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MANAGEMENT OF ELECTRONIC WASTE IN THE POST COVID ERA

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ABSTRACT

The development of Information Technology is coupled with growing heaps of electronic waste across the world. Identifying the untapped potential in the segment of managing electronic waste, various e-waste management Companies have set up their business. Some organisations are exclusively working as collection centres, some organisations are working as a recycling unit and some have adopted a complete model for disposing of electronic waste. While the entrepreneurs were fetching ideas for establishing themselves in e-waste management industry, the entire world was affected by pandemic (COVID 19). It posed a great threat to human lives resulting in lockdown in various parts of the world. When the whole world came to a standstill, the concept of 'work from home' gained momentum. Best possible efforts were made by professionals from different industries to manage their work through Video Conferencing software and online collaborative tools. With a greater number of people working from home and students attending online classes, there was a need of more electronic devices for each member of the family. Consequently, apart from loss of human lives and effect on economies, COVID 19 also left a major impact which is increase in the quantity of electronic waste. Few great minds of the world made efforts for converting this challenge into an opportunity and identified ways of setting up E-waste Management Companies. Also, existing market leaders are developing new strategies for dealing with increasing electronic waste.

Keywords: Covid-19, Electronic Waste, E-Waste, Pandemic.

1. INTRODUCTION

More than 53 million metric tonnes of e-waste was generated in 2019 as per the Global E-waste Monitor 2020. As the nations progress more technological developments, the quantity of e-waste tends to increase. In simple words e-waste includes any electrical or electronic device which has been discarded by owner without any intent of re-use. Numerous electronic items like laptops, desktop computers, chargers, cables, keyboard, mouse, speakers and other household items are included in the category of e-waste. Table 1 shows the list of items which have been categorised as e-waste as per Government of India. A report by the United Nation's Global E-waste Monitor, 2020 estimated that in last five years, the volume of E-waste increased by 21 per cent globally. It has a doubling rate of 16 years. The percentage of e-waste was already increasing at a rapid rate when the entire world had to face a crisis of COVID 19 in the year 2020.Since many nations experienced situation of lockdown due to COVID 19, best efforts were made to continue the working in different segments of life via *'work from home'* culture. This culture somehow fuelled the growth of electronic waste.

Table 1: List of items included in e-waste as per Schedule 1 of E-waste rules, 2011 (issued by Government of India)	
Broad category of items	**List of items**
Information Technology and Electronic Equipment	Centralized data processing: Mainframes and Minicomputers
Personal Computing	Personal computers (Central Processing Unit with input and output devices), Facsimile, Telex, Notebook computers, Cordless telephones, Laptop computers (Central processing uni t with input and output devices), Printers including cartridges, Notepad computers, Copying equipment, Electrical and electronic typewriters, User terminals and systems, Facsimile, Cellular telephones, Answering systems, Telephones.
Consumer Electrical and Electronics	Television sets (including LCD), Air conditioners excluding centralized air conditioning plants, Refrigerator, Washing Machine.
SOURCE: E-waste (Management and Handling) Rules, 2016	

2. REVIEW OF LITERATURE

COVID-19 pandemic has left a major impact on the economic development and health outcomes; consequently there is a global call for waste management (Sarkodie and Owusu, 2020). The corporate sectors and manufacturing units are making best possible efforts to adapt with the *new normal*. Manufacturers are coping up with changing situation by modifying the manufacturing processes. For instance adoption of Just in Time approach, application *Kanban system*, and waste free manufacturing system are few strategies to improve the production conditions (Jha, 2021). Blancco Technology Group partnered with Coleman Parkes to study the perspectives of enterprises towards electronic waste. The study revealed that 92% of enterprises agreed that they need to ensure that all the devices which were used by their workforce during the pandemic time period are appropriately disposed of. In addition to it 47% of the enterprises were "uncertain" about the ways for using and communicating e-waste policies. 35% of enterprises physically destroyed end-of-life equipment.

3. GROWTH OF E-WASTE

Reports suggested that the content of electronic waste has been rising rapidly. It needs to understand as of the most serious environmental challenges not just for one nation but across the world. Table 2 shows some statistics about the generation of E-waste across the continents. The rate of collection of E-waste is highest in Europe and lowest in Africa as per Global E-Waste Monitor,

2017. The rate of collection is 15% in Asia somewhat similar to that of America but the concern is that amongst the Asian economies, China and India happen to be the largest generator of E-waste as per the same report. All countries have been undertaking efforts to deal with the situation.

TABLE 2: CONTINENT-WISE GENERATION OF E-WASTE in 2016					
Indicator	**Asia**	**Europe**	**America**	**Africa**	**Oceania**
Countries in region	49	40	35	53	13
Population in region (millions)	4,364	738	977	1,174	39
WG (in metric tonnes)	18.2	12.3	11.3	2.2	0.7
WG (kg per inhabitant)	4.2	16.6	11.6	1.9	17.3
Rate of collection	15%	35%	17%	0%	6%
SOURCE: GLOBAL E-WASTE MONITOR 2017					

4. PANDEMIC AND E-WASTE

The Covid 19 pandemic has been a disaster on a global scale. Apart from loss of lives and livelihoods, another problem it has caused is the increasing heaps of electronic waste. In the first quarter of 2020, many countries had to restrict the movement of citizens on streets to curb the menace (Kalina, 2020). With lockdown imposed in numerous parts of the world, all the types of companies were somehow trying to manage work from home. Even the entire education system was shifted from traditional mode to technical mode. Since all the family members were at home and were required to perform their respective duties from their home, they needed independent electronic devices like laptops, mobile phones, earphones, chargers and so on. The consumption of these electronic gadgets increased leading to more need of fresh purchases after the lockdown was lifted. The point of concern was that after the fresh purchase was made for a new gadget, what happened to the previous gadgets? Some might have disposed of with regular household waste, some may have sold them, some might have donated them to a less demanding environment. But eventually due to pandemic, the quantity of electronic waste increased and new strategies are required for dealing with the situation.

5. NEED OF TREATMENT OF E-WASTE

E-waste is commonly termed as WEEE i.e., Waste Electrical and Electronic equipment. Every kind of e-waste generated before and after COVID-19 needs to be dealt with sophisticatedly. Few methods adopted for disposing e-waste are landfills, incineration, reusing and recycling. But each of these methods has merits and demerits associated with it.

- ***E-waste can be a cause of fire:*** Most electronic devices contain lithium-ion batteries which might be a reason of fire if not disposed off properly. Handling of electronic waste is not an easy task and requires skills for dismantling all the elements from the discarded electronic product.
- ***Environmental concerns:*** For managing e-waste, various methods of disposal are adopted. It involves incineration also which is burning in the open air and this might a reason for increasing air pollution. Also, dumping e-waste in landfills is another concern which might lead to environmental damage. Few authors have suggested that if e-waste is properly managed via formal recycling, then it might help in reducing the risks of environmental damage (Adam et al., 2021).

- ***Health hazards:*** The improper disposal of e-waste might also lead to certain health hazards. The workers involved in the process of recycling e-waste may be exposed to hazardous components by the way of inhalation, ingestion or skin contact (Pavithra et al, 2020). Moreover, skilled workforce is required to work at e-waste recycling sites. Lead present in printed circuit boards might be a reason for damaging central and peripheral nervous system, mercury present is relays and switches might cause severe brain damage if not treated with utmost care (Dervish et al., 2020).
- ***Rare earth elements need to be re-used:*** The precious elements present in electronic items make the treatment of e-waste more expensive and sophisticated. E-waste can be valuable source of precious and base metals. For instance, a mobile phone contains few precious metals like silver, gold and copper which can be extracted if it is dismantled properly. Similarly, PCB (Printed Circuit Boards) are a rich source of metals which can be reused in other electronic devices (Rao et al., 2020; Buechler et al., 2020).

6. STAKEHOLDERS INVOLVED IN E-WASTE MANAGEMENT

Stakeholders are defined as an organization or an institution who/which is directly or indirectly involved in the business. Stakeholders related to e-waste management can be categorized into formal sector stakeholders and informal sector stakeholders. E-waste management in India is majorly undertaken by informal sector where the disposal activities are not carried out in an environmentally friendly manner (Liu et al., 2012). The task of collection, segregation, dismantling and dissembling is carried out by another group of stakeholders which includes recyclers, scrap dealers, wholesalers, rag pickers and dismantlers. Following is a list of few stakeholders involved in e-waste management:

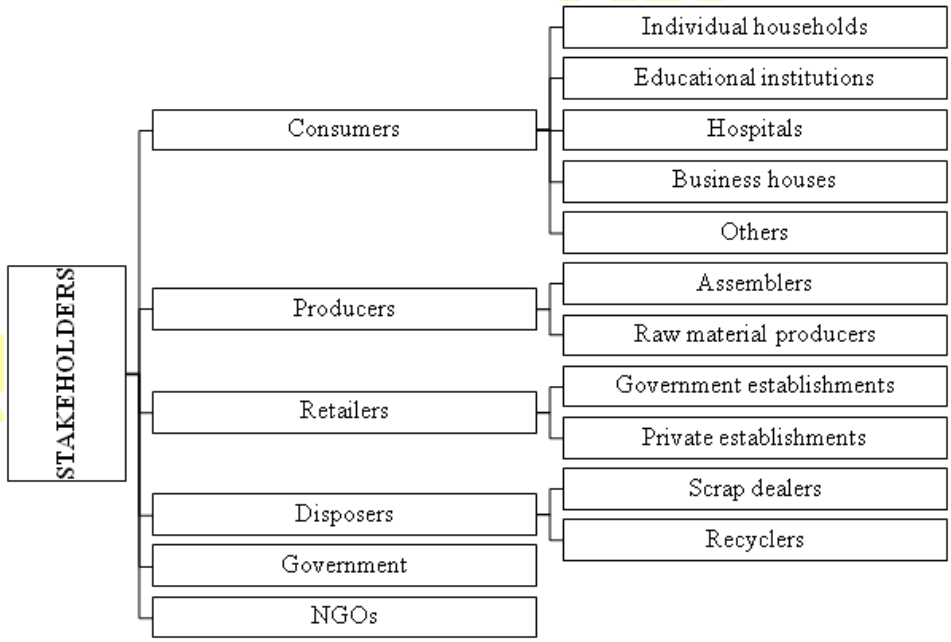

FIGURE 1: STAKEHOLDERS INVOLVED IN E-WASTE MANAGEMENT

- **Manufacturers/ Producers**

Manufacturers of electronic and electric equipment have provided convenience to human beings for carrying out daily activities but they are equally responsible for creation of heaps of e-waste. The concept of extended producer responsibility was initiated in many developing countries like India but it has not been implemented well so far. Manufacturers have made various claims about introducing take back schemes for their obsolete and discarded products but not much effort have been made in this direction. In a study conducted on take back schemes offers reveals that global manufacturers of electronic goods like Microsoft, Panasonic, Sony, Apple and Toshiba have not initiated any take back schemes for their products in India (Greenpeace, 2008).

- **Retailers**

In India retailing industry is on an infant stage of large retail chains and is dominated by sole proprietors. Such individual retailers usually do not collect e-waste from consumers unless the resale value of the product is high enough (Sinha, 2004). In the times of pandemic, the retailers had to offer innovative schemes for customers so that they can be encouraged to manage electronic waste.

- **Assemblers**

Assemblers are responsible for assembling different parts of electronic and electric items to make them ready for final use. Specifically in case of personal computers, assemblers have a major role to play. They purchase components like mother board, mouse, and monitors from different suppliers and then assemble them in form of a computer for the purpose of sale. Due to pandemic, the working of the assemblers was also affected to a greater extent as there was no availability of parts of electronic products.

- **Producers of raw material**

The process of recycling conserves the natural resources and is comparatively shorter and requires low level of energy and the waste intended for disposal is comparatively reduced (Raghupathy & Chaturvedi, 2013). However it has also been proved that the recovery of metals from primary production is lower as compared to secondary sources. The recycler is responsible for recycling e-waste and materials like glass, plastic, wire and other components which are resold to the supplier so that it can be reused (Sinha, 2004).

- **Consumers**

EEEs have entered lives of almost all humans and in the era of globalization, they are available even in remotest area of the country. Nowadays every segment of the nation including public sector establishments, research and educational institutes, hospitals, public sector establishments, corporate sector is dependent on electronic and hence contributing to e-waste. In some developing nations, the waste collector pays some amount of money to the consumer for obsolete items. This encourages consumer not to dispose of their e-waste with regular household waste rather to keep it for giving it to e-waste collector. Another interesting aspect of e-waste management in India is that EEE have more than one user. In case of a domestic consumer, they give away their obsolete products in a less demanding environment. Due to lack of knowledge about proper disposal of e-waste some electronics lie unattended in store houses. Moreover, the consumers view e-waste as a commodity and are usually reluctant to discard it immediately which might lead to third hand users of products which is actually good as the product gets used up to its complete lifespan (Sinha, 2008).This way consumer plays an indispensable role in managing e-waste by reusing the product or by donating it.

- **Scrap dealers**

Scrap dealers are a type of stakeholders who are more often unorganized. In India e-waste is either disposed off to scrap dealers or sold to them through auction and they further sell it to the recyclers in the informal sector **(**Raghupathy& Chaturvedi, 2013**)**. In India, the scrap dealers collect e-waste in an unorganized way. They simply purchase e-waste with other waste materials which can be recycled such as old newspaper, cardboard boxes, books, bottles (plastic/glass) etc. from consumers at a specified price and further sell it to wholesalers through small traders. The wholesaler sorts out the waste materials and segregates the scrap material and further sells them to recyclers or dismantlers or disposers for reprocessing (Wath et al, 2010). However it can be said that the scrap dealers whether large or small play an important role in e-waste management in India. Scrap dealers collect e-waste from consumers and sell it to recyclers.

- **Recyclers**

The concept of informal recycling is a low cost practice and is being undertaken in various nations. The recycling practice in India is in a very unfavourable condition and is harmful to environment and human health (Chi et al, 2011)**.** Very few researchers have indicated data about scrap collectors as there is no formal information from approved sources. However it is also revealed that many urban children and women are involved in recycling units

7. RECOMMENDATIONS

Adopting strategies for managing e-waste judiciously will not only help the organisations to deal with a growing concern of the society but will also help in establishing itself in a better position in the new post COVID 19 landscape against their competitors.

- ***Buy-back schemes:*** Companies can introduce more take back schemes for the end users which will encourage them to return the discarded electronic item to the manufacturer. Dell, HP, Acer, HCL, LG electronics, Nokia, Motorola, Samsung are some of the companies which are providing take back services.
- ***Cash back scheme:*** The vendors of electronic products can offer cash back to customers for motivating them to bring their unused electronic material to the vendor.
- ***Government incentives:*** Government should introduce certain incentives for promoting management of electronic waste. Numerous entrepreneurs have ventured into the field of management of electronic waste by setting up collection units, recycling units or dismantling units like Bengaluru based E-Parisaraa, Mumbai based Eco Recycling Ltd, Delhi based Namo E-waste and many more. A helping hand from the authorities will act as a motivator for budding entrepreneurs to explore more in this area and work towards the betterment of the society on the whole.

8. CONCLUSION

All the nations across the world have witnessed an exceptional degree of digital transformation since late 2019.With digital transformation the requirement of electronic devices like laptops, computers, printers, headphones, mobile phones and other electronic devices increased. Often, the electronics were discarded much before they completed their lifespan leading to heaps of electronic waste. All the stakeholders related to electronic waste be it retailers, manufacturers, consumers, assemblers all have a separate role to play in management of e-waste. With the rapid increase in quantum of e-waste during pandemic, all stakeholders are required to adopt certain strategies which will assist in management of electronic waste judiciously.

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