

Analysing Electronic waste management: A comparative legal approach

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Abstract

Electronic waste or e-waste is one of the fastest growing waste stream in developed as well as in developing countries like India. It is mainly due to the growing sales, constant up-gradation of technology and increasing obsolescence of these electronic products. The improper management of these wastes raises multidimensional concerns along various lines with the special mention of environment and health. The current study emphasize on the environmental aspects of e-waste management looking from the legislative approach making a comparative analysis of developed countries and India. The study found that India is in infant stage in terms of e-waste management as compare with the developed countries. Developed countries like Switzerland, Japan and European Union have proper channel through which 'product take back' and 'recycling' of e-waste are successfully operated. On the other hand in India, In-spite of amendments of new laws and acts on e-waste, Proper implementation has a long route to take. The legislation of these rules and regulations in case of India seems to be a ritualistic process without any effective evaluation. The literacy among the citizens regarding the potential harmful consequences of e-waste is almost absent. No concrete law has been enforced governing the import of 2nd hand electronic gadgets and hence adding fuel to the fire. There have not been properly guided efforts on part of government to contain the increasing ambit of illegal and unrecognized sale and purchase of electronic products.

Index terms- E-waste, Waste management, Informal sector, health and environment.

1.1 Introduction

The industrial revolution of 18th century brought about an unprecedented change in the discourse of global civilisations. This was followed by the inventions of new gadgets and technology which increased its use in modern economic sectors and households as well. With the advancement of time, more inventions took place along different lines like up-gradation of new gadgets, improved living standard of the people etc. However rising culture of consumerism among the middle classes increased obsolesce of e-waste both at household level as well as industrial level.

'Electronic waste' or 'e-waste' in short is a generic term which encompasses various electric and electronic equipments which no longer have intended use to the original owner. It comprises of old computers, DVDs, television, mobile phone, MP3 players etc. which has been discarded as obsolete by their users. There is no standard definition of electronic waste. However every country has defined electronic waste according to their need and convenience. However in general, the definition enunciated in European Union directive is accepted and adopted by the member countries as well as other countries in Europe.

According to the Waste Electric and Electronic Equipment (WEEE) Directive (EU, 2002 a) Directive 75/442/EEC, Article1(a) defines "waste" as "any substance or object which the holder disposes of or is required to dispose of pursuant to the

provision of national law in force.” ‘Electric and electronic equipment’ or ‘EEE’ means equipments which is depended on electric currents or electromagnetic fields in order to work properly and equipment for the generation, transfer and measurement of such current and fields falling under the categories set out in Annex 1A to Directive 2002/96/EC (WEEE) and designed for use with voltage rating not exceeding 1000 volts for alternating currents and 1500 volts for direct currents” (UNEP, 2007).

People initially viewed e-waste as a clean waste unlike industrial affluent which causes tremendous damage to health and environment. But e-waste if not handled properly can contaminate soil which rather would affect the ground water table leading down to the food chain thereby affecting animal and humans at different level. In addition to that, the smoke after burning e-waste causes environmental pollution. E-waste is a complex composition of more than 1000 elements. Broadly, it consists of ferrous and non-ferrous metals, plastics, wood and plywood, printed circuit boards, concrete and ceramics, rubber and other items. Iron and steel are composed of 50 Percent of e-waste, 21 Percent of plastics, 13 Percent of non-ferrous metals and other constituents (MoEF, 2008)¹. There are two major sources of e-waste generation:

- E-waste generation within a country
- E-waste generation due to imports from developed to developing nations

Developed countries remain the major exporters of e-waste and countries like India, China and South African countries remains the dumping house of e-waste. This is because of many factors like cheap labor forces and flexible environmental laws, slogan of bridging the digital gap and donation to different institutions etc. Globally the use of electronic products has increased exponentially in the recent decades. In developed countries E-waste is discarded even before it has reached their end-of-life cycle. For instance in 1994, around 20 million personal computers become obsolete that is about 7 million tons and by 2004, this figure increased to over 100 million personal computers. This implies that around 500 million computers have reached their end of life during the period of 1994 to 2003. These 500 million computers contain roughly 2,872,000 tons of plastic, 718,000 tons of lead, 1363 tons of cadmium and 287 tons of mercury (Puckett and Smith, 2002)

In 2010 U.S generated about 258.2 million units of computers, monitors, TVs, cell phones, out of which 171.4 million of e-waste collected for recycling and 14.4 million were exported (Live Science, 2013). According to “Solving the e-waste problem (StEP) initiatives,” in 2014 global e-waste generation was about 54 million tons. This is the average of 20 kg or the weight of eight bricks for every 7 billion people on earth. Based on a United Nation report, it is being predicted that, in China by 2020, electronic waste from old computers would heap by 400% on 2007 level and by 500% in India. Further it is being predicted that e-waste from discarded mobile phone will be 7 times more than the 2007 levels and it would be 18 times higher by 2020 in case of India (Tom Young, 2010).

United State is one of the major exporters of the e-waste to the developing nations. As the country has not ratified the Basel convention; it justifies its action. In the United State, the e-waste are not being handled effectively as expected because they either landfills the e-waste or they export it to developing nations (Kahhat et al, 2008). During the period of 2003 and 2005, 80-85 percent of electronic waste, ended up in landfill (U.S Environmental Pollution Agency, 2007a).

1.2 E-waste in India

India, in her recent growth history has witnessed a considerable expansion of IT sector especially in the last decade. It has contributed to a great extent for the country’s developmental process. The electronic market is one of the major giant markets in the world and there is further scope of its expansion in the coming near future. According to a report on electronic industry in India

¹ Non-ferrous metals consist of metals like copper, aluminum and precious metals like silver, gold, platinum, palladium etc.

(2015) by corporate catalyst, it is estimated that the electronic market is anticipated to grow at US\$400 billion by 2022 from US\$69.6 billion in 2012. The market is expected to grow at the rate of 24.4% during 2012-2020. The total production of electronic hardware is expected to increase in India by US\$104 billion by 2020. India is again an enormous exporters of electronic products for different segment like display technologies, entertainments electronics, optical storage devise, passive components electromechanical components, telecom components, transmission and signaling equipments, semi conductor designing, electronic manufacturing services. The electronic industry is mainly driven by computers.

The eruption of new culture of consumerism among the middle class in India led to increase in demand for non-essential electronic goods like LED TVs, laptops, split ACs, beauty and wellness products in a considerable amount. The rapid urbanization, changes in the life style and increase in the purchasing power of India's middle class have contributed to the expansive growth of the consumer and durable industry (TERI, 2008). According to the International Resource Group Systems South Asia Pvt. Ltd [IRGSSA] in 2005; the total e-waste generation of the country amounted to 146180.7 tones. Out of this Maharashtra (20270.6 tones) tops the country followed by Tamil Nadu (13486.2), Andhra Pradesh (12780.3 tones), Uttar Pradesh (10381.1 tones) & West Bengal. The per capita generation of e-waste in India is relatively lesser than the developed nations. But it has been predicted that the huge population pressure, developing manufacturing sectors and rising use of electronic products in the country would make India among the top e-waste generating countries in the world.

However, e-waste is both an opportunity as well as a challenge in India. It is an opportunity to the Indian poor in terms of enhancing the employability of the manual workers. On the other in India, 95% of the e-waste management goes to the informal sector, thereby creating a huge stake on health and environmental questions. The scenario is aggravated more in face of inadequate legal framework to cope up with the problem. Thus the current study will be mainly focused on highlighting the lacuna of environmental legislations with reference to that of developed countries.

2.1 Literature Review

E-waste is a complex combination of various elements. They are both toxic and non-toxic in nature. Non-toxic elements do not cause much harm as compared to the toxic ones. Some of the common toxic elements present in an electronic waste that can have serious health consequences are: Mercury, Americium, Sulphur, Cadmium, Copper, Lithium, Nickel, Lead, Beryllium oxide, Hexavalent chromium (Ammons et al., 2003; Sergio et al., 2005; Bool, 2009; Yilmax, 2005; Asuqo, 2004; Awokunmi, 2010). When electronic waste is treated in an irresponsible manner then it harms both environment and health.

It has been found that in the informal recycling site of China due to heavy exposure to lead and copper originated from the printed circuit board results in acute and chronic toxicity, such as damage to central and peripheral nervous systems, blood composition, lungs, kidneys, liver, and even death. (Leing et al., 2008; Kishore, 2010). In another study conducted by Xia Huo et al., (2007) found that the blood lead levels of the children in the recycling sites are very high. It also lead to other health problems like dermatological, gastro-intestinal, respiratory and genetic problem and other infectious disease. People residing near the recycling site also tend to suffer from headaches, diarrhoea, chest pains, and irritation of the skin, nose and eyes, typhoid and stomach ulcers (Amoah, 2016).

Informal way of treatment of e-waste in less developed countries leads to contamination of soil and pollution of ground water. Sometimes acidification of soil took place which further contaminates the ground water (Frazzoli et al., 2010). On the other hand looking at the environmental side, Borthakur et.al, 2001 & Wath et.al, 2010 have indicated that informal practices being adopted in developing nations led to emissions of hazardous substances to air, contaminate soil and water bodies. Tsydenova et al., (2011)

made a study on the chemical hazards associated with the informal e-waste treatment. The study concluded that informal recycling activities led to chemical contamination of workplace as well as the environment.

Premalatha et.al, (2014) examine the European Union's two major directives for e-waste management. They are Waste electric and electronic equipment (WEEE) directives and the restriction on the use of certain hazardous substances (RoHS). Japan is one of the advance nations that have incepted its first e-waste rule in the way back 1998. It was 'The household appliance recycling law' which was enacted in June 1998 and enforced properly in April 2001 (Bandyopadhyay, 2008). Kahhat et al., (2008) on the other hand reflected the e-waste management system in United State. They reflected that in the country there is no serious federal law that concerns about proper collection, disposal and recycling of e-waste. The irony to face is that U.S is one of the major e-waste generators in the world. In spite of its heavy generation of e-waste by the country there is no uniform e-waste rule that embraces the whole country like European Union. It either landfills the e-waste or exports it to the other developing nations.

Bandyopadhyay, 2010; Vats et al., 2012; Verma et al., 2014 have discussed the present legislative structure in India to manage e-waste. Their discussion reflected the growing rate of e-waste in the country from within the country and also from the imports from the developed nations.

3.1 E-Waste Management in developed nations

Under this section, three developed countries of European Union, Switzerland and Japan are considered. These three countries have been specifically chosen because of their proper e-waste management regime in place. Government conscious actions, private initiates and public awareness are the common features of these countries.

3.2 European Union

The European Union has adopted two major directives to tackle the problem of e-waste. The directives are WEEE and RoHS, comprehensively governing the e-waste management in EU. The Waste Electrical and Electronic Equipment (WEEE) Directive (2002/96/EC) was adopted in 2003 and focus on the regulation of five related e-waste norms: (1) EEE product design (2) e-waste collection (3) e-waste recovery (4) e-waste treatment and treatment financing (5) EEE user awareness.

The other directive is the Restriction of the use of hazardous substance, RoHS Directives (2002/95/EC), which will put restrictions on the use of certain hazardous substance in electronic products. These include lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (European Union commission RoHS Directive, 2003) [Kahhat et al, 2008]. The main objectives of these two directives are effective collection, recycling and recovery of all types of electronic waste. The Waste Electrical and Electronic Equipment (WEEE) directive has given various responsibilities to producers under Extended Producer Responsibility System (EPRs). The Extended Producer Responsibility is being defined as "an environmental protection strategy to reach an environmental objective of a decreased total impact from a product, by making the manufacturer of the product responsibility for the entire life cycle of the product and especially for the take back, recycling and final disposal of the product" (UNEP, 2007). The system of Extended Producer Responsibility can be implemented in various ways such as mandatory take back program, voluntary take back programs or with the support of economic instruments such as advance recycling fees (ARF) or advance disposal fees (ADF) [Costin, 2013].

3.3 Switzerland

Switzerland was the first country in the world to have initiated formal collection and recycling of e-waste (Khetriwal et al., 2005). The rising quantity of the electronic waste in Switzerland can be accounted to the living standard of people. It is estimated that about 99 percent of population have refrigerators and 96 percent have TVs (Euromonitor, 2003).

Given due consideration to the rising demand and consumption of electronic products, Switzerland in 1998 adopted a legislation on e-waste management, “The Return, The Taking Back and the Disposal of Electrical and Electronic Appliances.” The main purpose of this ordinance is to ensure that waste electric and electronic equipments (WEEE) does not get mixed up with the municipal waste and are disposed in an environmentally sound manner. It governs the return, taking back and disposal of e-waste (Step). According to 2014 Environment Performance Index (EPI), Switzerland top the list while India ranks 155th (The Haffington Post, 2014). The work of handling of electronic waste in the country is handled by two PRO’s² of- S.W.I.C.O³ and S.EN.S⁴.

The Swiss law laid major emphasis on the ‘Polluter Pays Principle’ and the concept of extended producer’s responsibility is well established in the country. S.W.I.C.O deals with brown goods (computers, TVs, radio etc) and S.EN.S deals with white goods (washing machine, oven, refrigerators etc) According to UNEP 2013, Switzerland has collected 129,100 tons of e-waste and recycled in 2013. Effective collection and recycling of electronic waste are not possible without a proper financing system. So Switzerland has adopted the system of Advanced Recycling Fees (ARFs) which are charged on all electronic equipments. The amount to be charged on each electronic product will be decided according to the items concerned. Switzerland, being a signatory of the Basel Convention Ban Agreement, the country does not allow import and export of e-waste. Under Section 3, Article 9 of ORDEA (SAEFL,1998), it specified the proviso for the exportation of e-waste for disposal. The exporter shall have to ensure that the disposal should be done in an environmentally sound manner and shall be given prior information to the importing country.

3.4 Japan

The e-waste management system in Japan is a bit different from European Union or Switzerland. Under the product take back system, the withdrawal of the obsolete electronic products to traders is not free of cost. The consumers are obliged to borne certain amount as returning charges to the traders. This take-back system is concentrated to four types of e-waste since 1998 (air conditioners, televisions, refrigerators and washing machines). The law is strict and non compliances lead to strict penalties (Widmer et al., 2005). Until 2004, 41 e-waste recycling facilities were being instituted. These facilities were partially financed by the Japanese ministries, municipalities or Japanese companies producing electronic products (J.Li et al., 2004).

Under the Japanese system, both producers and manufactures have the responsibility of taking back electronic wastes and to segregate them from the municipal waste (Widmer et al., 2005). Japan’s Home Appliances Recycling Law (1998) properly came into being from 2001 onwards. The law makes it compulsory for producers or importers to recycle four types of household e-waste (television, refrigerators, washing machines and air conditioners). In April 2001, it makes it compulsory in Japan to recycle business personal computers and the compulsion had further been extended to the recycling of residential personal computers in 2003 under the “Law for promotion of Effective Resource Utilization”. The consumers are obliged to borne the end-of-life fee of e-waste. This fee will cover both the recycling and transportation charges. A retailer in Japan also requires collecting and transferring the obsolete e-waste from the consumers. (Kahhat et al., 2008).

Japan also started the PC’s recycling program in 2003. Under this program, those personal computers which are sold after 2003 will have a “PC recycling mark” that consists of non refundable recycling fees which are already included along with the market price of PCs. And those PCs that come before 2003 which does not have “PC recycling mark”, consumers are obliged to pay the collection and recycling fees decided by the relevant authorities (PC3R, 2008; Terazono et al., 2006; Yoshida et al., 2007).

² PRO- Producer Responsibility Organization

³ SWICO- The Swiss Association for Information, Communication and Organizational Technology

⁴ S.EN.S – Stiftung Entsorgung Schweiz

4.1 E-Waste Management in India

India is reported to be the second largest producer of electronic waste in Asia. The Central Pollution Control Board (CPCB) of India reported in 2012 that e-waste has increased 8 times more in the last 7 years (Pradhan, 2013). Domestic generation plus imports of e-waste from the developed nations is the major reason for its phenomenal increase of e-waste in the recent years. Prior to 1989, the concept of e-waste was not familiar. It had nowhere mention in the Indian constitution to take care about electronic waste. However, under the Municipal solid wastes (management and handling) rules 2000 for the first time took a mention about e-waste. The 2000 rules include the guidelines for the management of electronic waste briefly but there were no such specific rules that specifically address electronic waste management. Subsequently various rules came into being which are related to the e-waste management system. These e-waste management related laws can be synchronized in the following manner (Report of Rajya Sabha Secretariat, June 2011).

4.1.1 The Hazardous Waste (management and handling) Rules 2003

Under this rule, it categorized electronic waste among 'hazardous' and 'non-hazardous' wastes. As per the rule, "hazardous waste" is defined as any waste which by reason of any of its physical, chemical, reactive, toxic, flammable, explosive or corrosive characteristics causes danger or is likely to cause danger to health or environment, whether alone or when in contact with other wastes or substances (Verma et al., 2014).

4.1.2 The Hazardous waste (Management, Handling and Transboundary Movement) Rules, 2008

This rule requires the recyclers of hazardous waste including electronic waste to register with the Central Pollution Control Board (CPCB). The particular authorized recyclers or the re-processors or the re-users are obliged to treat the electronic waste in an environmentally sound manner.

Under this rule Ministry of environment and forest are responsible for giving permission for the transit of electronic wastes through any part of the India (Report of Rajya Sabha Secretariat, June 2011).

4.1.3 Guidelines for Environmentally sound management of e-waste 2008

This rule highlights potentially aims to proper handling and treatment of electronic waste in an environmentally sound manner. As electronic waste is a composition of various components. It consists of valuable and hazardous components so identification of e-

Waste is crucial. One of the major aims is to provide guidance about the various sources of the electronic waste and various methods and techniques that can be adopted in an environmentally feasible manner.

4.1.4 The e-waste (management and handling) Rules, 2011

The primary objective of the e-waste (management and handling) Rules 2011 which was notified in May 2011 and came into effect from 1st May 2012; is to channelize the e-waste generated in the country in an environmentally sound manner. India's e-waste management is largely handled by unorganized sector which adopted rudimentary practices thereby increases wastages of valuable resources and damage to the environment.

This is applicable to producer, consumer or bulk consumer, collection center, dismantler and recycle of e-waste involved in the manufacture, sale, purchase and the processing of electric and electronic equipment. The stake holders have been assigned their obligation under the e-waste rule 2011. Under this rule, State pollution Control board need to ensure the proper implementation of the rule. While the central pollution control boards are required to give guidelines for the proper implementation of the rule, checking its progress and ensure the compliance of RoHS. Any permission related to the rule is required to be taken from the state pollution control board concern. India, like European Union also restricted the use of six hazardous components in electrical and electronic

components. These include lead, mercury, cadmium, hexavalent chromium, poly brominated bipenyls or poly brominated di phenyl ether.

4.1.5 E-waste (Management) Rules 2016

The e-waste rule of 2016 is an extended and elaborated version of e-waste (management and handling) Rule 2011. The amendment has further enunciated the roles of various stake holders involved. The promising part of the new rule is that it makes a proper inclusion of extended producer responsibility which is more precise and elaborated as compare to the former rule of 2011.

Initially in 2011 rule, the applicability was concentrated towards producer, consumer or bulk consumer, collection centre, dismantler and recycler. And it used to cover only electrical and electronic equipment as listed in schedule I. On the other side, the new e-waste rule of 2016 has extended manufacturer, dealer, refurbisher and producer responsibility organization. Other than electric and electronic equipments (EEE), it now includes consumables spares and parts of EEE listed in schedule I.

Some of the important features of e-waste (management) rule 2016 can be stated as below:

- The producer now will have to take authorization from Central Pollution Control Board (CPCB's) to ensure pan India implementation. There is no separate authorization needed to be taken for collection centre for which it now becomes a part under extended producer responsibility. Initially permission was needed to be taken from the state pollution control board for various dismantling and recycling activities etc.
- Now it is optional for producer for setting up PRO, e-waste exchange, e-retailer, Deposit Refund Scheme as additional channel for implementation of EPR by producers to make sure of efficient channelization of e-waste.
- It has set collection target for e-waste, which shall either be in number or weight. As per the EPR rule, the collection target will be 30% of the quantity of waste generation during the first two year of implementation of rules and will subsequently set the target of 40% during third and fourth years, 50% during fifth and sixth years and 70% during seventh year onwards.
- Deposit refund system has newly been introduced under the new rule. Here the producer charges some amount as deposit along with the price of the product at the time of sale of electric and electronic equipment. The interesting part is that at the time of consumer returning the end of life equipment, deposit made along with interest should be refunded.
- It clearly enunciated the provision and procedure for the implementation of Restriction of hazardous substances (RoHS) and related schedule II has been revised in accordance with the EU regulatory framework.
- In case of non compliance with provision would require the producer to withdraw and recall the product from market and make corrective measures to bring the product in accordance with the provision made.

The e-waste (management) rule 2016 amendment was the obvious consequences of the failure in the implementation of the e-waste (management and handling) rule 2011. According to a study conducted by toxic link on “e-waste management in India-Role of the state agencies” highlighted the failure of the proper implementation of e-waste rule 2011 by most of the Indian states (Business Standard, December 25, 2013). The study also expose that there is lack of initiatives and efforts from the state pollution control board of various states of the country. This however shows that the implementation of e-waste rule 2011 had not been successfully implemented in the country (Chandrasekar, 2012).

5.1 Areas to work upon

The implementation and proper execution of e-waste in India does not work in the same line as it does for the developed countries. Existence of capital, advanced technology, human resources and conscious citizens of the developed countries makes it easier for them to take care of e-waste. However, the case is opposite for India where e-waste is considered as an asset from where

some amount of money can be drawn at the time of parting with it. More-over India lacks private initiatives in terms e-waste management as can be documented from the fact that only 5% of the e-waste are treated properly both by private and government agencies. There are many reasons why these private initiations cannot be galvanized in an effective way. Some of the prominent include absence of constant supply of e-waste, costs over-weigh gains, inadequate effort or mis-direction on part of government.

The level of environmental consciousness among the citizens of India is either completely absent or is quite inadequate leading to permanent reluctance on part of masses. Such a scenario may be attributed to reasons like large population, uneducated masses, legal loopholes and executional failures. On the other hand in developed countries like Switzerland, citizens prefer the government to charged them for clean environment while the case is opposite for India. Environmental studies in the Indian curriculum are almost absent, even if present is only taught as an optional in higher standards. The authorities need to come up with different models and methods to make it a house hold concern.

Another line of failure is the institutional and legal mis-management and mal-practice of legal provisions. From our above analysis one can conclude with a bit of surety that publishing latest rules and regulations by modifying the existing ones has become a ritual. Through-out the whole study we could not find a single official evaluation report aimed at looking deeper into the performance of these rules and regulations at ground level. Another point to highlight is the pace with which the economy is experiencing a wedge between generation of e-waste and its proper disposal within the country. More effort needs to come from the government along all these lines to chock the rising menace of domestic e-waste.

The process of importation of e-waste is yet another area for the government to capitalize at. The government is yet to come up with some stringent laws either prohibiting all the importation of second hand electronic gadgets or trying to partially control it. The country is increasingly used as a hub for dumping the electronic waste generated in developed countries. The cheap rates of such products along with informal and unregistered sites of sale pose many serious challenges. The rising ambit of unorganized sale and disposal of electronic products may defeat the basic purposes of different legislations governing the menace of e-waste In spite of various legislations and legal amendments, there are several authentic studies which have indicated that India has performed badly in terms e -waste management.

6.1 Conclusion

A range of steps and initiatives have been taken by both developed countries as well as India but their enforceability levels differ immensely. Switzerland for instance has strict e-waste management rules. It is handled by two major Producer Responsibility Organisations (S.W.C.O & S.EN.S). European Union two major directives (WEEE directive & RoHS) are remarkable in the sense that developing countries are looking forward to it and try to make their laws in compliance with these two directives. Japan on the other hand has strict system where a consumer has to pay at the time of deposit of e-waste to the retailer or to the producer. The system of Extended Producer Responsibility (EPRs) is being advocated by almost every country for proper management of e-waste. It includes advanced recycling fees (ARFs), product take back mandate, virgin material taxes and combination of these instruments. It also includes “pay- as- u- throw” principle.

On the other hand in India legislation are not seriously implemented nor followed. Most of the e-waste goes to the informal sector (95%). The per capita generation of e-waste is more in country like Switzerland but due to its economic advantage and environmental awareness among the citizens leads to effective handling of e-waste. While as it is just the opposite in case of India. The employability potential on the other hand, is more in India. It is due to various factors like huge population, unskilled and semi skilled workers and moreover a source of income. Occupational hazards are again more in India due to rudimentary method adopted for recycling and handling of e-waste. Emission of toxics is again more in India due to lack of sophisticated technology used and moreover e-waste are handled manually.

Unlike in developed countries, e-wastes in India have some monetary value which when received by people makes them to part-off their e-waste. Effective recycling of e-waste requires a constant supply which can be initiated from both consumer awareness and governmental initiatives. The amendment made on the e-waste (management) rule 2016 is an improvement of the 2011 guidelines in various aspects and one of them is the deposit refund system. Although the concept is not new to the developed nations, but the concept of interest payment at the time of deposit to the producer is rather a welcome step to encourage good collection of e-waste. Such interest rates are not provided to consumer in any part of the developed nations but its provision is important in case of India. It is because it gives an incentive to consumers to deposit their e-waste back to the retailer and get their deposit and interest rate back. Other amendment like Imposition of financial penalty in case of non compliance of the provisions under e-waste rule 2016 is quite similar to what is adopted there in Japan. This is expected to raise the discipline among various stakeholders to comply the enacted rule. The new e-waste rule of 2016 have also enunciated RoHS in line with the European Union but it is yet to see how effectively it functioned. So collectively, the new e-waste (management) rule 2016 has taken cue from e-waste management rules of some of the developed countries. The government needs to give proper attention to the evaluation of such rules and regulations.

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