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Effective E-Waste Management Model Across the Globe: Need of The Hour!

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Abstract

According to estimates by United Nations, the world produces 50-60 million tonnes of e-waste every year and e-waste management system adopted across the globe is not competent to control the menace of e-waste. The Researcher intends to study global e-waste management models, guiding responsibility principles, adopted models, standard procedures, imposed penalties, lacunas in policy and probable consequences of mismanagement in various countries. The Researcher wants to explore e-waste management model in India in detail as compared to various models adopted in other countries. The researcher intends to inquire in to effectiveness of various steps like choosing safer technologies, non-hazardous metal substitutes, legal compliance, effective regulatory mechanism, investment opportunities in e-waste recycling and to analyze e-waste management models, legal principles, contemporary approach to curb the menace of e-waste.

Keywords: *e-waste, environment, management, model, laws, WEEE Directives, European Union, trans boundary movement, hazard, health, degradation, soil.*

Introduction

Since early 19th century, with the advent of electronic gadgets such as TVs, Computers and mobile phones; e-waste management has become a bane across the world. Moreover, this has impacted globally at such extent[2], which has compelled the

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developed nations to announce International E-Waste Day on Oct. 13 to spread awareness amongst the masses to take note of this global challenge. Several stake holders have conducted several events for the public to educate them about the impact of e-waste on our lives.

Smart phones, tablets, and computers are major contributors in the annual global e-waste generated across the globe. Whereas other household appliances like Refrigerators, ACs and other heating & cooling equipments will contribute the rest[3]. This huge quantity of e-waste will rise enormously in the next few years because only 25% of total e-waste generated is getting recycled annually. Nearly 45 million tons of e-waste has been filled in either landfills or burned, or being added in the water channels resulting in to polluting our environment and converting in to irreversible damages in the ecosystem. In addition to this, situation tends to raise the alarm because only 66% of World population is covered by e-waste legislation.

Electronic waste in developed country like Japan has become a serious environmental concern. Even Japan has implemented an effective electronic e-waste recycling model at first; still it is countering the growing e-waste challenge.

Extent of the problem of E-Waste

The entire world is producing a huge quantity of e-waste approximately 55 million tons annually and that requires an immediate and urgent legislative intent to establish more recycling facilities to enhance the rate of recycling else this challenge will get much worse[4]. E-waste is one of the fastest contributors in the entire solid waste produced globally. Menace of e-waste has increase too much in past 5 years, for instance, it was

[3] Frost & Sullivan, "*Report on e-waste by ASSOCHAM"* (21 April 2016)
[4]United Nations, "*Report by Dept. of International Communications"* (01 August 2019)

reported 44 million tons in the year 2016 and the same has touched 55 million tons in 2021. Consequently, this sharp rise has resulted in to devastation of land, soil and water channels.

Scholars and scientists believe that uncontrolled production of electronic devices for consumers have resulted in to a rush amongst the masses to buy more and more electronic devices by replacing older devices. On the other side, Nations have showed apathy to increase rate of e-waste recycling. Ultimately, in absence of recycling, valuable raw materials present within e-waste is going to landfills unnoticed. This is a greater loss for every Country in terms of their natural resources.

Land fills of e-waste has raised a serious environmental concern, where toxic chemicals are contaminating the soil and water streams. In India, agriculture deemed to be the prominent and major contributor in its economy depends on natural water streams for irrigation. Traces of harmful chemicals and metals present in the e-waste have been found in the agricultural crops which are resulting in to persistent health concerns.

Illegal Transboundary movement of e-waste to developing and under developed Nations

Despite WEEE directives and other domestic legislations across the globe, a huge amount of e-waste generated in the developed countries like USA has been constantly shipped to developing countries in the South Asian regions especially on the pretext of the used goods. This adds up the in the total quantity of the annual e-waste generated in the particular country. As per the recent reports, more than 40% of e-waste has been imported to India every year from western countries by violating the WEEE directives. In China, this contributes up to 45% of total e-waste generated there[5].

[5] Research Unit (LARRDIS), Rajya Sabha Secretariat, New Delhi, *"Report on E-waste in India"* (June 2011)

Environmental Risks posed by E-Waste

United Nations has launched several programmes to educate various stakeholders about the environment risks posed by e-waste. Apathy of the executive Govt., industry and other stake holders is responsible to make environmental consequences more severe. Problem of e-waste management is a global problem. It can't be resolved at national level. There is an imminent need to establish an international legal regime to curb the menace of e-waste. United Nations is committed to curb the menace of e-waste thereby conducting several activities through out the year. United Nations has developed a sustainable model for effective e-waste management which can be adopted worldwide. Developed countries like USA, ironically, contributing to the problem, because people can afford to buy more and more mobile phones and other electronic gadgets.

Effective E-waste Management Model

With reference to a global study conducted in 2015, 65% of e-waste generated in western countries has been dumped to South Asian Countries in the pretext of used goods which have not reached to their end of life. After enactment of WEEE directives, the practice of exporting e-waste to other countries has turned in to a menace which paves the way to make stringent e-waste import laws by under developed countries of South Asian region. In India, e-waste Management Rules 2011; provides for effective e-waste management regime in India but doesn't provide a check on international imports of e-waste[6]. The researcher intends to propose following recommendations to establish an effective global e-waste management model which can be categorized in following steps.

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[6] United Nations University-Institute for the Advanced Study of Sustainability, *"The Global E-waste Monitor"* (2014)

The first and foremost task of every Nation shall be on sharing the recent technology with the developing and under developed countries in order to facilitate people to buy latest technology products. We have observed that developed nations are not willing to share their latest technology and keen to introduce obsolete technology with them in order to sell their goods multiple times to the same consumer for the sake of profit. Ultimately this business strategy compels the consumers to replace their electronic items several times and thereby generating the e-waste. Then next essential focus shall be on the recycling of e-waste. But due to lack of awareness, absence of collection centers and zero incentives to consumers are some of the areas of serious concern in order to establish a proper recycling model is the need of the hour. WEEE Directives provides for stringent procedures and penalties to recycle e-waste in European Countries. Which makes the recycling an expensive process and in order to reduce the cost of recycling, industry starts exporting their e-waste to South Asian countries on the pretext of used items[7].

E-waste management model in India

Effective Recycling begins with eco-labeling which establishes a method to identify the hazardous and non-hazardous products. This task has been assigned to Bureau of Indian Standards in India to establish an effective e-waste management model. The Board is empowered to prepare and implement E-waste Policy Framework and also assists the Govt. Agencies, Manufacturers, Recyclers & Port and Customs etc. to establish a channel in order to dispose the e-waste properly. Several manufacturers have established Collection Centers and Recycling facilities in India to recycle the e-waste. Since the quantity of e-waste produced every year stills exceeds their capacity to recycle. This has resulted in to e-waste management concern and a huge quantity of e-

[7] Supra 4

waste is left in the landfills or water channels. After enacting the e-waste management rules in the year 2011, India still needs a proper implementation of its e-waste management model like other developing countries[8].

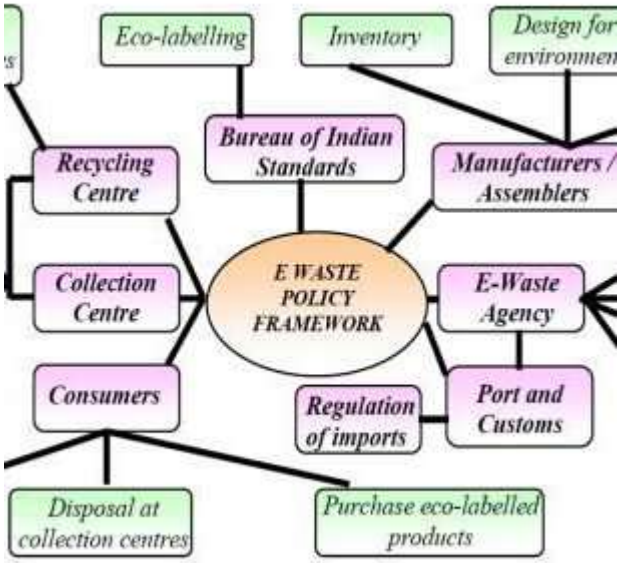

Chart-I: E-waste Management Model in India

Findings and Suggestions

After analyzing the extent of problem and elaborating the findings of the research, the author prescribes the following steps to be taken in order to establish an effective e-waste management model.

Step 1: Eco-Labeling of all electronics products by UIN (Unique Identification Number) method

Every manufacturer of electrical and electronics items shall be directed by the Bureau of Indian Standards to write the Unique Identification Number (UIN) over the product with a scan able bar code. This mandate is the utmost necessary first step in the

[8] Down to Earth, *"Recycling of e-waste in India and its potential"* (April 2019)

direction of establishing an effective e-waste management model. UIN shall provide the complete details of the manufacturers and details about the place of its origin. Registration of UIN with the Central Agencies in every country shall be made mandatory for the manufacturer.

Step 2: Sharing of Inventory Records with National Agencies

Till today, Manufacturers of electronic products are not liable to disclose the inventory details with National Agencies. This contributes in absence of data with the regulatory bodies in every country. We have no evidence to calculate the growing menace of e-waste across the world. Every time, we start research on assumptions and ends with presumptions. The Researcher states to establish a mandate to the manufacturers to share the inventory records with the central agencies so that an effective policy can be made for different categories of hazardous and non hazardous e-waste items[9].

Step 3: Responsibility of Manufacturers to collect e-waste for recycling (Extended Producer Responsibility- EPR)

Generally, Menace of e-waste starts with illegal transboundary exports to under developed countries. Then, it reaches to scrap markets for recycling which is to be done by unskilled labour. E-waste is a bundle of precious metals like Gold, Platinum, and Copper etc with hazardous elements like lead, mercury, silica etc. Scrap Dealers buy the e-waste for the purpose of extracting precious metals from the e-waste but they use highly improper methods in absence of safety measures[10]. Several harmful acids like Concentrated Sulphuric Acid, Hydrochloric Acid and Nitric Acid have been used for extraction of precious metals by the unskilled labourers. Sometimes extraction process involves burning of e-waste which results in to emission of poisonous gases in the air.

[9] United States Environment Protection Agency, *"Criteria for the Definition of Solid waste, e-waste & hazardous waste"* (2018)
[10] Supra 4

At the end, remaining dust, plastic, and ashes of e-waste is being thrown in to either water channels like rivers, lakes and other water bodies and sometimes, it's dumped in the land fills. Hence to stop this practice which is the utmost hazardous to the people employed in scrap industry and to the environment as whole, researcher intends to establish a mechanism, so that onus of recycling shall be shifted from scrap dealers to the manufacturers of the electronic items. Manufacturers either shall contribute in the establishment of recycling units OR shall be made responsible for collection of e-waste for recycling on their own. Central Govt. agencies shall stipulate the directives for the manufacturers in this regard in order to control the growing menace of e-waste across the globe[11].

Step 4: Incentives for consumers to dispose e-waste at collection centre

Collection of e-waste shall provide incentives to the consumers so that they stop selling their products to scrap dealers. If they get incentive from the collection units which shall be competitively higher as compared to what has been offered by the scrap dealers is the only way to establish an effective e-waste management model across the globe. Manufacturer must contribute to provide incentives to the consumers if they deposit their e-waste products after reaching their end-of-life through the collection Centers. This practice has been observed in the few Western Countries but it's almost absent in various Countries of Asian region. Regulatory authorities of State shall establish a mandate for the manufacturers to ensure payment of incentives to consumers for 100% collection of e-waste generated in the Country[12].

Step 5: Establishment of Collection and Recycling centre

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[11] Jianjie Fu, Haiyan Zhang, Aiqian Zhang, and Guibin Jiang, Environ. Sci. Technol, "*E-waste Recycling in China: A Challenging Field"* (2018) 52, 12, 6727–6728

[12] The Energy and Resource Institute (TERI), "*E-waste Management in India: Challenges and Opportunities"* (Nov. 2019)

The researcher intends to put focus on establishing more Collection and Recycling Centers for e-waste management across the Globe. For instance, In India, several collection centers have been established in India by various stake holders but still people are not aware about these facilities. There is an urgent need of establishment of many Recycling Centers also across the globe. Till now, India is capable to recycle only 25% of its annual e-waste generated. If still we ignore the need of establishing more recycling centers, situation will be worse by 2050 because rise in annual e-waste generation in India is alarming.

Step 6: Control of Imports of Used Items

E-waste Management Rules 2011 does not provide a mechanism to check the national imports of e-waste in the name of used items. It allows the import of Used Items. Western Countries has found the way to dump their e-waste in the name of Used Items by importing it to South Asian Countries. Another reason behind dumping of e-waste is the high cost of recycling in West whereas its boon in the Indian Scrap markets[13]. The researcher intends to introduce stringent penal provisions in the e-waste Management Rules 2011 to control the transboundary movement of e-waste. This step will drastically reduce the quantity of annual e-waste generation in India.

Step 7: Focus on Research and Development in Technology

Innovations in upgrading the technology are the only cause of increase in the annual e-waste generation. Developed Countries are under the onus of protecting the global environment and they are also signatory to the International agreements to share the technology with the under developed and developing countries. But in practice, sharing to technology with the World is nothing but just a possibility. Developed Countries

[13] Santhanam N., Journal of Environment, Health, Science & Engineering, *"Electronic Waste-an emerging threat to the environment of Urban India"* (2014)

shall share the latest technology with other countries for the sake of protection of environment[14].

Step 8: Importance to proper recycling

Improper recycling has become a consistent phenomenon across the globe and nearly 20% of e-waste has been recycled properly as per the chart shown below. People are not also aware about the e-waste recycling facilities and thereby compelled to sell the used electronic items to scrap dealers[15]. Even people have no information about the presence of precious metals like Gold, Copper & platinum etc in the e-waste. Hence, a widespread circulation of e-waste management directives amongst the masses in order to educate them is the need of the hour.

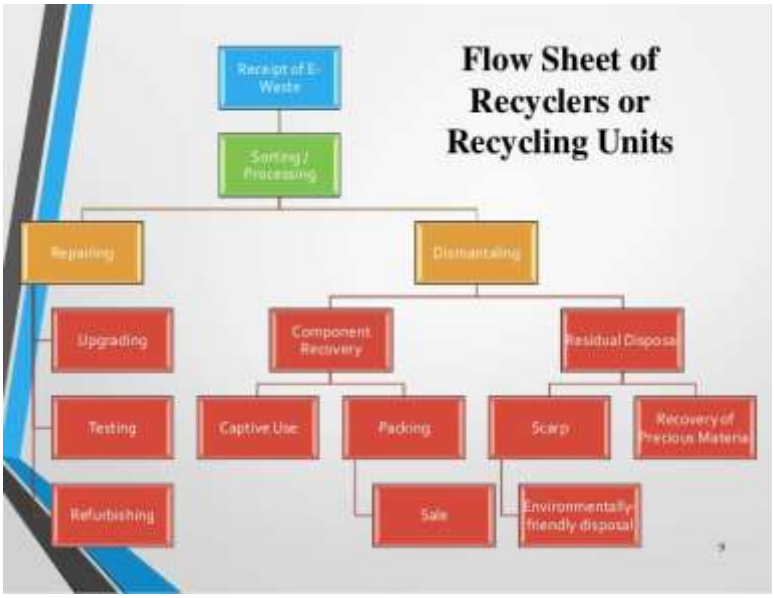

Chart-II: Effective e-waste recycling model for Recycling Unit

In every recycling unit, the process to recycle commences with receipt of e-waste followed by sorting process. This results in to separation of articles which can be repaired and used further after upgrading followed by testing and refurbishing. Items which can't be repaired are sent to dismantling with use of proper machines which

[14] www.greentumble.com (last accessed 10 July 2020)
[15] Supra 4

involves extraction of precious metals like Gold, Silver, Copper, Brass, Aluminium, Palladium etc. After extracting the precious metals the leftover plastic, silica, lead is separated so that the same can further used as raw material for manufacturing new items. Finally, the after extracting precious metals and raw material from the e-waste, leftover is sent to landfills. Proper recycling model must be adopted globally in to control environment degradation[16].

Conclusion

The Author concludes that Extended Producer Responsibility (EPR) must be observed as a fundamental liability principle on to the producer and it can be applied strictly under the concept of Corporate Social Responsibility (CSR). WEEE Directives must be adopted as the standards of Environmental, Health and Safety Management Systems in India and other developing countries. Transboundary Shipments or dumping of e-waste from international routes must be curbed. Re-use and Illegal Exports of E-waste must be controlled. Choosing safer technologies, non-hazardous metal substitutes, monitoring of Compliance of Rules, effective regulatory mechanism strengthened by manpower and technical expertise, reduction of waste at source and offering Investment Opportunities in e-waste recycling could be proved to be an effective and sufficient e-waste management model across the globe to curb the menace of e-waste.

[16] Bianca Nogrady, BBC Future, *"There's gold, platinum and other valuable materials in every phone – the hard part is getting it out"* (18 October 2016)