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E-WASTE MANAGEMENT: IMPACTS, METHODS, AND FACTORS OF SUSTAINABLE DEVELOPMENT

Dimitra G. Kostanasiou *

General High School of Paramythia, Paramythia, Greece.
* Corresponding Author

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ABSTRACT

The rapid pace of technological advancement contributes to the generation of a substantial amount of Waste Electrical and Electronic Equipment (WEEE), which contains not only recyclable materials but also toxic substances hazardous to the environment and human health. Households frequently dispose of large quantities of Electrical and Electronic Equipment (EEE), either due to hardware failure or simply to upgrade to newer technologies. The management of WEEE is a complex issue. Numerous factors must be taken into account when making decisions regarding the fate of end-of-life electrical and electronic equipment and its sustainable management. This paper presents a theoretical analysis of the WEEE management problem, examining the environmental risks stemming both from the composition of these wastes and their final disposal methods (such as landfilling, incineration, etc.) due to the presence of various hazardous chemical substances. Finally, the factors influencing the sustainable management of WEEE are briefly outlined.

Keywords: Waste Electrical And Electronic Equipment (WEEE); Environmental Impacts; Management; Sustainable Management; Reuse; Recycling.

1 INTRODUCTION

Continuous technological progress, companies constantly bringing new models to market, and consumer demand for new and innovative products have led to the rapid growth in the production of electrical and electronic equipment. This technological advancement results in the swift retirement and premature obsolescence of products long before the end of their intended lifespan, generating a massive volume of waste. Waste electrical and electronic equipment—commonly known as "e-waste"—consisting of discarded televisions, mobile phones, computers, and other types of electrical and electronic appliances, represents a rapidly growing global issue. It contributes significantly to pollution while simultaneously containing valuable resources that could be reused or recycled. According to EU data, e-waste is the fastest-growing waste stream in the European Union, with less than 40% currently being recycled [1]. More recent international data shows that in 2022, 62 million metric tons of e-waste were generated worldwide, with only 22.3% officially documented as collected and recycled in an environmentally sound manner [2,3,4]. In this paper, we first define the concept of electrical and electronic equipment, outline its composition in terms of both valuable and toxic materials, and detail the various waste categories. Subsequently, we present management methods for electrical and electronic waste and provide a brief overview of the policies implemented by the EU, Greece, and the USA. Finally, we discuss the environmental issues arising from their management, as well as the factors influencing the sustainable management of WEEE.

2 DEFINITION OF EEE – WEEE CATEGORIES

EEE (Electrical and Electronic Equipment) refers to any device that depends on electric currents or electromagnetic fields to function properly, including its components and subassemblies. **WEEE (Waste Electrical and Electronic Equipment)** refers to discarded or end-of-life EEE—that is, equipment that is no longer in use and is disposed of without the intention of reuse or refurbishment [5, 6, 7, 8, 9]. In several sources, the terms **e-waste** and **WEEE** are used almost synonymously, although some literature distinguishes WEEE as a broader category that also encompasses non-electronic household appliances [10, 11].

2.1 WEEE Categories

The clearest and most widely used classification in the EU is the **6 categories** outlined in the WEEE Directive [8, 12, 13, 14, 15]:

1. **Temperature exchange equipment:** refrigerators, freezers, air conditioners, heat pumps [14, 15].
2. **Screens, monitors, and equipment containing screens:** televisions, monitors, laptops, tablets [14].
3. **Lamps:** fluorescent lamps, LED lamps, HID lamps, etc. [14].
4. **Large equipment:** washing machines, clothes dryers, dishwashers, electric stoves, large printers, photovoltaic panels [14,15].
5. **Small equipment:** vacuum cleaners, microwaves, kettles, scales, calculators, small power tools, electronic toys, etc. [14].
6. **Small IT and telecommunication equipment:** mobile phones, routers, personal computers, small printers, telephones, e-book readers [14,15].

Other classifications exist in the literature—such as the older 10 main categories or groupings into *white goods* / *brown goods* / *grey goods*—but for legal and institutional frameworks within the EU, the 6-category classification remains the standard reference [8, 11,15,16].

3 COMPOSITION OF WEEE

The composition of WEEE constitutes a fundamental factor that influences the choice of the appropriate method for their processing. Waste Electrical and Electronic Equipment contains over 1,000 different materials in its composition, some of which have significant economic value and, if recovered, can yield great benefits both from an economic perspective and in terms of energy savings and the conservation of natural resources [17, 18].

On the other hand, certain components are highly toxic to humans and the environment, or can lead to the generation of toxic derivatives due to improper management and processing. These include heavy metals—such as mercury, cadmium, and lead—flame retardants, and other substances. Due to the presence of these materials, WEEE is considered hazardous waste and must therefore be managed as such [17, 18].

Consequently, components containing hazardous materials must be removed and subjected to separate treatment. Such parts or components containing hazardous materials include batteries, cathode-ray tubes, fluorescent lamps, mercury-containing parts (e.g., switches), asbestos, printer toner cartridges, liquid ink, colored ink, printed circuit boards, capacitors containing polychlorinated biphenyls, liquid crystal displays, plastics containing halogenated flame retardants, equipment containing chlorofluorocarbons (CFCs), hydrofluorocarbons (HFCs), and hydrochlorofluorocarbons (HCFCs), gas lamps, and discharge lamps [17, 18].

4 THE IMPACTS OF HAZARDOUS MATERIALS ON HEALTH AND THE ENVIRONMENT

Lead is a toxic substance that accumulates in the human body. It negatively affects the nervous system, causes renal failure, burdens the immune and cardiovascular systems by inhibiting physical development, and slows down cognition [17, 18].

The various compounds of mercury possess different physicochemical properties, resulting in their actions manifesting different symptoms. In general terms, the toxicity of mercury and its compounds primarily manifests in the form of poisoning and nervous system disorders [17, 18].

Cadmium is widely used in industry, particularly in the manufacture of alloys with low friction coefficients, in soldering for the production of electrical cables, etc. With the increase in industrial activity, the rate of environmental pollution with cadmium has simultaneously increased, as has the rate of its intake by humans. Its toxic action primarily affects human bones. Furthermore, chronic obstructive pulmonary disease or pulmonary fibrosis can be caused by chronic exposure to cadmium [17, 18].

Asbestos is a fibrous mineral characterized by high mechanical strength and resistance to high temperatures; for this reason, it is used in brake linings, insulation, construction materials, fireproof suits, etc. The disease caused by the inhalation of all types of asbestos fibers is called asbestosis. Its characteristics include difficulty in breathing, erosion of lung tissue, and extensive thickening of the layer covering the lungs (pleura). Most importantly, asbestos is one of the causes of lung cancer and mesothelioma (peritoneal cancer) [17, 18].

Polychlorinated biphenyls (PCBs) belong to the category of chlorinated aromatic compounds. These compounds have numerous industrial applications (coolants and insulators for transformers and capacitors, additives for the flexibility of insulating materials, etc.), owing to their properties of thermal and chemical stability and very low electrical conductivity. The main sources of environmental pollution from PCBs are waste from certain chemical industries, as well as capacitors and transformers in power stations. The toxicity of PCBs to various organisms depends on the type and specific isomer of the PCB. Today, the production and use of PCBs have decreased, and substitutes with similar properties—but low toxicity and rapid biodegradability—are being used [17, 18].

Halogenated flame retardants: Most polymers are petroleum-based, making them flammable. To increase their temperature resistance, a variety of over 175 chemical substances, known as flame retardants, are currently used. A flame retardant is a chemical substance used to slow down or, if possible, eliminate the spread of flame in a material. Flame retardants can be found in furniture, textiles, coatings, and plastics such as cell phones, laptops, televisions, microwave ovens, video games, vacuum cleaners, and other appliances, intended to prevent or slow down the spread of fire. Chlorinated and brominated halogenated compounds are the two main flame retardants used in industry due to their low production costs; however, they cause considerable damage to the environment and human health [17, 18].

Chlorofluorocarbons (CFCs), hydrofluorocarbons (HFCs), and hydrochlorofluorocarbons (HCFCs): CFC, HFC, and HCFC compounds are used as aerosol propellants and as refrigerants in refrigerators and freezers. CFCs are currently considered to be the primary cause of stratospheric ozone depletion. CFCs are compounds with a long lifespan. This long lifespan allows them to reach the stratosphere and release chlorine atoms, which act as catalysts in the reaction converting ozone into oxygen. Because chlorine atoms act as catalysts and are not consumed in the reaction, a single chlorine atom can break down numerous ozone molecules [17, 18].

5 MAIN WEEE MANAGEMENT METHODS

The main methods of WEEE management in many countries are sanitary landfilling and incineration. However, their disposal, combined with the depletion of landfill sites, creates the need to explore new management methods. The presence of hazardous components, as well as components of high economic value, within the composition of WEEE has led to the development of new management and processing technologies, with priority given to the recovery of valuable components and recycling for the conservation of raw materials [3,4,17,18,19,20].

5.1 Sanitary Landfill

In the sanitary landfill method, WEEE mixed with municipal solid waste is transported to landfill sites (landfills) and compacted, while being laid by conventional crawler earthmoving machinery as uniformly as possible in layers of predetermined thickness, separated from each other by layers of inert material (soil), so as to minimize any health or aesthetic impact on the environment. However, no landfill is completely impermeable, which maximizes the potential for environmental pollution, either through leachate or through gas leakage from WEEE. Sanitary landfilling of WEEE is therefore not considered the most environmentally appropriate management method for this type of waste [17,18,19,20].

5.2 Incineration

Incineration is a solid waste management method, but it entails excessive risks, and thus its application requires great caution. Among its advantages is that it reduces waste volume and allows the exploitation of the calorific value of combustible materials; however, there is always some residue, making incineration an incomplete processing method. Furthermore, gases can escape during incineration, such as dioxins originating from the burning of plastics, or toxic metals that, under certain conditions, can transition into the gaseous phase. Waste incineration contributes significantly to annual emissions of cadmium and mercury. Heavy metals that are not emitted into the atmosphere may end up in incineration residues and re-enter the environment through their disposal. WEEE will inevitably increase these emissions unless effective precautionary measures are taken [17,18,19,20].

Apart from incineration, pyrolysis constitutes a thermochemical process that is considered more suitable, especially for the processing of small-sized WEEE, because it enables the recovery of materials and energy; however, further investigation regarding the procedures is required to enable an environmentally sound design involving this type of processing [4, 17,18,19,20].

5.3 Reuse

Reuse comprises three processes: those resulting in products with different quality characteristics, such as repair, the process of upgrading-overhauling, and the process of product remanufacturing. Reuse processes are applied only to components or products that are more desirable to reuse than to recycle. All reuse processes involve disassembly of the product to some extent, which is why they are also referred to as disassembly processes [17,18,19,20].

The first process, repairing a product's malfunction, aims to restore the product to operational status with the least possible intervention. The upgrading process is carried out in a specialized facility and includes cleaning, repairing, refurbishing, and grading procedures. The result of this process is a product whose functional capabilities and quality are higher than when it was new. Finally, remanufacturing involves the detailed disassembly and reconstruction of the product, resulting in the creation of a product of superior quality compared to the original, often with upgraded features. The various components may be repaired or replaced with new ones, and any software updates available for the products may also be incorporated during remanufacturing. The resulting product carries a warranty equivalent to that of new products [17,18,19,20].

5.4 Recycling

According to studies, recycling as a WEEE management method has been proven to present the lowest environmental burdens compared to incineration and sanitary landfilling. It encompasses a wide range of procedures starting from disassembly/depollution and shredding, and concluding with plastics processing, energy recovery processes, and metallurgical processes to close the material loop [3, 17,18,19,20].

Recycling consists of three main steps. First, disassembly/depollution, where components are separated and hazardous as well as valuable elements are removed. Second, further reduction of material volume through mechanical processes and separation of the various material fractions. Third, metal recovery using metallurgical processes so that they become suitable for their original use [3, 17,18,19,20].

The recycling of WEEE components is not only positive from a solid waste management perspective, as it reduces the volume of waste ending up in landfills, but it also presents significant advantages in terms of conserving raw materials and energy, as well as preventing the pollution of the natural environment [3, 17,18,19,20].

6 WEEE MANAGEMENT METHODS AND SUSTAINABILITY

Electrical and electronic waste management methods should follow the principles of sustainability. Recycling is considered the most appropriate management method—being environmentally effective, socially acceptable, and economically viable—when reuse is not feasible [3, 17,18,19,20].

Therefore, there is a need to establish management and processing methods that enable the depollution of electrical and electronic waste and allow the recovery of economically valuable components. These processes aim to generate the least possible environmental impact while achieving a higher degree of recovery for the conservation of natural resources and energy recovery [3,4, 17,18,19,20].

7 EU, GREEK, AND US POLICY ON ADDRESSING THE WEEE PROBLEM

Miller & Spoolman [21] mention that the European Union spearheaded efforts to address the electrical and electronic waste problem by requiring manufacturers to take back relevant products at the end of their useful lifespan and to repair, remanufacture, or recycle them. In the European Union, the disposal of electrical and electronic waste in sanitary landfills, as well as its routing to incineration plants, is prohibited. Japan has also adopted this approach. To cover the cost of these programs, consumers pay a recycling tax on electrical and electronic products. However, due to the high costs associated with compliance with these laws, a large portion of the waste that is supposed to be recycled within a country is illegally exported to other countries.

In March 2020, as reported on the European Parliament website, the European Commission presented a new Circular Economy Action Plan, which includes the reduction of waste electrical and electronic equipment among its key priorities [1,3]. Specifically, the proposal outlines immediate objectives such as the "right to repair" and the general improvement of reusability, the establishment of a common charger, and the creation of a reward system to encourage the recycling of electronics.

In February 2021, the Parliament approved the new Circular Economy Action Plan, requesting additional measures to achieve a carbon-neutral, environmentally sustainable, toxic-free, and fully circular economy by 2050, including stricter recycling rules and binding targets for material use and consumption by 2030 [1,2,3,5,21].

Greece, as an EU member-state, has enacted rules, terms, and conditions for the alternative management of waste electrical and electronic equipment in compliance with the provisions of the European Union directives of the European Parliament regarding waste electrical and electronic equipment [1,2,5,21].

According to Eurostat data (2020), Greece ranks 23rd in the EU in terms of e-waste recycling, with a recycling rate of 32.9% relative to total electronic waste [1]. According to the latest Eurostat statistics (2024), the collection and recycling rate of WEEE in Greece remains low at approximately 37.5%, staying significantly below the mandatory EU collection target of 65% [22].

The waste management problem in Greece is further intensified by the existence of a large number of illegal and uncontrolled dumpsites. It is estimated that 90% of WEEE either ends up alongside other municipal solid waste or is recycled together with other metals, without any prior processing. In our country, according to the Hellenic Recycling Agency (EOAN), the competent body of the Ministry of Environment for the design and implementation of recycling in Greece, the annual generation of waste electrical and electronic equipment is estimated at 140,000–180,000 tons per year. Waste electrical and electronic equipment has been designated by Greek legislation as a priority waste stream due to its hazardous nature, the rapid increase of its volume, and the significant impacts caused by the production of electrical and electronic equipment on the environment [1,2,3,5,21].

The United States produces significant volumes of e-waste; in 2019, out of the 6.918 Mt generated, only 1.020 Mt (14.7%) was officially collected and recycled [23]. Most of the remaining waste ends up in sanitary landfills or incineration plants, despite the fact that many components contained in electrical and electronic devices include gold, rare earths, and other valuable materials that could be recycled or reused. Furthermore, this waste represents a source of toxic and hazardous chemicals that can cause pollution of air, soil, surface and groundwater, while also posing severe risks to human health.

Much of the electrical and electronic waste in the United States of America that has not been landfilled or incinerated is shipped to China, India, and other countries in Asia and Africa, where labor costs are low and strict relevant legislative policies are lacking. Workers in these countries, many of whom are children, dismantle, burn, and process electrical and electronic waste materials using acids in order to recover valuable metals and reusable components. During this process, workers are exposed to toxic metals such as lead, mercury, and other harmful chemical substances. The remaining materials are dumped into waterways and soil or undergo uncontrolled burning, exposing many people to highly toxic chemicals called dioxins. In this way, the disposal of a cell phone or other electronic device in the United States of America can result in health problems for people living in China, India, or Africa.

The transfer of such hazardous waste from more developed to less developed countries was prohibited by the international Basel Convention, which aims to reduce and control the transboundary movement of hazardous wastes. Despite this prohibition, a large portion of the world's electrical and electronic waste is not officially classified as hazardous waste or is illegally exported from certain countries. The United States of America can legally export its electronic waste because it is the only industrialized country that has not ratified the Basel Convention [1,2,3,4,5,21]. Despite having recognized the associated environmental risks and implemented internal restrictions on landfilling electronic components, the United States continues to channel a significant portion of its e-waste—via international trade or processing gaps—to developing nations with less secure waste management infrastructures [24, 25].

8 FACTORS AFFECTING THE SUSTAINABLE MANAGEMENT OF WEEE

8.1 Social Factors

Social consensus and public participation are of paramount importance in the management of WEEE. The management of WEEE must be embedded in people's consciousness as an integral part of daily life, just like the management of household waste. Therefore, its management is dependent on public trends and is influenced by economic and other factors, habits, and interactions among users [3,18].

8.2 Environmental Factors

Environmental factors relate to the measurement of environmental impacts generated by a process, operation, or product. These factors are associated with emissions, the consumption of natural resources, and the pressures exerted on humans and the environment resulting from the entire life cycle of the product, operation, or process. The assessment of environmental impacts resulting from WEEE recycling should encompass the entire recycling process: from collection, temporary storage, and sorting, to disassembly/depollution, shredding procedures, metallurgical recovery processes, and final disposal. Typically, environmental impact assessment includes evaluating emissions generated by each individual process that may contribute to the greenhouse effect, as well as energy and natural resource consumption [18,20, 26].

Recycling, when reuse is not feasible, is considered an appropriate WEEE management method in terms of energy recovery and resource conservation, as well as from an economic perspective. However, like any process, recycling also causes environmental impacts. For instance, the WEEE recycling process causes atmospheric pollution from particulate matter, while each individual recycling subprocess contributes varying degrees of hazardous air pollution from particulate matter [18, 20 ,26].

8.3 Economic Factors

Economic factors relate to the composition of WEEE, the methods used, and their efficiency in recovering components of economic value. Furthermore, they are associated with the existence of a market for recycled products, as well as the supply of an adequate quantity and satisfactory quality of recycled materials [18]. Recent reviews highlight that the circular economy in practice is linked to reuse, repair, remanufacturing, recycling, recovery, and repurposing; however, its implementation is constrained by institutional, technological, economic, and behavioral barriers [3,4,20].

9 CONCLUSIONS

In conclusion, the management of WEEE constitutes a multidimensional environmental issue and appears to be one of the most difficult and complex problems facing the modern world. Recycling will likely not keep pace with the explosive growth of electrical and electronic waste. The only true long-term solution is prevention, through which electrical and electronic products will be designed to be manufactured and easily repaired, remanufactured, or recycled without the use of toxic materials [2,3,4,18,20,21].

In order to transition toward low-waste economies, the order of priorities set for waste management must change. The transition to such an economy will require individuals and businesses to reduce resource consumption, as well as to reuse and recycle the majority of waste at local, national, and global levels [2,3, 18,20,21].

REFERENCES

[1] European Parliament. E-waste in the EU: facts and figures [Internet] [in Greek]. Available from:

https://www.europarl.europa.eu/news/el/headlines/society/20201208STO93325/ilektronika-apovlita-stin-ee-stoicheia-kai-arithmoi-grafima

[2] Baldé CP, Kuehr R, Yamamoto T, McDonald R, D'Angelo E, Althaf S, et al. The Global E-waste Monitor 2024. Geneva/Bonn: International Telecommunication Union and United Nations Institute for Training and Research; 2024.

[3] Quinto S, Law N, Fletcher C, Le J, Jose SA, Menezes PL. Exploring the E-waste crisis: strategies for sustainable recycling and circular economy integration. Recycling. 2025;10(2):72. doi:10.3390/recycling10020072.

[4] Dagwar PP, Kundu D, Dutta D. Upcycling E-waste for sustainable innovation: functional materials, toxicity reduction, and circular design. Environmental Science: Advances. 2026;5(4):966-996. doi:10.1039/D5VA00362H.

[5] Government Gazette of the Hellenic Republic. Government Gazette 4382/22-09-2021 [in Greek].

[6] Botelho Meireles de Souza GBM, Bisinotto Pereira M, Santos LF, Jegatheesan V (Jega), Cardozo-Filho L. Management of waste printed circuit boards via supercritical water technology. Journal of Cleaner Production. 25 September 2022;368. doi:10.1016/j.jclepro.2022.133198

[7] Grant K, Goldizen FC, D Sly PDL, van den Berg M, Pacella RE. Health consequences of exposure to e-waste: A systematic review. The Lancet Global Health. 1 December 2013;1(6):e350–61. doi:10.1016/S2214-109X(13)70101-3

[8] Işıldar A, Rene ER, Van Hullebusch ED, Lens PNL. Electronic waste as a secondary source of critical metals: Management and recovery technologies. Resources, Conservation and Recycling. 1 August 2018;135:296–312. doi:10.1016/j.resconrec.2017.07.031

[9] Soares Quinete NS, Tansel B, Katsenovich YP, Mendoza Manzano M, Nasir Z. Leaching profile of per- and polyfluoroalkyl substances from selected e-waste components and potential exposure pathways from discarded components. Journal of Hazardous Materials. 5 July 2025;491. doi:10.1016/j.jhazmat.2025.137953

[10] Chandrappa R, Das DB. Waste from electrical and electronic equipment. 2012. https://doi.org/10.1007/978-3-642-28681-0_8

[11] Murugappan RM, Karthikeyan M. Microbe-assisted management and recovery of heavy metals from electronic wastes. Environmental Management of Waste Electrical and Electronic Equipment. 2021. doi:10.1016/B978-0-12-822474-8.00004-0

[12] Shaikh S, Thomas K, Zuhair S. An exploratory study of e-waste creation and disposal: Upstream considerations. Resources, Conservation and Recycling. 1 April 2020;155. doi:10.1016/j.resconrec.2019.104662

[13] Erkmen AN, Ulber R, Jüstel TH, Altendorfner M. Towards sustainable recycling of critical metals from e-waste: Bioleaching and phytomining. Resources, Conservation and Recycling. 1 April 2025;215. doi:10.1016/j.resconrec.2024.108057

[14] Ramanayaka S, Keerthanan S, Vithanage MS. Urban mining of E-waste: Treasure hunting for precious nanometals. Handbook of Electronic Waste Management: International Best Practices and Case Studies. 1 January 2019;19–54. doi:10.1016/B978-0-12-817030-4.00023-1

[15] Kwon G, Yoon K, Kwon EE, Lee H, Song H. Technical advancement in valorization of electronic waste and its contribution to establishing economic value-chain. Chemical Engineering Journal. 15 August 2024;494. doi:10.1016/j.cej.2024.153154

[16] Punia A, Chauhan NS, Singh RP. Biological methods for the treatment of e-waste. Waste Management and Resource Recycling in the Developing World. 2023. doi:10.1016/B978-0-323-90463-6.00032-4

[17] Zapantis A. Management of electronic and electrical waste and environmental impacts [in Greek]. Patras: Hellenic Open University, Postgraduate Programme in Waste Management; 2018.

[18] Strati E. E-waste: the new challenge in waste management in the 21st century [in Greek]. Patras: Hellenic Open University; 2019.

[19] Anastasopoulou A. Management of waste electrical and electronic equipment (WEEE) in Greece and Europe [in Greek]. Athens: National Technical University of Athens, MSc Environment and Development; 2014.

[20] Gaur TS, Yadav V, Mittal S, Sharma MK. A systematic review on sustainable E-waste management: challenges, circular economy practices, and a conceptual framework. Management of Environmental Quality. 2024;35(4):858-884. doi:10.1108/MEQ-05-2023-0139.

[21] Miller GT, Spoolman SE. Environmental science [in Greek]. Dimitrakopoulos P, Gavrilakis K, scientific editors. Thessaloniki: Tziola Publications; 2018.

[22] Eurostat. Waste statistics - electrical and electronic equipment. European Commission, Statistics Explained. 2024. Available from: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Waste_statistics_-_electrical_and_electronic_equipment

[23] Shevchenko T, Danko Y, Golysheva I, Koblianska I, Kasianyna A. Institutional barriers to circular economy transition: The case of e-waste management in developing and developed nations. *Renewable and Sustainable Energy Reviews*. 2023 Mar;173:113088. doi:10.1016/j.rser.2022.113088

[24] Islam MK, Khatun MS, Mourshed M. An in-depth analysis and review of management strategies for E-waste in the south Asian region: A way forward towards waste to energy conversion and sustainability. *Heliyon*. 2024;10(5):e28707. doi:10.1016/j.heliyon.2024.e28707

[25] Yadav D, Vallero DA. Hazardous waste management in developing countries: Current status and potential trends. In: Hazardous Waste Management: An Overview of Advanced and Cost-Effective Solutions. Elsevier; 2021. p. 1-28. doi:10.1016/B978-0-12-824344-2.00001-8

[26] Papaoikonomou A. Investigation of factors affecting the sustainable management of waste electrical and electronic equipment [in Greek]. Volos: University of Thessaly, School of Engineering; 2013.