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E-waste Management in India: Opportunities, Strategies, and Progress

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Abstract

Electronic waste, commonly known as e-waste, has emerged as a pressing environmental and health concern globally, including in India. India is one of the world's largest producers of electronic waste, generated by the rapid growth of the technology sector and the increasing consumer demand for electronic devices. Improper disposal and inadequate recycling of e-waste pose significant risks to both the environment and public health. The hazardous components present in electronic devices, such as heavy metals and toxic chemicals, can contaminate soil, water bodies, and air if not managed effectively. This abstract provides an overview of the current state of e-waste management in India, highlighting the regulations practiced in India and current opportunities in recycling these e-wastes.

Keywords: Waste management, Recycling, Disposal, Legislation

Introduction

The information technology has revolutionized the way we live, work and communicate. The creation of innovative and new technologies and the globalization of the economy have made a whole range of products available and affordable to the people changing their lifestyles significantly. New electronic products have become an integral part of our daily lives providing us with more comfort, security, easy and faster acquisition and exchange of information. But on the other hand, it has also led to unrestraint resource consumption and an alarming waste generation. Both developed countries & developing countries like India face the problem of e-waste management. The rapid growth of technology, up gradation of technical innovations & high rate of obsolescence in the electronics industry have led to one of the fastest growing waste streams in the world which consists of electrical & electronic equipment products. It comprises a whole range of electrical and electronic items, many of which contain toxic materials. Many of the trends in consumption and production processes are unsustainable and pose serious challenge to environment and human health. Optimal and efficient use of natural resources, minimization of waste, development of cleaner products and environmentally sustainable recycling and disposal of waste are some of the issues which need to be addressed by all concerned while ensuring the economic growth and enhancing the quality of life. The UNU ADDRESS project documents that globally e-waste volume placed on the market since 1990 has grown from 19.5 million tones to 57.4 million tone in 2010 and is set to more than triple to approximately 75 million tones by 2015. The developed countries are the largest producer of e-waste, let's look at the statistics; The three largest producer of e-waste are USA with 5.1 million tones followed by UK with 1.2 million tones and Australia with 1.19 million tones. The total revenue generated from the e-waste management market is expected to grow from $9.15 billion in 2011 to $ 20.25 billion in 2016 at a rate

of 17.22 percent. E-waste disposed contains both valuable materials as well as toxic materials, which needs special type of care while handling it. Many e-waste recycling companies are taking full advantages of this scenario.

Objectives of The Study

The major objectives of the study are:

1. To study of E-waste in today's scenario.

2. To know the associated aspects of E-waste

3. To explore the opportunities for the budding entrepreneurs.

Methodology

Secondary sources of data like recent independent studies conducted by the NGOs or government/private agencies, journal articles, authentic internet resources, etc were evaluated for the purpose of this study.

What is E-waste?

Since there is no definition of the E - waste in the environmental regulations in India, it is simply called 'e-waste'. E-waste or electronic waste, therefore, broadly describes loosely discarded, surplus, obsolete, broken, electrical or electronic devices. In other words old computers, laptop, scanners, copiers, consumer electronics, home appliance or similar products which is out of use or discarded or that have reached its end of life are called e-waste or electronic waste.

Composition of E-waste

The composition of e-waste is diverse and falls under 'hazardous' and 'non-hazardous' categories. Broadly, it consists of ferrous and non-ferrous metals, plastics, glass, wood and plywood, printed circuit boards, concrete, ceramics, rubber and other items. Iron and steel constitute about 50% of the waste, followed by plastics (21%), non-ferrous metals (13%) and other constituents. Non-ferrous metals consist of metals like copper, aluminum and precious metals like silver, gold, platinum, palladium and so on. The presence of elements like lead, mercury, Beryllium, cadmium, selenium, Barium, chromium, and flame retardants beyond threshold quantities make c-waste hazardous in nature. It contains over 1000 different substances, many of which are toxic, and creates serious pollution upon disposal. Obsolete computers pose the most significant environmental and health hazard among e-wastes.

E-waste generation in India

Although no definite official data exist on how much waste is generated in India or how much is disposed of, there are estimations based on independent studies conducted by the NGOs or government /private agencies. According to the Comptroller and Auditor- General's (CAG) report, over 7.2 MT of industrial hazardous waste, 4 lakh tones of electronic waste, 1.5 MT of plastic waste, 1.7 MT of medical waste, 48 MT of municipal waste are generated in the country annually In 2005. The CPCB estimation has come true that it would exceed the 8 lakh tones or 0.8 MT mark by 2012-13. There are 10 States that contribute to 70 per cent of the total e-waste generated in the country, while 65 cities generate more than 60 per cent of the total e-waste in India. Among the 10 largest e-waste generating States,

Maharashtra ranks first followed by Tamil Nadu, Andhra Pradesh, Uttar Pradesh, West Bengal, Delhi, Karnataka, Gujarat, Madhya Pradesh and Punjab. Among the top ten cities generating e-waste, Mumbai ranks first followed by Delhi, Bengaluru, Chennai, Kolkata, Ahmedabad, Hyderabad, Pune, Surat and Nagpur. main sources of electronic waste in India are the government, public and private (industrial) sectors, which account for almost 70 per cent of total waste generation. The contribution of individual households is relatively small at about 15 per cent; the rest being contributed by manufacturers. Though individual households are not large contributors to waste generated by computers, they consume large quantities of consumer durables and are, therefore, potential creators of waste. An Indian Market Research Bureau (IMRB) survey of 'E-waste generation at Source' in 2009 found that out of the total e-waste volume in India, televisions and desktops including servers comprised 68 per cent and 27 per cent respectively. Imports and mobile phones comprised of 2 percent and 1 percent respectively. As a large-scale organized e-waste recycling facility, the Attero Recycling Plant in Roorkee opened in January 2010. Despite 73 units currently registered with the Government of India, Ministry of Environment and Forests Central Pollution Control Board, as e-waste recyclers/ re processors, having environmentally sound management facilities, the entire recycling process more or less still exists in the un organized sector. According to a data of CPCB (Central Pollution Control Board) less than 5 % of India's total e-waste gets recycled due to absence of proper infrastructure, legislation and framework. Almost half of all unused and end-of-life electronic products lie idle in landfills, junkyards and warehouses. There is huge scope for growth as the recyclers.

E-waste Regulations in India

The Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal was adopted in the year 1989 and India became party to the Convention in the year 1992. The scope of the Convention covers wide range of wastes defined as hazardous wastes based on their origin and/or composition and their characteristics. Under the provision of the Convention, transboundary movement of hazardous wastes is restricted except where it is perceived to be in accordance with the principles of environmentally sound management. Further, it proposes for application of regulatory system where transboundary movement is permissible. In pursuance of our obligations under the Basel Convention, Ministry had notified Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008 for regulating the handling and transboundary movement of hazardous wastes including e-waste in the country.

E-waste (Management and Handling) Rules, 2011 have been notified for effective management of e-waste. State Pollution Control Boards/Pollution Control Committees are the designated authorities for monitoring and compliance under these Rules. For better management of electronic waste, Ministry has published draft e-waste (Management) Rules, 2015 inviting public comments and suggestions. The provisions of draft Rules include expanding producers' responsibility, setting up of Producers' Responsibility Organizations, and e-waste Exchange, assigning specific responsibility to bulk consumers of electronic products for safe disposal, providing for economic incentives for collection of electronic waste, providing for logo-based identification of e-waste Rules compliant companies and providing for restriction on Government procurement of electronic products only from the companies who are compliant with e-waste Rules. Other measures include dedicated responsibility of electronic and electrical product manufacturers for collection and channelizing of electronic waste.

Opportunities

Central Pollution Control Board (CPCR) estimated India's e-waste at 1.47 lakh tones or 0.573 MT per day. In July 2009, India has the label of being the second largest e-waste generator in Asia. More than 90 per cent of the e-waste generated in the country managed by unorganized sectors for recycling and disposal. Organized recyclers have been able to capture only 10 per cent of the total share of the e-waste market hence there is room for new recyclers in the organized sector. Various other research papers, reports and data points on the internet highlight the following facts:

- Ministry of Environment and Forest [MoEF] '2012 report says that Indian electronic waste output has jumped 8 times in the last seven years i.e. 8, 00,000 tones. India has majorly two types of electronic waste market called organized and unorganized market. 90% of the electronic waste generation in the country lands up in the unorganized market. And out of this only 5.7 % of e-waste is recycled. Out of the total electronic waste generation in India, only 40 % of these are taken into the recycling processes and rest 60% remains in warehouses due to lack of skills, knowledge and awareness; inefficient and poor collection systems etc. If done in the right way, and in an organized fashion, e-waste management can become a dominant economic sector.

- According to the United Nations Environment Programs [UNEP] '2010 report predicts that by 2020, E-waste from old computers in India will increase to 500%; from discarded mobile phones will be about 18 times high; from televisions will be 1.5 to 2 times higher; from discarded refrigerators will double or triple; than its respective 2007 levels.

- TechNavio's analysts forecast the E-Waste Market in India market to grow at a CAGR of 26.22 percent over the period 2014-2019.

- High technology penetration in Urban areas (>70 %). This means that the highest source of e-waste is here.

- Given the size of our population any fraction of any demographic unit is a large chunk in itself.

- PC penetration in India is estimated to be 40 per 1000 as compared to 995 in the US. This shows the immense potential for refurbished PC market.

- Large companies refresh the PCs every 4 years due to advancement (average).

- In India, organized e-waste recycling is a nascent industry.

- Moderate penetration in semi urban areas but a high growth rate (-100%).

- Very low rural penetration and medium growth rate, but accelerating very fast.

Conclusion

Electronic waste recycling is one of the fastest growing green sectors in India, with a massive potential for growth. Entrepreneurs looking to enter this sector face a secular growing industry for a long time given the exponential rate of electronic waste in the country. Not only is India generating huge amounts of e-waste, thousands of tones of electronic waste are being imported into the country from the developed nations. Most of this e-waste is manually recycled with huge amount of inefficiency and also can lead to safety issues. Scientific recycling and disposal is need of the hour, as per capital electronics consumption in the India grows at a rapid pace. The big volume of e-waste are being generated in India annually and though India has a number of laws in place/proposed, most e-waste goes untreated, There are already some e-waste companies who are aggressively expanding but there is a lot of space for budding entrepreneurs to get in. In context of e-waste there is no need to say that one man's waste, however, is another man's treasure.

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