Chapter 8
Economic Perspectives: Opportunity and Challenges in E-Waste Management

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ABSTRACT

Managing electronic trash (or "e-waste") offers both opportunities and challenges in the modern era. There are excellent opportunities for recycling and recovering valuable resources via good management as electronic devices and technology use grow. Lowering the demand for new materials and increasing employment possibilities in the recycling and waste management sectors can result in cost savings. But controlling e-waste can be difficult. Due to the toxic compounds, including lead and mercury, that are present in electronic gadgets, the immense amount of electronic consumption has the potential to overwhelm the waste management infrastructure that is already in place, causing environmental degradation. Adequate regulatory frameworks and efficient e-waste policy enforcement are essential to addressing the issues related to e-waste management. This study explored the potential and barriers to promoting sustainable practices to analyze the economic aspects of managing e-waste.

1. INTRODUCTION

Electronic waste (e-waste), which results from the use of electronic and electrical gadgets, has become a major global issue. Due mostly to the poisonous chemicals and hazardous materials found in e-waste,

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this issue poses a risk to both human health and the environment. Additionally, an excellent motivation for recovery initiatives is the possibility of financial benefit from the recovery of valuable materials, particularly precious metals inherent in e-waste. Even with environmental regulations in place, a simulation predicts that industrialized countries would see the greatest growth in the manufacturing of electrical and electronic equipment. The entire mass flow of Waste Electrical and Electronic Equipment (WEEE) (Azevedo, L. P. et al. 2019) increases by a factor of 2.7–4.0 even within an environmental regulatory framework, but a factor of 3.1–7.0 is projected in the absence of regulation. The quick economic growth of the sector, the short product lifecycle of electronic equipment, and the recent development of a wide range of electronics-related items are all significant causes (Bazargan, A., et al. 2012). There is a lot of growth in the production of electronic and electrical devices and there are many industries set up globally to produce these devices. E-waste is classified based on the origin and intended use of electronic items. E-waste includes a wide range of electronic devices, including telecommunications and information technology equipment, sizable home appliances, automated dispensers, lighting systems, medical equipment, monitoring tools, consumer electronics, and even items like electronic tools, electrical tools, sports equipment, toys, mobile phones, and computers. New models are frequently developed with faster mechanical speeds, simplifying duties even further. However, the practice of replacing older versions with newer ones generates a substantial amount of e-waste, which causes serious environmental and health issues. For this reason, e-waste management is required (Shahabuddin, M., et al.2023). With an annual e-waste production of around two million tonnes that is increasing at an alarming pace of 30%, India faces a huge challenge. Unfortunately, due to insufficient infrastructure management and a lack of collection centers, along with the absence of a structured incentive system for both makers and recyclers, a startling 95% of e-waste ends up in the unregulated sector for disposal. Consumer awareness of the critical importance of safe e-waste disposal remains depressingly low, and the lack of appealing incentives restricts involvement in recycling efforts (Sheoran, M., & Das Gupta, D. 2023). On the other hand, several studies have evaluated how much e-waste is produced in the Netherlands according to ten categories included in the European WEEE Directive. These evaluations have been based on certain technologies, such as but not limited to liquid crystal display (LCD) and cathode ray tube (CRT) devices, as well as several other electrical products, including monitoring equipment, televisions (TVs), laptops, and mobile phones. Several other studies have concentrated on analyzing e-waste generation specifically from electrical equipment, such as TVs, refrigerators, and personal computers (Ismail, H., and Hanafiah, M. M. 2020). The negative consequences of e-waste on people and ecosystems are of the utmost importance in South Asian countries that are undergoing rapid economic development, lifestyle changes, and sociotechnical transformations. Contrary to popular belief, these nations frequently lack effective waste management systems. Consider Bangladesh, where only 20% to 30% of the 3.2 million tonnes of e-waste produced each year is recycled, with the balance being dumped in landfills. This huge variation emphasizes how urgently these areas require comprehensive e-waste management solutions (Hossain, M. S. et al., 2015).

India ranks third worldwide in e-waste production, following China and the United States. The volume of e-waste has surged dramatically, escalating from 700,000 tonnes in FY18 to 1.6 million tonnes in FY22. The e-waste management sector in India is predominantly characterized by unregulated and informal entities (https://www.businesstoday.in/magazine/deep-dive/story/will-indias-bet-on-new-policy-to-tackle-e-waste-pay-off-385530-202
3-06-14). Increased production of electronic waste is closely related to increased demand for electronic products in India. Experts in the field estimate that the nation sells 6.5 million washing machines, 148