadarsani, Assistant Professor, ICFAI Law School, Hyderabad, India

ABSTRACT

The activities of human beings to increase their wealth and lead a luxurious life has led to environmental degradation, polluting the air, water and soil and generation of many types of waste like household waste, industrial waste, agricultural waste, hazardous waste, chemical waste and electronic waste. Waste means any material substance, which is eliminated or discarded as no longer useful. The safe and environmentally sound disposal of waste is the need of the hour. As the usage of electronic gadgets is increasing day by day, this has led to an increase in electronic waste, which is very harmful to the health of human beings and the environment. Today Electrical and Electronic Equipment (EEE) are used in every field in the present digital world.

Safe management of electronic waste has become a serious problem all over the world, more so in developing countries like India. Lack of proper centers for recycling, reuse and safe disposal, inadequate technology, lack of awareness among stakeholders and ineffective implementation of rules are contributing to this problem. In order to study about the existence of centers, technology, awareness and proper implementation of rules and regulations, the researcher has selected this area for the research work. There are no many studies in this field.

Keywords: E-waste, environment, recycling, management, safe disposal.

Introduction

The electronic waste and its management is a global problem and the concern towards the proper management in view of environmental protection is to be given top priority. The concern for environmental protection in India is found in Kautilya's 'Arthashastra' written between 321-300 B.C.[1] It emphasized that every individual should protect nature. Religious and cultural practices also play an important role in protecting the environment. The four Vedas- Rigveda, Yajurveda, Samaveda and Atharvaveda mentioned that man should conserve earth, water, air, fire and ether. They also emphasized about protection of wildlife and domestic cattle. During the British reign, there were laws regarding forestry, wildlife, water pollution, etc

The environment includes water, air, land, and the inter-relationship, which exists among and between water, air, and land and human beings, other living creatures, plants, microorganisms, and property.[2] Environmental quality is directly related to the quality of life of human beings. Humans are solely responsible for the degradation of the environment. The problem of environment pollution has started from the day of human civilization. Urbanization, industrialization, and the development of science and technology are the main reasons for the pollution of the environment. The activities of human beings to increase their wealth and lead a luxurious life has led to environmental degradation, polluting the air, water and soil and generation of many types of waste like household waste, industrial waste, agricultural waste, hazardous waste, chemical waste and electronic waste. Waste means any material substance, which is eliminated or discarded as no longer useful. The safe and environmentally sound disposal of waste is the need of the hour. As the usage of electronic gadgets is increasing day by day, this has led to an increase in electronic waste, which is very harmful to the health of human beings and the environment. Today Electrical and Electronic Equipment (EEE) are used in every field in the present digital world.

The Global E-waste Monitor 2024 prepared under the UNITAR- Sustainable Cycles (SCYCLE) Programme in March 2024 says that the world's generation of electronic waste is rising five times faster than documented e-waste recycling. By 2022, the world generated 62

[1]Armin Rosencranz, Shyam Divan, 'Environmental Law and Policy in India-Cases, Material and Statutes', 2nd Edition, Oxford University Press, 2001.
[2] Sec 2(a), Environment Protection Act, 1986.

MMt of e-waste, or an average of 7.8 kg per capita. Only 22.3 percent (13.8 MMt) of the e-waste generated was documented as properly collected and recycled. 16 MMt of e-waste is estimated to be collected and recycled outside of formal systems in high- and upper-middle-income countries with developed e-waste management infrastructure. 18 MMt of e-waste is estimated to be handled in low- and lower-middle-income countries with no developed e-waste management infrastructure, mostly by the informal sector. 14 MMt of e-waste is estimated to be disposed off as residual waste, the majority of which is landfilled globally.

The report further says that worldwide, the annual generation of e-waste is rising by 2.6 million tonnes annually, on track to reach 82 million tonnes by 2030. The report foresees a drop in the documented collection and recycling rate from 22.3% in 2022 to 20% by 2030 due to the widening difference in recycling efforts relative to the staggering growth of e-waste generation worldwide.

Coming to India, it is in the third position in generation of e-waste[3]. Even the recycling of e-waste in India is not carried safely and properly because nearly 90% of e-waste collection and handling is in the hands of informal sector. The collection process of informal sector is well organized than the collection process of the formal sector. E-waste contains several precious metals and hazardous chemicals. If e-waste is recycled by the formal sector, then the precious metals like gold, silver can be extracted and used as secondary materials. According to 'Global e-waste monitor 2020', the value of raw materials in the global e-waste generated in 2019 is equal to approximately $57 billion USD. However, as only 17.4% is recycled by the formal sector the total raw material cannot be extracted.

The increase of e-waste was mainly due to development in science and technology and increase of purchasing capacity and arrival of new models in electrical and electronic equipment. As the purchasing capacity was less in olden days the usage of electrical and electronic equipment was also very less. If any problem came to the device, they used to repair and reuse it. However, now-a-days people go for new ones rather than getting repaired the old ones. Thus, there is increase in the discarded goods and this is leading to increase in e-waste.

[3] Report of Global e-waste monitor 2020

Meaning

According to the Hazardous Waste (Management, and Handling) Rules, 1989, "Hazardous wastes" means any waste which by reason of any of its physical, chemical, reactive, toxic, flammable, explosive or corrosive characteristics causes danger or is likely to cause danger to health or environment, whether alone or when in contact with other wastes or substances.

According to E-Waste (Management & Handling) Rules, 2011 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.

Widmer defines Electronic waste as various forms of electric and electronic equipment that have ceased to be of any value to their owners.

According to Organization for Economic Co-operation and Development (2001), 'Electronic waste' means 'any appliance using an electric power supply that has reached its end-of-life'. Sinha (2004) defines, 'Electronic waste' as 'an electrically powered appliance that no longer satisfies the current owner for its original purpose'. According to Puckett and Smith 'Electronic waste encompasses a broad and growing range of electronic devices ranging from large household devices such as refrigerators, air conditioners, cell phones, personal stereos and consumer electronics to computers which have been discarded by their users'. According to Peralta & Fontanos (2005), 'Electronic waste' means 'electronic products that no longer satisfy the needs of the initial purchaser'. Widely acceptable definition of e-waste is, "Used, obsolete, unserviceable, not working, irreparable, stored for considerable time, broken, not possible to utilize to its originally intended capability, equipment reached its end of life i.e., manufacturer planned obsolesces; such equipment which uses electricity for its function is otherwise called as Waste Electrical and Electronic Equipment (WEEE)".

In the early days of e-waste management in India, there was limited regulation specifically targeting electronic waste. E-waste was not a significant concern as the consumption of electronic devices was relatively low compared to recent years. However, as the use of electronic products increased rapidly, so did concerns about their disposal and environmental impact. One of the earliest regulations addressing e-waste in India was the Hazardous Waste (Management and Handling) Rules, 1989, under the Environment

(Protection) Act, 1986. These rules classified certain electronic components and devices as hazardous waste, requiring proper handling and disposal. However, these rules were not comprehensive enough to address the growing e-waste problem effectively. The realization of the need for more focused regulation on e-waste management led to the introduction of the E-Waste (Management and Handling) Rules in 2011. These rules aimed to ensure environmentally sound management of e-waste by mandating responsibilities for producers, consumers, bulk consumers, collection centers and recyclers. It introduced concepts like Extended Producer Responsibility (EPR), under which producers are responsible for the proper disposal of their products after use.

Due to certain drawbacks in E-waste (Management & Handling) Rules, 2011 regarding EPR Authorization from multiple SPCB's, non-inclusion of collection centers, exemption of micro and small enterprises and lack of regulation on bulk consumers, etc., they are amended and in 2016, the E-waste (Management) Rules, 2016 came in to effect from 1st October, 2016. The highlights of the rules are EPR Authorization, effective e-waste collection mechanism, safe and sound recycling, minimizing illegal recycling and reducing hazardous substances in e-products. EPR authorization will be given by CPCB and additional options like establishment of PRO, e-waste exchange, deposit refund schemes are introduced and the bulk consumers need to file annual returns. The E-waste (Management) Rules, 2016 are replaced and on 1st April 2023, the E-Waste (Management) Rules, 2022 came into force and the main objectives of these rules are to strengthen the EPR rules, environmental compensation and also promote resource recovery. These rules are also applicable to solar photo- voltaic modules and panels or cells.

The E-waste (Management) Rules, 2022 are amended twice in 2023- E-waste (Management) Amendment Rules, 2023 and E-waste (Management) Second Amendment Rules, 2023. In the first amendment, there were minor additions to the second schedule. The Central Government has notified the E-Waste (Management) Second Amendment Rules, 2023. The rules were published in the Official Gazette on 25th July 2023 and they came into force with immediate effect. These rules aim to ensure secure, accountable and sustainable management of e-waste, specifically focusing on refrigerants generated during the manufacture and end-of-life of refrigeration and air-conditioning equipment.

The old rules focused on collection target but 2022 rules emphasize on recycling targets. According to new rules 2022, e-waste recycling through weight is 60% in 2023-2024

and 2024-2025, 70% in 2025-2026 and 2026-2027, 80% in 2027-2028 and 2028-2029. Later the recycling target may be reviewed and altered after 2029 year. If anyone imports used e-products and if that equipment is not re-exported after end of its life they will be responsible 100% for its recycling. The EPR recycling targets for new producers for 2023-2024 year is 15% of the sales figure of financial year 2021-2022, for 2024-2025 year is 20% of the sales figure of financial year 2022-2023 and from 2025-2026 it is 20% of the sales figure of the financial year two years back. According to these rules, the Bureau of Indian Standards/Ministry of Electronics & Information Technology should issue standards for refurbished products.

Significance of the problem

Safe management of electronic waste has become a serious problem all over the world, more so in developing countries like India. Lack of proper centers for recycling, reuse and safe disposal, inadequate technology, lack of awareness among stakeholders and ineffective implementation of rules are contributing to this problem. In order to study about the existence of centers, technology, awareness and proper implementation of rules and regulations, the researcher has selected this area for the research work. There are no many studies in this field.

Objectives

The broad objectives of the study include the following:

1. To study about the electronic waste and its management
2. To understand the extent of the problems associated with the recycling practices
3. To examine the functioning of M/s. Ramky E-waste Recycling Facility

Scope & Limitation

The present study is limited to M/s. Ramky E-waste Recycling Facility, Hyderabad as there is homogeneity of the centers in India and due to availability and access to the study. The study is limited to recycling process and disposal of electronic waste.

Hypothesis

1. Non availability of special technology may lead to the loss of precious materials.

2. Unsafe disposal may lead to environmental degradation.

Methodology adopted

The study involves both Doctrinal & Non-Doctrinal approach. The study is Doctrinal in terms of the provisions and the information with respect to e-waste. For Non-Doctrinal, observation and interview schedule are used as tools for collecting relevant data. For the purpose of interview, purposive sample has been selected and the respondent group consists of Managers, administrators, engineers and workers of Ramky E-waste Recycling Facility. An interview schedule has been prepared for conducting the interview[4]. The questions framed for interview cover, how they receive the E-waste, the equipment and machinery available at facility, measures taken for segregation, dismantling, including safety measures provided to workers involved, compliance with the rules and regulations and awareness about the problem.

For the doctrinal part books, articles and reports have been consulted for the analysis. Newspapers, Journals and Official reports of state pollution control board have been referred to obtain the genuine information for the purpose of research

Literature Review

Though the research work has been conducted basically through non-doctrinal method, for the purpose of supporting documentary evidences and to find out research gaps, the researcher has reviewed the following literature.

1. Sukanta K.Nanda, in Environmental law[5], 2015, discussed about environment, causes for environment pollution, meaning and definition of waste and hazardous waste.

2. Aniyie Ifeanyichukwu Azuka, "The Influx of used electronics in to Africa: A Perilous Trend", published in Law, Environment and Development Journal (LEAD), 2009 discussed about the origin, meaning and definition and various international

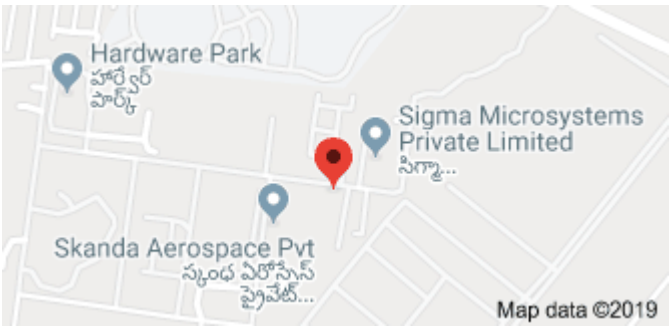
[4] A copy of the interview schedule has been annexed.
[5] Central law publications

conventions. The author had not thrown light upon the existence and functioning of E-Waste Management Centers.

3. In an article "How are WEEE doing? A Global review of the management of electrical and electronic wastes"2010, Ongondo F.O, Williams I.D, Cherrett T.J analysis the waste, causes of waste, and types of electrical goods but had not thrown any light on recycling centres.

Data Analysis and Findings of the Study

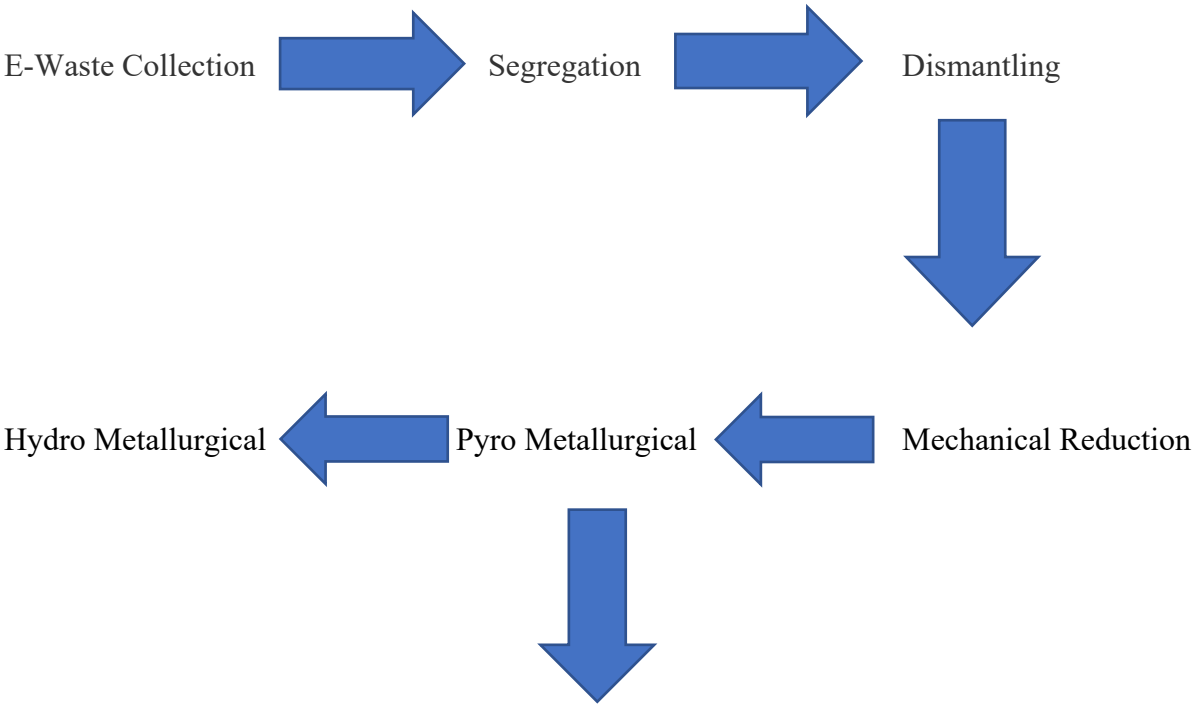
M/s. Ramky E-waste Recycling Facility, Hyderabad is located at 25/A, Hardware Park, Near International Airport, Srisailam Highway Road Kurmalguda, Hyderabad, in the state of Telangana. M/s.Ramky E-waste Management Limited is a Public incorporated on 13 March 2008. It is classified as Non-government Company and is registered at Registrar of Companies, Hyderabad. Its authorized share capital is Rs.18, 000,000 and its paid up capital is Rs. 18,000,000. M/s.Ramky E-waste Management Limited's Corporate Identification Number (CIN) is U74999TG2008PLC058138 and its registration number is 58138.



The office is situated in a full-fledged, single story perfect building in 3.2 acres of land. This facility is run by a Private limited founded by Alla Ayodhya Rami Reddy who is acting as Chairman. The personnel working in this facility are classified in to management, administration, technical experts, plant safety committee members and workers. Two persons, one CEO and Engineer manager represent management. Three directors and two supervisors represent administration. One Safety Coordinator and five in-chargers represent safety committee members. Workers group consists of fifteen members. Adequate working space and facilities are available in the facility.

M/s. Ramky E-Waste Recycling Facility gets the e-waste from many companies like Accenture, IBM, all government District Rural Development Agencies bodies. The facility also collects the e-waste from people of informal sector like rag pickers, itinerants. The Red cinemas came to M/s. Ramky E-Waste Recycling Facility for disposal of their e-waste. The e-waste of Robo movie was also disposed in M/s. Ramky E-Waste Recycling Facility.

The M/s.Ramky E-Waste Recycling Facility uses both manual labour and machines and segregates the plastic and e-waste. They send their vehicles and get the e-waste from the places of generation. There are technical assistants in the facility who will check first, whether there is life in it. If life is there, it is refurbhised. If not it will be dismantled. The following diagrammatic representation depicts the process of recycling in the facility.



At present in India there is no technology to recover the precious metals which are not visible to the naked eye. Due to this there is loss of recoverable resources. So, M/s. Ramky E-Waste Recycling Facility is sending the mother boards of laptops, computers, cell phones, etc., where in the precious metals are present to AURUBIS Company in Germany for the recovery of precious metals by ship. Based on the calculation and output, the German Company pays the amount to M/s. Ramky E-Waste Recycling Facility.

M/s. Ramky E-Waste Recycling Facility tied up with Abington Reldan Metals (ARM) an U.S. based company to establish India's first large e-waste precious metal recovery facility. It is a joint venture. ARM Limited Liability Company has refining for over 30 years with a combined experience of over 30 years turning clients waste in to recoverable and quantifiable assets. Certifications of ARM include: ISO9001, ISO14001, OHSAS18001.

M/s. Ramky E-Waste Recycling Facility is now using the ARM Technology for recycling the e-waste. After dismantling the e-waste, the hazardous waste which is obtained is sent to the Doondikal, Hazardous Waste Management Centre for environmentally sound management. Cathode Ray Tube Dismantling Unit and Shredder are not operating as the rules are amended in 2016.

There are both men and women workers working in the M/s. Ramky E-Waste Recycling Facility. The women workers are from Padi Sharif, a nearby village. Mostly men workers are migrant workers from Uttar Pradesh. The facility works from 9:30 a.m.to 5:30 p.m. M/s.

Ramky E-Waste Recycling Facility gives training to the workers for one month initially. The women are using machinery like De Walt-18VXR and Lethiym Ion Impact Driver for dismantling the E-waste. Men workers are separating the Mother Boards.

The facility under study is taking care of the workers by providing safety facilities like helmets, safety jackets, face mask, hand gloves, safety glasses are being used by the workers. In M/s. Ramky E-Waste Recycling Facility they provided first aid box, fire extinguishers and even there is a dust extraction machine, so that the workers do not inhale dust. They are even constructing a weighing bridge.

M/s.Ramky E-Waste Recycling Facility has processed 2111 Metric Tonnes of e-waste in the year 2016-2017. The material recovered mainly consisted of iron, aluminium, plastic and glass. About 63.34 Metric Tonnes of batteries were also processed in the year 2016-2017[6]. M/s.Ramky E-Waste Recycling Facility has processed 1088.5 Metric Tonnes of e-waste in the year 2017-2018[7], 298 Metric Tonnes of e-waste in the year 2018-2019[8], 819.42 Metric Tonnes of e-waste in the year 2019-2020[9], 350.5 Metric Tonnes of e-waste in the year 2020-21[10] and 269.151 Metric Tonnes of e-waste in the year 2021-22[11].

The below table clearly indicates that during the recycling process of e-waste, materials like iron, aluminium, plastic, glass, battery, copper, waste are being extracted but no precious materials like gold, silver are being extracted in India. As India is not having the technology to extract the precious materials which are not visible to the naked eye, the recycling centers are sending the motherboards to developed countries and these countries are being benefitted by paying less to the developing and under developed countries. As the dismantling process is being done in the developing and under developed countries it is degrading the health of the people and environment in these countries. The study reveals that non availability of special

[6] https://tspcb.cgg.gov.in/Shared%20Documents/E-WasteAnnualReport-2016-17.pdf
[7] https://tspcb.cgg.gov.in/Shared%20Documents/E-WasteAnnualReport-2017-18.pdf
[8] https://tspcb.cgg.gov.in/AnnualReports/E-Waste%20Annual%20Report%202018-19.pdf
[9] https://tspcb.cgg.gov.in/AnnualReports/E-Waste%20Annual%20Report%202019-20.pdf
[10] https://tspcb.cgg.gov.in/AnnualReports/E-Waste%20Annual%20Returns%202020-21.pdf
[11] https://tspcb.cgg.gov.in/AnnualReports/E-Waste%20Annual%20Returns%202021-22-.pdf

technology may lead to the loss of precious materials and unsafe disposal may lead to environmental degradation and both the hypothesis are proved correct.

Materials recovered after dismantling of e-waste by M/s. Ramky E-Waste Recycling Facility

S.No	Materials Recovered	Quantity (MT)2016-2017	Quantity (MT)2017-2018	Quantity (MT)2018-2019	Quantity (MT)2019-2020	Quantity (MT)2020-2021	Quantity (MT)2021-2022
1	Iron	886.70	401.7	107.3	243.5	144.8	122.651
2	Aluminium	52.78	27.2	12.6	72.0	14.3	10
3	Plastic	781.14	434.3	22.3	35.7	54.2	30.1
4	Glass	63.34	9.8	0	-	-	-
5	Waste (Dust)	31.67	6.5	6.4	-	8.7	-
6	Battery	63.34	31.6	15.3	18.2	12.9	14.5
7	Card Boards & Packing	168.89	143.7	67.7	25.2	8.9	25
8	Copper	42.22	12	34.8	15	9.6	12.3

Conclusion and suggestions

1. Practice of Zero waste technologies protects the environment, benefits the communities and supports a strong local economy. The main goal of zero waste is for no trash to be sent to landfills, incinerators or the ocean. According to zero waste technology, material should be reused until the optimum level of consumption.

2. Transformation to miniature modules results in lesser quantities of e-waste as the weight will be reduced and the use of metals will be reduced resulting in conservation of natural resources and protection of the environment.

3. Wastes should be treated at their source as it will reduce costs as well as informal recycling.

4. Facilities and recyclers should strive to refurbish and reuse discarded Electrical and Electronic Equipment as it will reduce generation of e-waste.

5. Companies should offer free take-back services for old electrical and electronic products.

6. Awareness should be created in people regarding the e-waste disposal. Due to lack of awareness at various levels of Stakeholders, the e-waste is also being collected from informal sector.

7. Latest machinery should be imported for the recycling of e-waste. Because of non-availability of special machinery to extract precious metals like gold, silver, platinum, etc., which is not visible to naked eye, they are sending the motherboards to companies of other countries like Germany and those companies are paying only less amount which is less value than the metals.

8. Repeated awareness programs through print and electronic media regarding disposal of e-waste is very much needed. Government, manufacturers and producers should work for this.