Chapter 13
From Waste to Wealth: Global Perspectives on Effective Management of Electronic Equipment Waste Towards Sustainable Development Goals (SDGs)

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ABSTRACT

The exponential surge in global e-waste has emerged as a critical social, ecosystem, and public health matter. Within this chapter, the authors delve into the multifaceted economic, social, educational, legal, and technological challenges entwined with electronic equipment waste management. It accentuates the imperativeness of devising effective strategies to overcome these hurdles. Insufficient management practices culminate in the emission of perilous substances, thus exacerbating pollution levels and health risks. Numerous nations have adopted regulations and policies to govern the people and proper disposal of electronic equipment waste. In this chapter, the authors explore the utmost significance of managing electronic equipment waste in connection with the Sustainable Development Goals (SDGs). The discourse encompasses exemplary practices and strategies. Conclusively, this chapter emphasizes the paramount importance of robust policies and continuous innovation in achieving sustainable electronic equipment waste management and making valuable contributions towards the realization of the SDGs.

INTRODUCTION

The amount of e-waste, which includes abandoned electrical equipment and electronic devices, has been increasing globally at alarming rates due to quick advancement and low cost of electronic devices (Chen et al. 2015a). According to many research, this hazardous e- waste is one of the fastest-growing waste streams in the world (Lambert et al. 2015). Electronic equipment waste mainly refers to the disposal of electronic equipment, including smartphones, televisions, Pc's, and other similar equipment (Huang et al.

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Table 1. Category-wise e waste

Contribution of e-waste based on the different categories.

Category	Examples	Contribution of e-waste in the year 2019 (million metric tons)
Small equipment	Irons, Toasters, Luminaires, Radio sets, Microwave oven, Ventilation equipment, Vacuum cleaners, Clocks and Watches, Digital cameras, Electric kettles, Video cameras	17.4
Large equipment	Large medical devices, Large monitoring and control instruments, Photovoltaic panels, Cookers, Electric stoves, Large computer mainframes, Large printing machines, Washing machines, Clothes dryers, Dish washing machines	13.1
Monitors and screen	Televisions, LED/LCD, Monitors, Tablets, E-Book readers, Laptops	6.7
Temperature exchange equipment	Heat pumps, Freezers, Air-conditioners, Refrigerators	10.8
Lamps	CFL, Fluorescent lamps, Pressure sodium lamps, Metal halide lamps, LED lamps	0.9
Small IT and telecom equipment	Mobile phones, Printers, Routers, Personal computers, Telephones, GPS and navigation equipment	4.7

2014). Table 1 depicts the item-wise e-waste (Forti et al., 2018). These devices are considered electronic waste when they reach their expiry or are no longer desired or needed. The global increase in electronic equipment waste can be attributed to the rapid proliferation of electronic devices and their shorter lifespan, which represents an important 21 percent increase over the last five years (Chen et al. 2015b).

In 2016, an astonishing 44.8 million metric tons of electronic waste were produced across the world. Further, Data also depicts the toxic items growth by 3 to 5 percent annually (European Parliament Briefing, 2015). In the year 2019, the Global electronic waste generation was approximately 54 million tonnes in which only 17% has been managed and rest 83% not accounted (Forti et al., 2020). As per the Global Electronic Equipment Waste Monitor 2020 statistics report "the prediction is, by 2030 this will touch approximately 75 million tonnes (Statista, 2023). However, It is shocking to see that only approximately 18% of the world's electronic waste has been properly disposed of in an environmentally friendly way.

There are multiple reasons behind this growth. Among them, one is an average lifetime of Electronic products. Previous research has revealed a worrying trend: the average life expectancy of the latest computer has slowed considerably. In 1992, these electronic miracles boasted an average lifetime of 4.5 years. However, by 2005, this number had fallen to about two years, and this trend seems to persist (Widmer et al., 2005). This reduced lifespan leads to a significant increase in the number of computers that need to be disposed of or, in some cases, exported to developing countries.

Adding to this concern is the fact that the longevity of central processing units (CPUs) has also witnessed a decline. Back in 1997, CPUs could be expected to function optimally for a span of 4 to 6 years (Shamim et al., 2015). Fast forward to 2015, and this duration had further shrunk to a range of 2 to 3 years (Yazici and Deveci, 2013). According to a comprehensive report, the annual influx of obsolete computers, monitors, and televisions in the United States alone surpasses a staggering 130 million, and this number is on an upward trajectory (Bushehri, 2010). To put this into perspective, the period between 1997 and 2007 saw an eye-opening 500 million computers rendered obsolete within the United States. Notably, Japan was not far behind, with a tally of 610 million discarded computers by the close of December 2010.