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E-waste Recycling and Management

Present Scenarios and Environmental Issues

 Springer

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ISSN 2213-7114

ISSN 2213-7122 (electronic)

Environmental Chemistry for a Sustainable World

ISBN 978-3-030-14183-7

ISBN 978-3-030-14184-4 (eBook)

<https://doi.org/10.1007/978-3-030-14184-4>

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This Springer imprint is published by the registered company Springer Nature Switzerland AG.

The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

Expanding the rate of market infiltration, financial development and fast mechanical progression prompt the monstrous age of electronic waste in the habitat. The absence of awareness and coarse treatment of e-waste causes a worldwide threat. E-waste is a famous casual name for electronic items generated after their helpful life. Computers, televisions, video cameras, recorders, stereos, copiers and fax machines are some of the regular electronic items being generated as e-waste. A number of items may be reused after giving a face-lift. However, with quick changing advancements and consistent buyer interest for the most recent gadgets, the ascent in e-waste looks set to proceed. Indeed, the purchasers may play an essential role by picking items that are less perilous and are intended for more secure reusing. On the other hand, the e-waste management networks may be set up to guarantee the collection of inappropriately surrendered or censured items and outdated or broken electrical or electronic gadgets. It is obvious that the e-waste items, which are generated and not managed properly, contaminate nature, making it inadmissible for human home. On the other hand, the progression of advancements has decreased the life cycle of electronic items. Thus, the rate to outdated old items increases progressively. Thus, it is very necessary to be aware of the e-waste world and its impact on the global habitat of the species. In view of that, this book is planned to provide a comprehensive literature on the global e-waste recycling and management. This book is divided into 12 chapters as given below:

Chapter 1 explores the status of a cathode-ray tube disposal and environmental issues followed by potential challenges of segregating funnel and panel glass of cathode-ray tube. Separation of funnel and panel glass from the cathode-ray tube based on open-loop and closed-loop process is discussed with pros and cons.

Chapter 2 includes a description of methods of disassembly focused on e-waste recycling in compliance with environmental standards. The required steps of the end-of-life products disassembly vary depending on the category of waste equipment. To show these differences, the chapter includes two case studies showing the configuration of a layout of e-waste processing lines with possible options to reconfigure them. The variants of the system's configuration depend on the volume of the waste stream, labour cost and required purity of output materials. Economic

efficiency indicator of e-waste is presented in this chapter on cooling appliances recycling for four European countries.

Chapter 3 discusses some of the most important factors, including legal, statistical, economic and organizational factors that affect the recycling of waste electrical and electronic equipment or more broadly the recycling of general electronic waste in Japan and other countries. The policy importance of incorporating manufacturing supply chains in the design of environmental management of production systems is emphasized. This chapter puts forward some recommendations that need to be taken into account in the public policy debate in order to improve the current low rates.

Chapter 4 discusses the current state of electronic waste management through technology. It begins by giving the definition and classification of electronic waste separation and recycling strategies. It is also mentioning the importance of electronic waste management and statistics of the exponential increase of electronic waste. After that, electronic waste is classified, and the major challenges faced in electric and electronic waste management and control regulations are discussed. Finally, the material composition in waste electrical and electronic equipment and current as well as future electronic waste management technologies are discussed in details.

Chapter 5 discusses the recycling challenges for the adoption of e-waste reverse logistics under the perspective of developing countries. It is also pointing out the categorization of the barriers in financial/economics; environmental; market related; legal; policy related; management; knowledge related and technical and technological related. The compilation of information related to recycling challenges of e-waste in developing countries and the identification of some solutions and actions to overcome these barriers are also discussed which can be useful for practitioners and researchers.

Chapter 6 explores the systematic methods used for the management of electronic waste. It provides information about electronic waste, plastics in electronic waste, electronic waste management issues, worldwide electronic waste generation and issues related to electronic waste and environmental public health. Finally, energy recovery from electronic waste using methods such as chemical recycling, mechanochemical treatment, hydrothermal process, pyrolysis, combustion process, gasification process, integrated process and hydrocracking is discussed.

Chapter 7 contributes to the literature on the management of waste electrical and electronic equipment (WEEE) by comparing the performance of the different European Union countries according to the targets set in the regulation of the Union's environmental policy on WEEE. To this end, the traditional non-parametric data envelopment analysis is used to measure technical efficiency for the first time in the literature. A sample of 30 European countries for the year 2014 is used with the purpose of comparing their performance, ranking the countries and identifying their level of inefficiency.

Chapter 8 addresses the various categories deployed towards effective e-waste management such as collection, disposal of dangerous portions and recovery of precious metals and energy. The benefits, challenges and future of e-waste management are also highlighted.

Chapter 9 discusses the methods used for the recycling of the precious metals obtained from the light-emitting diode industry. These metals are gallium, indium, rare earth elements like yttrium and cerium and precious metals such as gold and silver. Some of the most important methods developed for this purpose include pyrometallurgical (pyrolysis), hydrometallurgical (acid leaching) and biotechnological technologies (microbial leaching).

Chapter 10 discusses the current scenario in the electrical and electronic equipment industry and generation of waste electric and electronic equipment considering the implications of resource management and environment, social and economic impact in this production chain.

Chapter 11 deals with sustainable electronic waste management implications for environmental and human health. It is written to explain the electronic waste and sustainable development goals with electronic waste tracking and driving trends. The electronic waste statistics and measurement along the side positive and negative effects of electronic waste are also discussed. Some of the products that make challenges to a recycler are also discussed. Finally, the implications of electronic waste on human health and the environment discourse with the aim of electronic waste management are discussed.

Chapter 12 provides a brief insight into the global trends of e-waste generation, critical issues and challenges associated with e-waste and its effects on environmental and human health. Finally, the chapter highlights the need for sustainable environmental management of e-waste.

Jeddah, Saudi Arabia
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