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Managing Electronic Waste: An Assessment of Issues and Challenges in Urban Areas

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Abstract

The tremendous growth in information technology worldwide has given a big push towards the socio-economic and technological development of both developed and developing economies in the last two decades. The challenge of managing e-waste is of great concern, especially in urban areas in developing countries, as most of these countries lack the capacity and technology for handling and recycling the hazardous materials contained in the e-waste.

Keywords: *E-Waste, E-Waste Management, Willingness to pay.*

INTRODUCTION

Electronic Waste (E-Waste) consists of electronics or electrical goods that are not fit for their original use or have reached their end of life. It may include computers, servers, printers, scanners, calculators, battery cells, mobile phones, televisions, and refrigerators (WHO 2010).

The growing use of information technology, the fast rate of technological changes, and the higher standard of living have made the electronic industry the most significant and fastest-growing manufacturing industry (DIT, 2003). Computers, mobile phones, and televisions have shown robust growth in the electronic equipment market. (WHO 2010).

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The increase in the volume of e-waste is primarily due to three main reasons: increasing market penetration, replacement market, and high obsolescence rate. Besides that, due to the increased affordability of new products and technological advancements, it is easy to purchase rather than repair outdated equipment (Arora, 2008.) Electronic waste is an emerging problem and a business opportunity of increasing significance, given the volumes of e-waste generated and the content of both toxic and valuable materials in them (Widmer, 2005). Majority of the consumer electronic devices (CEDs) end up in landfill sites without proper treatment as there is no segregation mechanism. Thus, more than 90% of e-waste get landfilled, while in some countries, a significant fraction of e-waste from households ends up in waste incinerators. Most consumers do not immediately dispose of or recycle unused electronics as they consider them valuable (Babu,2007). Although the industrial sector widely practices e-waste management at the domestic or household level, e-waste management is an issue. The disposal of e-waste is already a global environmental and

public health issue, as it is the most rapidly growing component of the formal municipal waste stream world over. Electronic wastes can cause widespread environmental damage, mainly due to toxic materials in electronic goods (Mehra, 2004). With the growth of IT and related industries and rapid urbanization, the usage and disposal of electrical and electronic equipment are all set to increase, increasing the quantity of E-waste generated. So, it is vital to examine e-waste management practices. The challenge of managing e-waste is an even more significant concern in developing countries, as most of these countries cannot handle and recycle the hazardous materials contained in the e-waste. It leads to the disposal of both e-waste and municipal waste in dumpsites, thus polluting the environment and creating health risks to the nearby community and the population.

E-waste Situation in India and Kerala

In India, e-waste management has become a complicated task as it often gets mixed with solid wastes. Computers and telecommunication devices form 70 percent and 12 percent of India's total e-waste, respectively. Mumbai dumps an estimated 1,20,000 tons of e-waste annually, while Delhi and Bengaluru chip in with 98,000 and 92,000 tons of e-waste generation. State-wise, Maharashtra is ranked first in a generation of electronic waste, followed by Tamil Nadu and Uttar Pradesh. Seventy percent of heavy metals found in landfills comes from E-waste (Garg, Neha, and Adhana, Deepak2019). According to a Greenpeace Report, India generated 380,000 tons of e-waste in 2007, only 3% reached the authorized recyclers' facilities. India is one of the fastest-growing economies of the world, and as a result, domestic demand for consumer durables has seen a significant increase. In India, there is no separate collection of e-waste; the availability of reliable data on the quantity of e-waste disposed of each year is almost absent.

Another interesting fact is that most damaged electronic items stay at the household level, as people have no idea how to discard them. Another preferred practice is to exchange it with retailers while purchasing a new item. (Toxics Link, 2003). Indian businesses and households will generate around 1.38 million outdated personal computers and 1,46000 tons of obsolete or broken-down electronic and electrical equipment per year. (CII, 2006). Faulty breaking down and processing e-waste is dangerous to human health and the ecosystem. Twenty-five thousand workers, including children, work in e-waste dump yards bare hands in big cities like Delhi, which generates around10,000–20,000 tons of e-waste (Pandve, Harshal. 2007). Developing countries often become a dumping yard of e-waste from developed countries. The Basel Action Network (BAN) reported that 50-80% of e-waste from the USA comes to India, China, Pakistan, Taiwan, and several African countries (Puckett J, & T. Smith 2002).

Kerala will generate around 1,50,000 t/year of e-waste even at an ordinary rate of 5 kg of e-waste generation per person per year (KSPCB 2010). However, the quantity will become higher as consumerism and standard of living reach a high level along with a high influx of IT industries. There is no e-waste treatment and disposal facility in Kerala. The Greater Kochi Area (GKA) ranks 24th among the country's critically polluted areas (CPA). The two industrial clusters of Eloor-Edayar and Ambalamugal come within Kochi Corporation and the Grama Panchayats of Eloor, Varapuzha, Cheranallor, Kadamakkudy, and Kadungalloor. The urbanized Grama Panchayats, Corporation, and Panchayats areas generate around 270 tons of MSW daily. Kochi Corporation has an MSW plant (250 t/day). The present scenario is only indicative of the large-scale development expected very shortly.

E-waste is a relatively new form of waste compared to municipal or biomedical wastes. The technique for safe disposal is still evolving, the quantity of waste is enormous types of waste are varied, and the components present in e-waste are not uniform for all kinds of wastes. There are plenty of valuable materials that can be recovered and reused; simultaneously, the health and environmental effects due to the toxic substances are a cause for significant concern. Hazardous materials such as lead, mercury, and hexavalent chromium in one form or the other are present in such wastes primarily consisting of Cathode ray tubes (CRTs), Printed board assemblies, Capacitors, Mercury switches and relays, Batteries, Liquid crystal displays (LCDs), Cartridges from photocopying machines, Selenium drums (photocopier) and Electrolytes. E-waste contains toxic substances such as Lead Cadmium, lead oxide, mercury, polychlorinated biphenyls (PCBs), brominated flame retardants, and polyvinylchloride (PVC). All electronic equipment contains printed circuit boards which are hazardous because of their content of lead, brominated flame retardants, and antimony oxide, which is also present as a flame retardant (Devi et al., 2004). E-waste management is one of the challenges faced by modern urban societies globally. New electric and electronic equipment have entered all aspects of our daily life, providing us with more comfort, health and security and at the same time has created more toxic problems for our society. With the growth of IT and related industries, the usage and disposal of electrical and electronic equipment are all set to increase, which will increase the quantity of e-waste generated. Therefore it has become essential to study the e-waste management practices that are adopted. The management of e-waste has become an environmental concern in many developing countries due to improper handling and disposal of e-waste and also as urbanization continues to take place. The city of Kochi has

seen substantial economic development over the past years. It is also a hub of the IT boom and the next important IT destination like the big cities in India. It is essential to have a sound e-waste management system to ensure that it will not affect humans and the environment. Against this background, the study examined the origin and nature of the e- wastes, analyzed the existing e-waste management practices, looked into the relation between Willingness to Pay (WTP) for the proper disposal of E-waste and awareness about e-waste issues.

Results and Discussion

The study's significant findings show that the respondents bought almost all the equipment as new. The maximum duration of use is for television and fridge while mobile phones were for three years on average. Each household possesses almost three mobile phones. It shows that the e-waste stream will be increasing in the coming years. Storage of the e-waste in the house itself is the preferred way of disposal, while dumping in the corporation waste bin is also done. The practice of giving e-waste to recycling units is done only by a tiny group. 10% dispose old ones to buy new ones as the new ones are cheaper and better. 20% dispose of it as the life span gets over. Respondents consider recycling as the best method of disposal. More than half of the respondents are aware of the social and environmental problems associated with e-waste. The internet seems to be the best source of information regarding e-waste. Only a tiny number got information from government publications.

Regarding the willingness to pay for an improved e-waste management system, 71.4% replied affirmatively. A majority gave storage difficulties as the main reason for their willingness to pay, while others considered keeping the environment clean as the main reason. Regarding the unwillingness to pay for an improved e-waste management system majority gave financial inability as the reason. In contrast, others felt that the corporation should bear the expense, and another group had no faith in the corporation. 91.2% of the respondents who were aware of the issues related to e-waste were willing to pay for an improved system. In comparison, 73.3% of the respondents who were unaware of the issues related to e-waste were unwilling to pay for an improved system.

Conclusion

More awareness of the effects of discarded e-waste on the environment and human health must be provided at all levels of governance and for the general public. The information must be made available through appropriate websites, workshops/seminars, and campaigns. Collection and management of data systems need to be improved, and a data acquisition system that allows for design, monitoring, and control of e-waste must be available. It is essential to continuously update and use data for transparent decision-making and system improvement. Risk perception studies and impact assessment studies should be conducted regularly to incorporate community values in the e-waste management policies. The informal sector should be formalized or connected to formal operations to enable the government to control e-waste management properly and promote efficient local e-waste markets. There is a need for developing a formal e-waste recycling sector by documenting tested and best available processes and practices. It includes developing and improving the skills and competencies of entrepreneurs and other stakeholders. Emphasis should be on the continuous improvement of the infrastructure by establishing standards and auditing procedures. There is a need to strengthen the existing institutional framework in terms of technical, human, and financial capacities to handle e-waste management effectively and efficiently. The minimization of the negative impacts of solid waste on health and the environment can be attained through the 3 R's of reuse, recycling, and reducing.

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