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RISING ENVIRONMENTAL CHALLENGE OF 21st CENTURY IN INDIA: E-WASTE

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ABSTRACT

Due to rapid increase in the usage of electronics, the waste generated due to electronics has increased two fold in the last two decades. Every household has mobile phones, computers, televisions etc. adding to the major components of E-waste. This chapter deals with basic concept of E-waste, E-waste scenario around the globe and in India and ways to reduce E-waste for a sustainable future. The three R models of Reuse, Repair and Recycle can help us in achieving a better environment and dropping the E-waste.

Keywords: *E-waste, Recycle, Reuse, Repair, E-waste Scenario in India.*

Introduction

Electronic industry is one of the largest and innovative industry of the entire world. Waste electrical and electronic equipment's are considered as the major threat to the whole world. Every year numerous electronic items are sold and after their usage they become a complex waste matter. Few products are dumped; while the others are burnt or exported to recyclers. The uncertainty of use of e-waste is 75% and ways are found to use them such as refurbishment, re-manufacture, reuse and repair.(Sivaramanan, 2013)Computer equipment's and mobile phones are considered as the major generators of e-waste. Due to technological innovation, e-waste generation is increasing day by day because now-a-days society revolves around technology and with the constant requirement of new high technology products, generation of e-waste has also increased.

Concept of e-Waste

Electronic waste also known as e -waste may be defined as any broken or unwanted electrical or electronic appliance which has been discarded by its original user. It also includes waste which has been generated during the process of manufacturing and assembling of electronic equipment.The global pandemic, COVID-19 has contributed a lot in increasing the e-waste as people remain indoors and use devices.It is a growing global problem because it has led to degradation of the atmosphere due to the release of harmful substances such as dioxins, polycyclic aromatic hydrocarbons, heavy metals, lead and mercury as they can contaminate both the soil and water and people living in the areas nearer to e-waste disposal sites are more prone to get affected by the release of such harmful substances.

E-waste or electronic waste, constitutes mainly rejected, spare, out-dated, shattered, electrical or electronic devices. (Hindu, 2009)

Components Contributing to e-Waste

(Arya& Kumar, 2020) Major components that contribute towards generation of e-waste are LCD, Fluorescent lamp, PCB's and CRT, Switches, Relays, flat screen displays, old computers, mobile

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phones, lubricant additives, plastics fillers, tubes, microwaves, LED's, semiconductors and diodes, projectors, printers, computers, oven, coffee maker, CD player, kettle, TV, washing machine, induction, battery charger, vacuum cleaner, lighting, hair dryer, refrigerator, air conditioner, fan and dishwasher(Bekaroo, Sungkur, Ramsamy, Okolo& Moedeen,2018). While the toxic components present in e-waste which has serious implications on health as well as environment are Arsenic, Lead, Barium, Cadmium, Beryllium, Chromium, Mercury, Nickle, Poly Vinyl Chloride (PVC) Plastics and Selenium (Singh, 2016).

Harmful Effects of e-Waste

Since these products are ending up in rubbish dumps and recycling centres, a new threat is posed upon policy makers. It is very important to educate and aware consumers about harmful impacts of e-waste as most of the people are unaware about the potential negative impact from frequent use of monitors, computers, televisions and other electronical products. When electronic products are disposed improperly in the form of landfills or are incinerated, they not only pose health risks due to the hazardous materials they contain but also contribute in damaging the environment. With the increase in e-waste in landfills, exposure to environmental toxins is likely to increase which will ultimately result in increased risks of cancer, developmental and neurological disorders, weaken the immune system, stomach upset, spewing, brain and liver damage, ozone depletion, contamination of air and water and various medical complications (Arya& Kumar, 2020).

Factors Contributing to e-Waste

Major factors identified that contributed to increase of e-waste are high level of electricity consumption, increasing carbon emissions, high intensity of consumption activities, low awareness about harmful impacts on environment because of high energy consumption, energy-inefficient buildings, poor management of urban resources, increase in income, increase in household appliances, expensive sustainable lifestyle, high reliance on unsustainable infrastructure, inability to understand and interpret footprint data, increased possession of automobiles, high variations in composition of consumption and commodification of consumption activities(Shittu, 2019).

Global Measures to e-Waste

According toThe Global E-Waste Monitor 2020, e-waste worth 53.6 million tones was generated by consumers globally in 2019, up by 20% in 5 years and out of which only 17.4% was sustainably recycled. Thus, to tackle this issue various measures are adopted globally for management of e-waste such as Extended Producer Responsibility(EPR) is adopted by European Union which held producers responsible for their products and 'Consumer Pay model' is adopted in Japan which obligates retailers to take back the products supplied by them and the cost incurred in collection and recycling would be borne by the consumers. While "Regulation on the Administration of the Recovery and Disposal of WEE" is promulgated by China; which provides special funds for collection and treatment of e-waste and in the African region, acts like The National Waste Act and Consumer Protection Act are established for management of e-waste. Even USA, Ghana, New Zealand and Portugal have taken measures for management of electronic waste such as 'Mixed Model' which involves state regulations, recycling of electronics, zero-waste targets and minimization plans, more recollection points and increased re-use of equipment's respectively. Indonesia has not formulated any specific regulations for management of e-waste till date. (Oteng-Ababio & Amankwaa, 2014).

e-Waste Scenerio in India

India ranks 3rd among the top countries producing e-waste that is around 3 million tones and by 2021, it is expected to rise to 5 million tones. India is the only country which has legislations on e-waste in the Southern Asia. Various initiatives have been taken by Indian government to overcome the problem of e-waste such as Municipal Solid Waste Management and domestic collection of e-waste by informal sector as well as various rules formulated for management of e-waste such asE-waste (Management) Rules 2016, E-waste (Management) Amendment Rules 2018 and E-waste (Management and Handling) Rules, 2011.The important players involved in management of e-waste comprises of government sectors, the Directorate General of Foreign Trade, NITs, IITs, Manufacturer Association of Information Technology, NGOs and NEILIT (Arya& Kumar, 2020).

The following figure shows the growth of E-waste in India and also shows the exected growth in coming years.

Figure 1: Source: e-Waste in Transition - From Pollution to Resource (Mihai, 2016)

Measures for Reducing e-Waste

There are several ways through which e-waste can be reduced such as through creation of awareness, education and informing people, formulation of laws and regulations, encouraging eco-friendly practices, creation of sustainable communities, etc. Awareness can be created among people through launching various campaigns and programs; which can aware people about sustainability and its practices. While, it is also important to educate people about the harmful impact of consuming and producing electronic products which in turn will help in molding the behavior of individuals by moving towards eco-friendly products and informing them about the new energy-efficient technologies and substitutes available in the market which are environmentally friendly. Strict laws and regulations should be formulated for promoting sustainable consumption behavior; which penalizes those who adopt unsustainable practices that are harmful for environment and human health. Moreover, eco-friendly practices should be encouraged for promoting sustainable consumption behavior by rewarding people who depict sustainable behavior. While, efforts should also be made to create sustainable communities which engage and involve individuals and plan activities for the sake of environment. Few other measure for overcoming this problem are technological advancement, implementation of 4'Rs, EPR,ECR, Development of value added products, Development of optimal supply chain, better quality, strict implementation of environmental policies, skill enhancement, promotion of use of renewable energy, green computing, donate electronic to those in need rather than discarding, collection of e-waste through artificial intelligence algorithm and proper training (Arya& Kumar, 2020).

Conclusion

It can be concluded that E-waste if disposed in the right way can be controlled. We are all aware that E-waste is increasing day by day but also it has to be realized for a sustainable future we need to reuse, repair and recycle the waste properly. Let's build a better future for our technically advanced generations and make them aware of the importance of environment.

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