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Menace of Electronic Waste: An inquiry into a need for effective and efficient Legal framework

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Abstract

Electronic waste (E-waste) in the context of solid wastes can be defined as the wastes which resulted by the electronic gadgets or system used for domestic, commercial and institutional purpose. The implications of the electronic wastes on the environment directly affect the human beings as well as disturb the ecological balance. Therefore for the sustenance of better survival there must be some framework or structure to limit the implications of the electronic waste. This paper will examine the separate legal framework under the existing Environment Protection Act to curb and control this problem. The paper will argue for the rights and protection of the workers who work for collecting the E-waste and then recycle them. The toxic substance and gases affect the physical and mental health of the workers. The paper will include the environmentally sound E-waste system which can be used for better disposal of waste and the protection of environment. The paper will analyse the pro and cons of Hazardous Waste Rules, 1989 which include the E-waste but do not provide any sufficient provisions or framework to regulate the E-waste system. The paper will analyse the existing international framework relating to the E-waste system and how other developed and developing counties are measuring and controlling the E-waste problem. At the end the paper will come up with some suggestions and recommendations.

Key words: *Electronic waste, environment, Human beings, environment, natural resources*

1. Introduction:

In the current age clean environment is an essential requirement for the sustenance of healthy life. Human beings and environment are closely related to each other. The degradation of environment will eventually lead to the end of human, animal and natural existence. Human beings and nature are inextricably connected and this fact has led to

the view that protection of nature is prerequisite for the survival of mankind. However the ecology is getting affected in the name of development and electronic waste is one of the outcomes of development in the field of information and technology.

The contemporary world is 'techno-savvy'. [1] In fact, electronics have become an integral part of twenty first century lifestyle. The world has witnessed an astounding change from transistor and black and white television to the high-tech world of computers such as desktop, laptops, notebooks, and palmtops, 3G mobile phones, and the new sensation, that is, the iPhone.[2]

The reaction of chemical substances of electronic items and the electronic mechanism lead to the ecological disturbance and create the situations which affect the life of human beings. Like Lead and cadmium are found in printed circuit boards; lead oxide in cathode ray tubes which can cause brain damage, retardation, and impairment of cognitive and behavioural development, silicosis cadmium can cause renal damage and severe ecological damage and atmosphere pollution.[3] . A survey of 2011 revealed that some 53 million tons of electronic waste was generated worldwide in 2009 and only about 13% of it was recycled.[4]

So the mounting pressure of environment pollution is alarming the requisite of such an electronic waste disposal system which can attribute to the protection of environment and can be used to eradicate the hazardous substances and chemical from the environment. This paper will subsequently discuss with the reflection and negative implication of E-waste and what are the suitable steps which can be taken to reduce the E-waste pollution. The Supreme Court of India has adopted the Basel Convention and said that in the light of the conditions provided in the Basel Convention Technical Guidelines on 'Trans boundary Movements of Electronic and Electrical Waste', the Digital Multifunction Print and Copying Machines are not in the restricted category, at present.[5]

2. Harmful Effects of Mounting E-waste Scrape on Human and Environment

Human who work in E-Waste recycling plants are known to suffer from many health issues. As some of the constituents of E-waste are very harmful for the humans such as Arsenic, Cadmium, and Chromium etc. Skin disease, lung cancer, brain damage, kidney disease and abortion are some of the harmful effects that they face.[6]

According to a group of scientists who studied about the effect of E-waste in those areas, have discovered that in Guiyu which is the biggest E-waste recycling centre in China, has the highest level of cancer causing dioxin and abortion rate in the world.[7] Not only adults that are affected, the children in that area are also suffering as well.[8] The lead Levels in blood can result in lowered intelligence, reading and learning disabilities, impaired hearing, reduce attention span, hyperactivities and antisocial behaviour.[9]

"When we burn, the smoke brings disease, so we don't like it. We need the smoke to come down, it is difficult, and we get sick." Mohamed Hassan, a scrap metal scavenger in Accra told Greenpeace.[10] Children reported constant respiratory complaints. Doctors warned that the longer-term toxic effects could harm brain development, the nervous systems and the children's developing reproductive systems.[11]

Table: E-waste Toxin and Affected Human Body Parts

Components	Constituents	Affected Body Parts
Printed circuit boards	Lead and cadmium Beryllium	Nervous system, kidney, lever
Motherboards	Lead oxide, barium and cadmium	Lungs, skin
Cathode ray tubes (CRTs)	Mercury	Heart, lever, muscles
Switches and flat-screen monitors	Cadmium	Brain, skin
Computer batteries	Polychlorinated biphenyls (PCBs)	Kidney, lever
Capacitors and transformers	Brominated flame-retardant casings cable	Kidney, lever
Printed circuit boards, plastic	Polyvinyl chloride	Kidney, lever
Cable insulation/coating Plastic housing	Bromine	Immune system

Source: Electronic For You[12]

The most common form of cadmium is found in Nickel-cadmium rechargeable batteries. These batteries tend to contain between 6 and 18% cadmium. The sale of Nickel-Cadmium batteries has been banned in the European Union except for medical use. [13] When not properly recycled it can leach into the soil and harm microorganisms and disrupting the soil ecosystem.[14] Exposure is caused by proximity to hazardous waste sites and factories and workers in the metal refining industry. The inhalation of cadmium can cause severe damage to the lungs and is also known to cause kidney damage.[15] This is the dismal state of the people working in E- waste plants. That is why bringing us to the conclusion that effective steps need to be taken to tackle this growing problem.

Table: How much waste is in 500 million Computers?[16]

Plastic	6.32 Billion Pounds
Lead	1.58 Billion Pounds
Cadmium	3 Million Pounds
Chromium	1.9 Million Pounds
Mercury	632,000 Pounds

1 Pound = 0.4536 Kilograms

3. Legislation related to an effective E-waste system:

The increasing density of electronic waste on the earth is giving rise to the ecological disturbance and the threat for the human and natural survival. Electronic waste affects the surrounding environment and causes major environmental problems. To curb ecological and human problems, it is essential for the government to come up with concrete solution so that a healthy environment can be attained.[17] The Court has observed that if the reusable computers have to be refurbished and if the non-functional computers have to be made re-usable it will result in heavy amount of e-waste generation.[18]

The ministry of Environment and forest under the government of India issues the rules in 2011 called as the *E-waste (Management & Handling) Rules, 2011*, which deeply discussed the each and every aspect of e-wastes. Prior to 2011 e-waste rules, there was Hazardous Waste Rules, 1989, which included the E-waste but do not provide any sufficient provisions or framework to regulate the E-waste system. The detail analyses of this rules is discussed below.

3.1. E-waste (management & handling) Rules, 2011:

A major concern of the 2011 rules is to reduce the use of hazardous substances in electrical and electronic equipment by specifying threshold for use of hazardous material including lead, mercury

and cadmium etc. in the rule 3 (1) (k) E-waste is defined as *e-waste means electrical and electronic equipment, whole or in part or rejects from their manufacturing and repair process, which are intended to be discarded.*[19] The 2011 e-waste rules have been categorised in VI chapters which are discussed below.

3.1.1 Responsibilities of Producer and collection centre:

Rule 4 [20] describes the responsibilities of the producer, who involves in the manufacturing and the assembling of the electronic and electrical equipment. It is the producer responsibilities for the collection of e-waste and channelizing it for recycling or disposal. This rule talks about the *Extended Producer Responsibility (EPR)*. EPR can be understood as extending the responsibility of producers beyond the factory gates and creating economic incentives to achieve set targets for collection re-use and recycling, manufacturers should become more aware of the issues related to the end-of-life management of their products.[21] Rule 4 (4) describes financing and organising a system to meet the costs involved in the environmentally sound management of e-waste generated from the 'end of life' of its own products and historical waste available on the date from which these rules come into force. The financing arrangement of such a system shall be transparent. The producer may choose to establish such a system either individually or by joining a collective scheme.[22] The producer is duty bound to mention the information related to handling, hazardous constituent, accidental breakage instructions and affixing a visible and legible symbol which contains the usage of equipment and do's and don'ts instructions.[23] The collection centre is bound to follow the procedure mentioned by the pollution control board and he is required to ensure that the e-waste collected by them is stored in a secured manner till it is sent to registered dismantlers or recycler.[24]

3.1.2 Responsibilities of Dismantler and Recycler:

Every dismantler is required to be authorised and registered within the norms of the state pollution control board. While doing dismantling, it must be ensure that no environment damage is caused and no scope is left for polluting the ecological system. At the time of storage and transportation of the e-waste, the probability increases to disturb the ecological balance. Rule 7 of the 2011 e-waste rules defines the responsibilities of the dismantler. It covers that the dismantling process do not have any adverse effect on the health and environment and for looking into this matter every dismantler is bound to follow the procedure of the pollution control board and ensure that the method which they are following is the registered and reliable method. There must be regular checking of the dismantler and the proceeding so that if any fault is found out, can be corrected at the time for the prevention of big tragedy. The dismantler is bound to maintain the quality for the sake of protection of environment and the humanity.

Like the dismantler, every recycler is bound to obtain the authorization and registration from the state pollution control board. Rule 8 (2) says that the recycler must ensure that the facility and recycling processes are in accordance with the standards laid down in the guidelines published by the central pollution control board from time to time. The recycle plant is also bound to maintain the standard of quality in the recycling process and must adopt the adequate measure for the successful completion of the process.

3.1.3 Procedure for seeking authorization and registration for handling E-waste:

Rule 9, 10 and 11 of 2011 e-waste rules contain the whole procedure for the granting and termination of the authorization and termination for handling E-waste. Rule 9 describes the procedure for grant of authorization. It says every producer of electrical and electronic

equipment listed in schedule I of the 2011 rule, collection centre, dismantler and recycler of e-waste shall obtain an authorization from the state pollution control board or pollution control committee of union territories and they are required to make an application within the 3 months of the commencement. After receiving the application the pollution board or committee will inquire into the appropriate facilities, technical capabilities and mechanism to handle the e-waste. Under the rule 9 (8) the state pollution control board in case of a respective state or the pollution control committee in case of union territories shall maintain a register containing particulars of the conditions imposed under these rules for environmentally sound management of e-waste, and it shall be open for inspection during office hours to any person interested or affected or a person authorized by him on his behalf.[25]

The state pollution control board or the pollution control committee has power to terminate the authorization on the ground of non-compliance of the conditions or any provisions of the act or violation of any procedure or hiding the material facts related to the e-waste, which may result into the disasters. The board or committee will give the reasonable chance to heard the part and will issue the show cause notice for seeking the answer that why your authorization or registration should not be terminated or cancelled. And the person against whom the action is taken is bound to follow the directions of the pollution control committee or board.[26]

3.1.4. Reduction in the use of hazardous substances in the manufacture of electronic and electrical equipment:

The producer of electrical and electronic equipment is duty bound to ensure that the equipment does not contain the hazardous substance like Lead, Mercury, Cadmium, Hexavalent, Chromin, Polybrominated Biphenyles. E-waste contains toxic substances that have an adverse impact on human health and the environment

if not handled properly. These hazardous arise due to the improper recycling and disposal process. It can have serious repercussions for those in proximity to places where e-waste is recycled or burnt. E-waste from the white and brown goods is less toxic as compared with grey goods. A computer contains highly toxic chemicals like lead, cadmium, mercury and phosphorous compounds.[27]

In the 21st century the IT and electrical sector have achieved a lot and discovered the many new technical equipments , which are impossible to manufacture without using the mentioned substances. Provided that the producer must use at the minimum concentration of these hazardous substances so that it should not affect the environment. The rule 13 (1) provides the use of quantity. It says a maximum concentration value of 0.1% by weight in homogenous materials for Lead, mercury, hexavalent chrimum, polybrominated biphenyls and polybrominated diphenyle ethers and of 0.01% by weight in homogenous materials for cadmium shall be permitted. [28]

By this legislation it can be said that by require adequate and proper control measure the menace of e-waste can be handled. In developing nations like India, there are additional problems including the dumping of hazardous waste from foreign nations. An example of this is when Supreme Court Monitoring Committee (SCMC) found that a Danish ship carrying hazardous waste was beached at the Alang ship-breaking yard in Gujarat.[29] The carrying of the toxic waste was noticed by the Government of Denmark and they ordered the ship to remain there till its decontamination was complete. But the ship changed its name and went to India. The SCMC ordered it to return to its country of origin.[30] In case of non-functioning of the electric machines or equipment, the same should also be certified by the Chartered Engineer as these machines may have to be categorized as e-waste and have to be handled as per the Hazardous Waste Rules as

they have to be treated as hazardous waste.[31]

4. The International Conventions and Framework Vis-à-vis E-waste Issue

4.1 History and need for the Convention:

"I think the economic logic behind dumping a load of toxic waste in the lowest wage country is impeccable and we should face up to that ... I've always thought that under populated countries in Africa are vastly under-polluted."[32]

This statement was released from a memo of the chief economist of the World Bank and they had created a global outcry about the ruthless insensitivity with which the 'developed' countries operate. The economic logic and convenience of the export of hazardous wastes from the rich industrialized countries of the North to the poorer less-industrialized countries of the South had already become amply clear to the global community before Mr. Summers wrote his infamous memo.[33] Beginning in the mid-1980s headlines began appearing announcing the discoveries of barrels of mixed industrial poisons dumped on tropical beaches, and vessels laden with toxic trash plying the coastlines of developing countries searching for a port-of-call.[34] Also certain developed countries involved in exporting these waste materials for recycling to the other developing/ under developed countries.[35]

The Convention was initiated in response to numerous international scandals regarding hazardous trafficking that began to occur in late 1980s.[36] After two years of negotiations involving 116 countries, a conference convened under the auspices of UNEP adopted the Basel Convention on the Control of trans-boundary Movements of Hazardous Wastes and their Disposal in 1989.[37] As the developed countries progressed in their use of electronic goods and equipment, it became more and more evident that there needs to be an appropriate system of disposal of used, worn out equipment.

4.2 The Basel Convention:

The Basel Convention establishes a global notification and consent system for the trans-boundary shipments of hazardous and other wastes among parties and requires Parties to manage and dispose of waste in an environmentally sound manner, providing the impetus for many nations to revise or enact for the first time laws governing the import and export of dangerous wastes. It also prohibits Parties from trading in covered wastes with non- Parties.[38]

Basic Obligations of the Convention:

The convention places conditions on the export and import of covered wastes as well as strict notice, consent and tracking requirements for the trans-boundary movement of wastes. The United States is a non-party and, as a result, many countries that are parties to the convention are prohibited from exporting wastes to or importing wastes from the US. This convention also commits parties to honour import bans adopted by other parties and many governments have gone beyond the requirements of this convention to ban the import of certain hazardous wastes into their national territory.[39]

Parties are prohibited from exporting or importing hazardous or other wastes if the exporting or importing country has a reason to believe that the wastes would not be managed in an "environmentally sound manner".[40] Parties are also required to ensure that trans-boundary movements are only allowed where: a) the exporting country does not have the technical capacity or facility to dispose of the wastes in an environmentally sound manner; or b) the wastes being exported are required as a raw material for recycling or recovery in the state of import.[41]

Even where waste exports are allowed, Basel establishes a global written notice and consent regime for the trans-boundary movement of dangerous wastes. Parties may not initiate the export of such wastes without written confirmation. The notification must contain specific information

identified in Annex V (A)[42] of the convention, including information on the exporter of the material, generator of material, disposer of the material, intended carriers, competent authorities, and means of transport and content of material. [43] The waste shipments must be accompanied by a movement document and must comply with applicable international packaging and labelling requirements. Parties are also obligated to re- import wastes under certain circumstances where wastes cannot be managed in an environmentally sound manner in a receiving country and in instances of illegal traffic. [44]

Basel Ban Amendment:

Following the adoption of the Basel Convention, the negotiations on the introduction of a total or partial ban on trans-boundary movements of hazardous wastes continued in the framework of the COP. They resulted in the adoption by COP 3 in 1995 of the Amendment to the Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal (hereinafter referred to as "the Ban Amendment"). [45]

The Ban Amendment provides for the prohibition of exports of all hazardous wastes covered by the Convention that are intended for final disposal, reuse, recycling and recovery from countries listed in annex VII to the Convention (Parties and other States which are members of the OECD, EC, Liechtenstein) to all other countries. But however, due to certain controversies the Ban Amendment has not yet entered into force. The evolution of the membership of the Organisation for Economic Cooperation and Development (OECD), the emergence of new waste streams and techniques for recycling and resource recovery, and the increasing availability of state-of-the-art recycling facilities in non-OECD countries has added new dimensions to the problem.[46]

Informal discussions were initiated at COP 9 in 2008 to identify a way to enable the entry into force of the Ban Amendment while addressing the concerns and needs of all countries in this

context. The Basel Protocol on Liability and Compensation for Damage resulting from Trans-boundary Movements of Hazardous Wastes and their Disposal (hereinafter referred to as "the Basel Protocol") was adopted by COP 5 in 1999. The Basel Protocol regulates civil liability for damage resulting from the trans-boundary movement of hazardous wastes and other wastes, including incidents occurring as a result of illegal traffic.[47] Each phase of a trans-boundary movement, from the point at which the wastes are loaded to their export, international transit, import and final disposal, is covered. Delegates at COP 5 also agreed on an interim arrangement to cover emergency situations until the Protocol enters into force. COP 6 approved the Interim Guidelines for the Implementation of decision V/32 on the Enlargement of the scope of the Technical Cooperation Trust Fund.[48]

4.3 The Bamako Convention:

The Bamako Convention on the Ban of Import into Africa and the Control of Trans- boundary Movement and Management of Hazardous Wastes within Africa was signed by all 51 members of the Organization for African Unity (OAU, now known as African Union) on January, 1991 in Bamako, Mali. The Convention essentially bans the import of hazardous waste generated outside of Africa.[49]

Objectives: The objectives of the Bamako Convention are to protect human health and the environment from dangers posed by hazardous wastes by reducing their generation to a minimum in terms of quantity and/or hazard potential.[50]

The OAU states argued that Basel failed to address adequately three important problems: 1) How to control shipments of mixed waste; 2) How to address instances where an importing State fails to dispose adequately of the waste; and 3) How to prevent forgery and bribery from circumventing Basel's notice and consent provisions.[51]

Despite initially refusing to sign the Basel Convention, African Countries could still receive waste from Basel parties through Basel's

Article 11 exception for exports by a party to a non- party pursuant to a separate bilateral or multilateral agreement. To eliminate this possibility, the OAU made use of Basel's Article 4 provision forbidding a Party from shipping waste to a State that has banned all hazardous waste imports or that belongs to an economic integration organization that has done so. Art. 4(2)(e).[52]

Bamako requires all Parties to prohibit under their own domestic law the importation of hazardous waste from outside Africa. The convention also requires Parties to adopt laws prohibiting the dumping of hazardous waste at sea or in territorial water, exclusive economic zone (EEZ), and continental shelf of each party. This provision also declares ay dumping of hazardous wastes at sea, including incineration, to be illegal.[53] Art. 4(2)(a). It exceeds the restrictions of Basel and could outlaw the kind of ocean dumping practiced in the Khian Sea incident, where a ship loaded with hazardous incinerator ash allegedly dumped its cargo at sea after being refused docking rights by several nations. Bamako's scope is broader than Basel's.[54]

A waste will fall under the scope of the Convention if it is within the category of wastes listed in Annex I of the Convention and it does exhibit one of the hazardous characteristics contained in Annex III.[55] In other words it must both be listed and contain a characteristic such as being explosive, flammable, toxic, or corrosive. The other way that a waste may fall under the scope of the Convention is if it is defined as or considered to be a hazardous waste under the laws of either the exporting country or the importing country or any of the countries of transit.[56]

4.4 The Waigani Convention:

Objective of the Convention:

The Waigani Convention is a treaty that bans the exporting of hazardous or radioactive waste to Pacific Islands Forum countries, and prohibits Forum island countries from importing such waste.[57]

The overall objective is to protect, preserve and improve the environment of the South Pacific and the health of all peoples in the region by prohibiting the importation of hazardous and radioactive wastes into Pacific Island Developing Parties, and to regulate and facilitate the environmentally sound management of hazardous wastes in the region.

The objective of the Waigani Convention is to stop the import of hazardous and radioactive waste into the South Pacific region, to minimise production within the region and to ensure the environmentally sound management and disposal of already existing waste.[58]

The Waigani Convention provides a mechanism to stop waste traders from using the South Pacific as a highway for hazardous waste or as a waste dump. Once party becomes the signatory of Waigani Convention than the country is eligible for technical and financial assistance to help in the management of hazardous or nuclear waste.[59] There by creating an effective regional mechanism to facilitate the clean-up of hazardous and radioactive waste.[60]

The Waigani Convention consists of 13 including countries such as Australia, Cook Islands, Federated States of Micronesia, Fiji, Kiribati, New Zealand, Niue, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu.[61]

Obligations and rights:

Through the Waigani Convention, members agree to;

- Provide the secretariat information regarding any illegal activity on the importation of hazardous wastes and radioactive waste within areas under its jurisdiction, which will be co shared with other member states.
- Ban the dumping of Hazardous wastes and radioactive waste at sea
- Within a member state convention area, parties are obliged to ensure the production of hazardous waste

is reduced at its source at a minimum, and to ensure that the disposal of waste is done in an environmentally sound manner and close to source as possible

- Effective protective mechanisms to stop waste traders from dumping waste into the Pacific and to clean up hazardous wastes in the region.
- Agreeing to the Waigani Convention also recognizes member states with other international convention such as the Basel Convention which serves as the primary international instrument governing the Trans boundary movement of hazardous waste[62].
- The Convention covers the land territory, internal waters, territorial sea, continental shelf, archipelagic waters and exclusive economic zones (EEZs) established in accordance with international law of 24 countries, including Forum Island Countries (FICs), Australia and New Zealand (referred to as Other Parties). It also encompasses those areas of high seas which are enclosed from all sides by Parties' EEZs, and other areas of the Pacific Ocean as may be included in the Convention Area (Article 1).[63]

5. E-waste Mechanism System of other Nations

5.1 E-waste Framework in the European Countries (WEEE):

In the European Countries they have directive on Waste Electronics and Electrical Equipment known as WEEE Directive. This directive came into force because of mounting electronic waste in the European nations. [64] So as a result some member countries had formed their own legislation to control the e-waste which resulted into the common European countries directive for e-waste.[65]

The mission of WEEE forum is to provide for a platform for co-operation and exchange of best practices in e-waste mechanism. In doing so, optimise the effectiveness of the operations of the member organisations, while striving for excellence and

continuous improvement in environmental performance.[66] The WEEE forum seeks to be a centre of competence that allows members to make constructive contributions to the general debate on e-waste policy matters.[67]

The purpose of the WEEE Directive is to prevent waste from arising, as well as to increase rates of re-use, recycling and recovery. It also aims to improve the environmental performance of producers, distributors and consumers involved in the life cycle of electrical and electronic equipment.[68] After August 13, 2005, producers will be responsible for financing the collection, treatment, recovery and environmentally-sound disposal of waste from their own products.

WEEE directive involves that system for the treatment of WEEE (which must be financed by producers) must use the best available treatment, recovery and recycling techniques.[69] They may operate by individual companies or be set up as part of a collective scheme involving a number of producers. As a minimum, treatment is to include the removal of all fluids, plus appropriate treatment for specified forms of WEEE, e.g. the removal of batteries and components containing mercury.[70]

5.2 E-waste Framework of the USA:

United State of America is the world leader in producing the electronic waste about 3 million tons each year followed by china producing 2.3 million tons.[71] Producing the largest amount of e-waste, USA is not a signatory of Basel Convention. The National Safety Council estimates that 250 million computers will become obsolete by 2009, and cell phones will be discarded at a rate of 130 million per year.[72] Environment Protection Agency (EPA) is the main body which regulates and keep eye on the environment pollution and seeks the way to reduce it. It issues the notifications and direction which are must to follow by the people or corporation for the reduction of the environment pollution.[73]

EPA has launched the plug-In to eCycling campaign, which seeks to increase the national recycling rate for used electronics. EPA is working with electronics manufacturers, retailers, and government agencies to reduce the environmental impacts of electronic products during their production, use and disposal.[74]

The agency is implementing the e-cycling campaign through partnerships with industry, states, and environmental groups and through training, outreach, and technology assistance for business, governments, and citizen groups.[75] The EPA in the assistance of the government keep changes the fee of recycling for providing the better method and policies.[76] The court has also determined that the EPA could not "extend the reach" of the terms "solid waste" and "hazardous waste" to reach products that was still in functional reuse.[77]

In the USA, when electronic wastes are disposed, regulatory requirements under the federal or state hazardous waste programme will apply. There is Resource Conservation and Recovery Act (RCRA) which sets forth a framework for the management of non-hazardous solid wastes.[78] Generators who send electronic wastes for disposal must make a hazardous waste determination, and if the e-waste exhibits a hazardous characteristics, then it must be manifested and disposed in a permitted RCRA landfill.[79]

6. Conclusion

The effects of E-waste are considered as serious problem for the ecological balance. The mounting e-waste scraps is mounting the pressure on the environment and polluting the environment. In the 21st century, rapid development in the field of information technology and electronics, are also giving the major problem of E-waste. Computers and electronics equipments are designed without giving sufficient attention to the aspects such as downstream impacts, and the ease of recycling. Thus, their dismantling is also extremely labour-intensive.[80] The hazardous substances present in the electronic and electrical equipment gives raise the

hazardous pollutants which ultimately affects the environment. There are many technologies have been developed to curb the E-waste like the process of recycling and dismantler.

In the E-waste (Management and Handling) Rules 2011, there is proper procedure has been described for getting the authorization and registration for the recycling plant and what method and precaution must be employed so that during the recycling process the environment does not get affected. The paper has discussed about the E-waste (Management and Handling) Rules 2011 which describes the responsibilities on the producers, customers, dismantler and recycling plant. In spite of Indian e-waste Handling and Management rules, there are international convention which particularly focuses on the curbing and controlling the E-waste problems like Basel Convention, Bamako Convention and Waigani Convention. Other than this the European countries have adopted their separate law and directive which specially deals with the electronic waste. The directive is known WEEE. The USA has Environment Protection Agency to control the environment pollution. It also controls the hazardous substances which may result into the environment pollutants and affects the environment.

We must undoubtedly be pro- development but for every step that we take forward we must ensure that nothing that we have left behind causes any worry to our progeny. So constantly keeping a watch on how best we can handle the waste.

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[18] *Ibid*

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[20] *Ibid* § 4

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[22] *Supra note* at 19, §4 (4)

[23] *Supra note* at 19, § 6

[24] *Supra note at* 19, § 6

[25] Supra note at 19 §9 (8)

[26] Supra note at 19, §10 (1) and §10 (2)

[27] *See* Justice T S Doabia "Environmental & Pollution Laws in India ", 713 (2nd ed. 2010)

[28] Supra note at 19, § 13 (1)

[29] P.B. Sahasranaman, "Handbook of Environmental Law", 257 (1st ed. 2009); *See also Down to Earth,* 30 June 2005 (Magazine published by society for environmental publications, New Delhi)

[30] *Ibid* at 258

[31] Vinay Auto Copier Machine and Ors. v. Union of India (UOI), 2011(274)ELT33(Mad.)

[32] Office Memorandum from Lawrence M. Summers, Ext. 33774, Subject: GEP, the World Bank/IFC/MIGA, 12 Dec. 1991

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