Chapter 7
E-Waste Management in Developing Countries: Current Practices, Challenges, Disposal, and Impact on Human Health and Environment

Laxmi Kant Bhardwaj
https://orcid.org/0000-0001-7518-4199
Amity University, Noida, India

Prangya Rath
https://orcid.org/0000-0002-6764-1625
Amity University, Noida, India

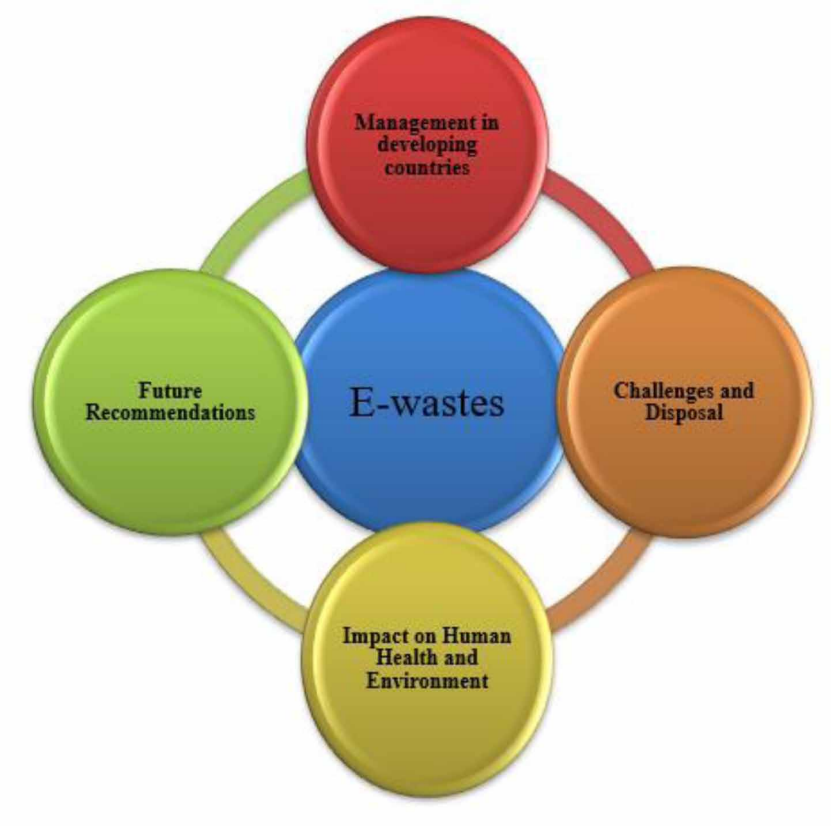
Rajat Tokas
Amity University, Noida, India

ABSTRACT

Information and telecommunications technology (ITT) has expanded into many aspects of modern life and has positively affected human life even in the most remote areas of developing countries. The rapid growth in ITT has led to an improvement in the capacity of computers but simultaneously to a decrease in the product's lifetime as a result of which increasingly large quantities of e-waste are generated annually. It contains hazardous components that if it is not properly managed can have adverse environmental and health effects. The management of e-waste poses significant challenges in developing countries. Due to the lack of adequate infrastructure, e-waste is burned or dumped in open areas. Informal and inefficient recycling practices are generally employed which further exacerbate pollution and health risks. So, the implementation of e-waste management, adequate recycling, and waste disposal facilities have become crucial concerns. This chapter reviews the concept of e-waste generation, challenges, disposal, and its impact on human health and environment in detail.

DOI: 10.4018/979-8-3693-1018-2.ch007

Figure 1. Graphical abstract



1. INTRODUCTION

Electrical waste (e-waste) constitutes one of the most rapidly expanding categories of solid waste globally (Bhardwaj et al. 2023a). Its growth rate stands at 3-5% per year, ~ three times quicker than other distinct waste streams (Schwarzer et al. 2005). This category encompasses ubiquitous items like mobile phones, computers, toys, televisions, iPods, printers, power tools, fluorescent lamps and various other small to large appliances prevalent in modern households and industries. E-waste, unfortunately, includes a myriad of noxious substances, containing plastics and heavy metals such as lead (Pb), nickel (Ni), chromium (Cr), cadmium (Cd), arsenic (As) and mercury (Hg). Additionally, it includes polybrominated diphenyl ethers (PBDEs) and polybrominated biphenyls (PBB), employed in cables, connectors and covers. The central processing units (CPUs) contain Cd, Pb and Hg, while printed circuit boards (PCBs) consist of antimony (Sb), silver (Ag), Cr, zinc (Zn), Pb, tin (Sn) and copper (Cu) (Herat and Agamuthu 2012). Notably, Pb finds common usage in computers, cabling, fluorescent tubes and tin-lead solders (Herat 2008). The presence of these hazardous constituents raises concerns about potential negative impacts on both the environment and human health if e-waste is not appropriately managed. Numerous studies have reported hazardous pollutants in samples collected from diverse sites of e-waste recycling, as detailed in Table 1.