Chapter 3
E-Waste Collection and Recycling Best Practices and Innovations

Pathapati Preethi
Woxsen University, India

Thotakura Deepak
Woxsen University, India

Siddadapu Venkata Anusha
Woxsen University, India

D. Bhagya
https://orcid.org/0000-0002-1685-5930
Sapthagiri College of Engineering, India

ABSTRACT

Over the last two decades, the usage of electronic equipment in human life has been increasing dramatically and the life span of electronic products is short. E-waste is growing in the world, because they do not biodegrade easily, and most of them are not reused or recycled. In this chapter, the authors have explained the best practices and innovative approaches in e-waste collection and recycling, aiming to address environmental concerns, conserve resources, and promote sustainable waste management. The main problem is the release of toxic chemicals like lead, chromium, manganese, and polybrominated diphenyl ethers (PBDEs) from e-waste leads to many environmental and health issues as most recycling facilities are located in low-income areas. In those mainly women and children often participate in e-waste recycling as a form of income and are frequently exposed to hazardous pollutants. Some of the health effects include impaired learning and memory functions; altered thyroid, estrogen, and hormone systems; and neurotoxicity.

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1. INTRODUCTION

The concept of E-waste collection and recycling has come to light due to the increasing use of electronic items, the amount of pollution they exposed to air, land, and soil, and the hazardous compounds they contain such as lead, chromium, mercury, polyvinyl chloride, gallium arsenide, cadmium, beryllium, and others. When these compounds eventually reach our bodies. This finally harms us. There should be suitable procedures in place to manage E-waste.

The impact of technological advancement and incorporation in day-to-day living gadgets has been seen globally in recent years, empowering individuals in the form of electronic appliances or devices. Appliances, such as refrigerators, washing machines, stoves, televisions, battery-powered toys, and mobile phones, are prevalent in houses regardless of necessity or economic level. Personal cameras, laptops, cell phones, air conditioners, computers, and security systems have become commonplace in upper-income families. All of these technologies have found an irreplaceable place in our lives and have both positive and negative impacts. The darker side of technology developments in the electronics industry referred to as the poison of the digital age, has been e-waste created from EOL electronic gadgets utilized in every household (Bhaskar & Turaga, 2018).

E-waste is detrimental to our environment. Assume you go to a mobile shop to exchange your phone. Instead of recycling the merchandise, some retailers often burn them. This allows them to extract copper, silver, and gold. When these technologies are burned, hazardous gases and chemicals are released. Hydrocarbons, brominated dioxins, and other heavy particles are among the harmful chemicals. Because these particles persist in the air, humans ultimately inhale them. Animals inhale these as well.

The Quantity of electronic trash created and reported by various organizations frequently differs. The main cause is that the estimating techniques differ and the units they use to describe themselves are not standard. The lack of adequate guidelines by ISO or any other international authority organization for the assessment of e-waste creation is another factor (Bhaskar & Turaga, 2018).

The optimum number of vehicles and the proper routing are necessary for efficient collection to minimize unnecessary collection costs and potential profit losses. A flexible and reliable communication system might also increase the amount of rubbish that is legitimately collected between the community and the garbage collection company. The field of e-waste recycling and emerging technologies have seen new trends emerge, and internet-based garbage collection services have already been investigated in China and India. Investigated the primary factors and challenges that affect Chinese individual decisions to recycle e-waste through e-commerce. The desire to recycle via e-commerce generation was shown to be favorably correlated with attitudes, personal standards, and the simplicity of e-commerce, despite the fact that residents did not all agree to use it (Nowakowski & Pamuła, 2020).

Electronic waste recycling is a gold mine from an economic standpoint since it may produce a wide range of priceless materials, including palladium, copper, iron, gold, aluminium, platinum, and silver. Technically the majority of these metals are recoverable and recyclable. Recycling of e-waste also adds to the issue of unemployment in several nations, including China, which employs around 100,000 recyclers at one of its facilities. Hazardous substances including lead, mercury, and cadmium, as well as gases and chemicals like flame retardants and chlorofluorocarbons, may all be avoided through recycling, Global e-waste is estimated by the United Nations University to be worth more than $62 billion in raw materials (Aboelmaged, 2021).