

E – Waste Management through Regulations

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ABSTRACT: *The developed and developing countries are facing the heat of e waste and have come up with measures for controlling, dealing and combating. Regulations for E-waste management in developed and developing countries through Regulations, Rules and Legislative approaches and observation of implications arising out of it are of prime importance to take stock of preparedness for dealing it. The study the influence and intentions of selected developed countries initiatives in this effort vis a vis developing countries and predict strengths and obstacles to effectiveness of e-waste regulations is need of time. The inclusion of newer approaches of various stakeholders in formulating the rules is requirement and is essential to address the minimization and justified tackling of e-waste situation successfully. The need to define and analyze E waste stock, source of inflow, restrictions in and from formal and informal sectors etc are the primary need in the international forum which can address to the economic causes of illegal e-waste export and handling. The addressing of all three entities i.e. enforcing regulatory, compliance and eliminating the health and environmental hazards related to e-waste handling will need to be observed that how far it has been resolved by the regulations and access the need for new regulations.*

Keywords: *WEEE, e-waste, imports, developed countries, developing countries.*

I. INTRODUCTION

Products consisting of Computers, Mobile Phones, Monitors, Keyboards, Video Cameras, Stereos, Photocopiers, Televisions, Microwave Ovens, Washing Machines, VCRs, Dishwashers, Fax Machines, Digital Cameras etc are normally termed as Electrical and Electronic Equipment (EEE) or e product. In recent past development and dependence on use of e products has increased significantly. After use and end of life in exponential growth of rising amounts of wastes termed as waste of electrical and electronic equipment (WEEE) or alternately as e-waste. E-waste is a highly complex waste stream which contains both very scarce and valuable as well as very toxic components. As per UN survey of 2009 every year 20 to 50 million tons of e-waste are generated worldwide. By 2020 e-waste from old computers in South Africa and China will grow by 200-400% and by 500% in India where as for mobiles it will be 7 times higher in China and 18 higher in India compared to 2007.

For effectively tackling problem of e waste various country's irrespective of developed or developing and underdeveloped in nature create individual regulations, Laws, Regulations and Initiatives to tackle the mammoth growth problem of e waste. The group of developed countries namely European Union, United States and other major stakeholder developed Asian countries contributing to e products initiatives till date can be listed as :-

- Waste Electrical and Electronic Equipment (WEEE) Directive
- Restriction of Hazardous Substances (RoHS) Directive
- EU Directive on Energy-using-Products (EuP)
- EU Directive on Registration, Evaluation and Authorisation of Chemicals (REACH)
- E-waste regulations in Japan, China, India, Korea, United States, Canada and other many nations
- Basel Convention/s
- Basel Convention Partnership on the ESM of E-waste in the Asia- Pacific region
- Mobile Phone Partnership Initiative (MPPI)
- Partnership for Action on Computing Equipment (PACE)
- StEP Initiative
- Regional 3R Forum in Asia

The Developing and marginally developed Asian African countries has become major destination for e products from developed countries since nineties in name of technology transfer , globalization and opening of international markets and trades initiatives. The situation for comprehensive regulation and regulatory rules emerged urgently because of mammoth increase in e-waste domestically or otherwise. Till September 2010 in India apart from the adhoc regulations aiming to other initiative, there was no comprehensive regulation in effect covering the management, recycling and disposal of e-waste. Consequently, much of the domestic and

imported WEEE ends up in illegal dismantling, recycling and disposal. The lack of proper facilities for workers working in these processes which are hazardous to both their health and the environment can be seen. The 'The e-waste (Management & Handling) Rules 2011 which came to effect from 1st May 2012 with other rules aim to address both domestic and imported e-waste management in India.

The detailing exhibiting strengths and problems associated with e-waste regulations in developed countries and unions particularly those exporting or affecting technology to India which may influence or pose potential threats and obstacles to the success of the rules effectiveness of Indian regulations are analyzed. The examples of WEEE management regulation and enforcement in major exporters like European Union (EU), US, China, Japan, Korea, Thailand etc. e product world leaders in legal or otherwise format and illegally transboundary shipment in India i.e. countries having common boundaries like Bangladesh and Pakistan etc are of prime importance. The situation of EU is important as the WEEE directives are the original and almost applicable universally. The developed countries process the technology to treat their own e-waste and can extend the technology to other developing countries for reduction of hazards to environment and health.

The paper deals the sources of e-waste and will be able to picturise the strengths and weaknesses of regulation in developed, developing and nearby countries vis a vis explores Indian e-waste regulation and provisions of the rules and Acts. The problem due to economic causes of illegal e-waste transboundary migration and handling are addressed worldwide, enforcing regulatory compliance and eliminating the health and environmental hazards related to e-waste dismantling will remain difficult.

II. E-WASTE STOCKS: AN OVERVIEW

E-waste encompasses ever growing range of obsolete products classified as

1. Electronic devices such as computers, servers, main frames, monitors, TVs & display devices
2. Telecommunication devices such as cellular phones & pagers, calculators, audio and video devices, printers, scanners, fax machines, refrigerators, air conditioners, washing machines, and microwave ovens.
3. Recording devices such as DVDs, CDs, floppies, tapes, printing cartridges, military electronic waste, automobile catalytic converters.
4. 4. Electronic components such as chips, processors, mother boards, printed circuit boards, industrial electronics such as sensors, alarms, sirens, security devices, automobile electronic devices.

The complexity of e-waste flows and inadequate record-keeping by industry and other playing participants make an estimation of the quantities of e-waste difficult to estimate but a survey shows an estimate that in 2012 nearly 7.1 million (m) computers, 16 m TV sets and ~190 m mobile handsets are expected to be a part of the e-waste pool in India. This would translate into 1 m tons of e-waste in 2012. However, a study limited to an examination of computers, mobile phones and televisions reckoned that 400 thousand (th) ton of e-waste were generated in 2007, 50 th ton (approx. 13%) of which were imported illegally. Worldwide it has been observed that the main generators of e-waste are still the developed countries. Since 2008, the EU has produced on average 6.5 million tons of e-waste each year which may almost double to 12 million tons by 2015. In terms of per capita e-waste generation, the UK rate is 15 kg per year, Germany 13.3 kg, while Japan generates 6.7 kg and China 1.7 kg.

Of the e-waste imported into India, it is estimated that approximately two third is imported from the US, while one fifth is predominantly imported from the EU and remaining from Asian leading IT developed countries like China, Thailand, Korea etc. Since a good proportion of import of e-waste is illegal it is often shipped via third country, it is not possible to have exact statistics. Of the estimated 400 th ton of e-waste generated in India, 150 th ton enters the e waste stream through recycling. A pervasive view of e-waste as a commodity causes a reluctance to dispose of e-waste immediately, although modest incentives through advertisement have been used for encouraging disposal among consumers. With modest recovery rates to formal recyclers being common across India, lower legislation compliance costs and the ability to externalise significant environmental costs, the informal recycling sector is able to out-compete the formal sector, including state-of-the-art recyclers, in bidding for e-waste in India. The informal sector thus dominates e-waste recycling in India.

Need of legislation designed to reduce the environmental hazards of e-waste recycling in India is needed primarily to address the ability of informal recyclers to outbid formal and state-of-the-art recyclers. Legislation must be able to either prevent informal recyclers from accessing e-waste in the same markets as formal recyclers or prevent them from externalising their costs.

III. E-Waste Legislation And Enforcement In Selected Countries

The various countries and unions have developed different approaches for managing e-waste, diverging both in the legislative scope and the instruments effectiveness. The briefs of the bench mark countries i.e. stake

holders in IT sector like EU countries, US and Asian countries like China, Taiwan, Korea and countries through which illegal migrations are possible can be observed. These are as follows

3.1 E-waste regulations European Union

The European Union of Countries (EU) have addressed to the e waste problems and from nineties decade have comprehensive and progressive e-waste legislations. The main approaches are:-

The Waste Shipment Regulation (WSR) passed in 1993 and amended in 2007 was the first dedicated e waste regulation. It emphasizes that no EU member state is allowed to export e-waste classified as hazardous to non-OECD (Organisation for Economic Cooperation & Development) countries. As number of e waste components didn't fall under the WSR's definition of hazardous substance, these components continued to be exported to non-OECD countries under other provisions.

In 2003 the EU has passed e-waste Directive / legislation for changing product designs and increasing recycling rates of discarded WEEE and Restriction of the use of certain hazardous substances (RoHS). The RoHS Directive addresses the beginning of the EEE life cycle by attempting to eliminate hazardous substances such as mercury, lead and fire retardants in domestically produced or imported electrical and electronic products. The WEEE Directive concentrates on the end-of-life stages of EEE. The Directive intends to encourage product designs that facilitate the recycling, repair, disassembly and reuse of WEEE by introducing the concept of Extended Producer Responsibility (EPR). EPR deals with the financial responsibility for collecting and managing WEEE in line with the Directive to the producers. Individual Producer Responsibility (IPR) applies for the management of new products put on the market. For historical waste, i.e. products put on the market before 13 August 2005, the financial responsibility is divided among producers in proportion to their market share of a specific type of equipment (WEEE Directive, Article 8). The rationale behind producer responsibility is the "polluter pays" principle, which intends to include the costs of disposal and treatment in a product's price, thus reflecting the product's environmental effects.

To deal with the Directive's insufficient effectiveness and efficiency, the European Commission proposed a revision in 2008. Several modifications were affected and has helped to reduce illegal e-waste exports to non-OECD countries. The provision of higher mandatory collection target for e-waste, establishing minimum monitoring requirements for WEEE shipments and introduction of legally binding provision for the distinction between new, used or waste products to tackle the false labeling of WEEE as used EEE have been effected.

The important e waste dealing Packaging Directive was implemented into UK law through two pieces of legislation:

1. The Packaging (Essential Requirements) Regulations 2003 (as amended) requires that packaging is minimized, that it can be recycled and recovered and that dangerous substances (such as heavy metals) are restricted.
2. The Producer Responsibility Obligations (Packaging Waste) Regulations 2007 place an obligation to reduce packaging on all UK companies with £2 million plus turnover or handling more than 50 tones of packaging each year.

3.2 E-waste regulations in the US

In US segment wise development and enactment of directives and legislations and regulations have can be observed as there is no federal legislation specifically targeting the national management or the export of WEEE. As on date there are only two federal regulations addressing e-waste and its export namely

The Resource Conservation and Recovery Act of 1976 (RCRA) and

The Environmental Protection Agency (EPA)'s CRT Rule.

RCRA proscribes a "cradle to grave" tracking system for hazardous waste. The legislation requires both individuals and firms handling, disposing of or shipping hazardous waste to obtain permits / permission from the EPA and/or get permission from importing countries. The RCRA has mainly two loopholes. The loopholes are

- a. RCRA regulates WEEE disposal only when the substance falls under the act's definition of hazardous waste. When disposed of in landfills in the US, most e-waste does not meet this definition; when dismantled abroad exposure to toxins increases. The EPA has created exemptions for the export of certain hazardous items.
- b. The households and businesses producing up to 220 pounds of hazardous waste per month may dispose of that waste in landfills.

The RCRA is less effective in regulating disposal of municipal e-waste within the United States or its export.

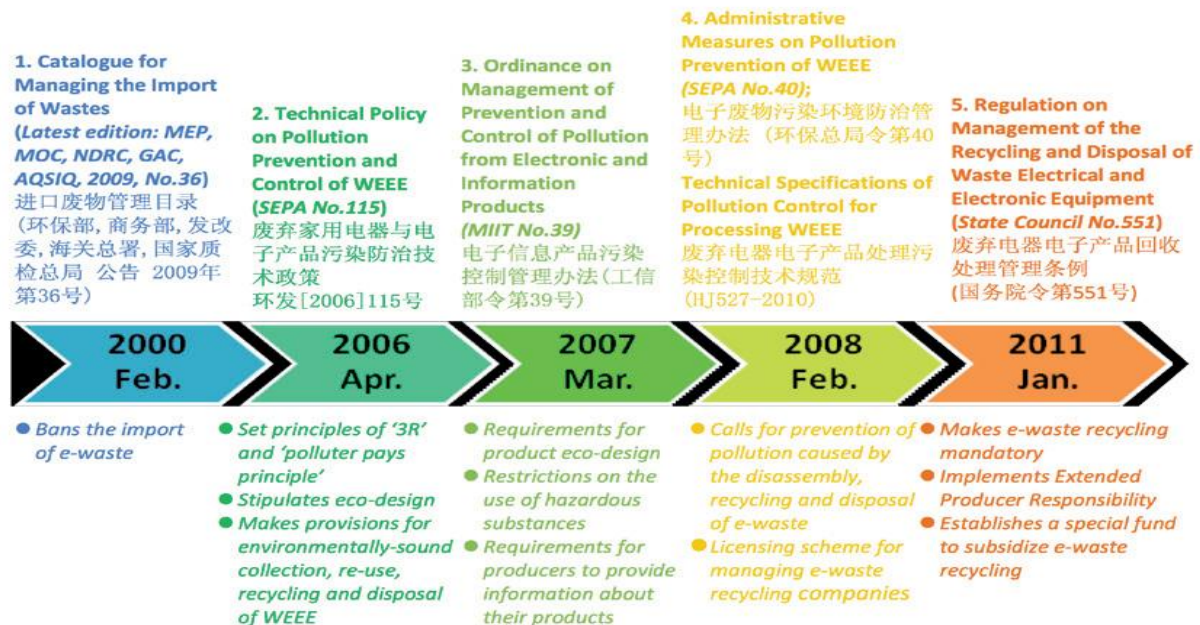
The CRT rule currently in effect due to few loopholes makes it less effective. The rule regulates the export of unsorted CRT glass and CRTs destined for recycling. The EPA does not restrict the export of unused, intact CRTs intended for reuse or recycling. Since the federal government does not consider most e-waste hazardous, American recyclers are allowed to ship the electronics abroad without any restriction.

The individual US states have also started to address their own e-waste through regulation and effective management systems. Nearly 23 states have passed legislation for restricting the disposal of certain types of e-waste. The state laws ambiguity are resulting in increase in e waste exports for two reasons. Firstly, exports are growing because the state laws mandating recycling are working in the limited boundary and percentage of e-waste collected for recycling has increased in recent years. Secondly, the absence of federal e-waste laws strengthens the existing economic incentive to export e-waste.

Reason for deliberately inaction of US can be indicative of American recyclers and manufacturers send their e waste abroad because recyclers in developing and transition countries can extract the precious materials more cheaply as the manpower are cheaply available and the hazardous effects are also transferred.

3.3. E Waste Regulations in China

The Chinese government has issued a variety of environmental laws, regulations, standards, technical guidance and norms related to e-waste management over the past decade. Five of the most important ones are shown in Figure below



In order to deal with the problems arising from the illegal import of e-waste, the government has passed numerous regulations to restrict and ban the import of e-waste. China is signatory to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, a multilateral environmental agreement, as well as the Basel Ban Amendment.

The first policy as per Figure, catalogue for managing the import of wastes, which was passed in 2000, included second-hand electronic equipment and e-waste in the “List of Prohibited Goods to be Imported for Processing or Trade”, which is being updated regularly.

The second key policy, Technical Policy on Pollution Prevention and Control of WEEE, was enacted in 2006 with aim to reduce the volume of e-waste, to increase the reutilization rate for discarded electrical and electronic equipment, to increase standards for e-waste recycling. The principle of 3R namely “Reduce, Re-use and Recycle” and “Polluter Pays” (i.e. shared responsibility of producers, retailers and consumers) was profounded with aim of environmental measures to minimize environmental pollution during the storage, re-use, recycling and final disposal of e-waste for listed items.

The Ordinance on Management of Prevention and Control of Pollution from Electronic and Information Products, was implemented in 2007 for reduction of use of hazardous and toxic substances in electronic appliances reducing the pollution generated in the manufacture, recycling and disposal of these products.

Administrative Measures on Pollution Prevention of Waste Electrical and Electronic Equipment, was enacted in 2008 with aim of preventing pollution caused by the storage, transport, disassembly, recycling and disposal of e-waste. This policy aimed to e-waste recycling companies seeking treatment licenses. The local authorities were entrusted responsibility for checks and balances for standard maintenance. The Technical Specifications of Pollution Control for Processing Waste Electrical and Electronic Equipment provides the technical standards and specifications for various e-waste treatment processes and activities such as storage, transport, dismantling and waste handling, as well as for equipment and material fractions.

The latest “The Regulation on Management of the Recycling and Disposal of Waste Electrical and Electronic Equipment” was enacted in 2011. It is a pivotal piece of national legislation for e-waste management in China. The regulation stipulates that e-waste should be collected through multiple channels and recycled by licensed recycling enterprises. The regulations establish a “specialized fund” to subsidize the formal collection and recycling of e-waste. Producers and importers of electronic products are required to contribute to this fund.

3.4 E Waste legislations in Thailand:

The important initiatives regarding these are as follows:

Industrial Product Standards Act 1968 aims at setting industrial product standards useful for industrial promotion, safety, or damage prevention to the people or industrial business or the nation’s economy. Till date Act has undergone multiple amendments regarding ; selection and placing Secretary General of the Industrial Standards Institute, composition of the Industrial Product Standard Committee; addition on producing or importing of industrial products set up by the Act to be conformed with foreign standards or international standards for export purpose or temporary import; improvement of staff’s and the committee’s authorities and industrial product control to comply with standards and penalties for misconducting; penalties of juristic person for misconducting and for comparable trials; addition on authority to set up conditions for permission certificate issuance; and setting up criteria to transfer permission certificate of industrial product standards resulting in production continuation of production permission certificate of the receiver.

Export and Import of Goods Act, 1979 authorizes the state to collect special fees for certain goods imported or exported. It made provisions to implement international trades to be in perfect order to national economics and securities, and reliable to overseas. This act is a tool for import and export control that allows only safe goods can be imported. Product take-back by producer or importer is confirmed by the Act. In case of securities to economies, public interests, public health, people’s peacefulness and morale, or other State’s interests, the Commerce Minister with the cabinet’s approval is authorized to announce in the Government Gazette about any one of the setting up list for the goods which will be prohibited for export or import; framing the list of goods to be requested for import or export permission; framing list of types, kinds, quality, standards, quantity, sizes, weight, prices, commercial names, marks, original trade marks for export or import goods, including country of origin or destination of the goods; formalizing types and kinds of goods entitled to special fees for import or export; formalizing list of goods for import or export that requires certifications of rules of origin, quality assurance, or others, upon agreement or international trade; and taking up other measures useful for export or import codes of conduct complied to the Act.

The Enhancement and Conservation of the National Environmental Quality Act (NEQA) 1992 The NEQA is aimed at environment and pollution degradation by participation of government, people and private organizations in environmental promotion. It aims at supporting the framework of environmental policies, determination and maintenance of environmental quality standards, environmental quality management planning, determination of environmental impact assessment etc.

Factory Act 1992 aims at appropriately supervision of factory activities. Act authorizes Industry Minister classification of factories into class 1, 2, or 3 as per directive listed herein

Class 1 for factories that can manufacture immediately without official request and permission;

Class 2 for factories that can manufacture following official request; and

Class 3 for factories that can manufacture following official permission.

he Act regulates factories to conform to the Establishment; Environment; Factory building and interior characteristics; Characteristics and types of equipment and tools; Knowledge needed for workers by factory types and sizes; Codes of practices; Production process; Tools to prevent, terminate, or ease the danger, the hardship, or damage to individuals or factory assets or nearby locations; Standards and controlling methods of disposal release; Pollutants affected the environment; Document file for supervision and investigation; Data necessary for manufacturer to timely inform the office; and Others for safety protection in implementation etc.

Substance Act 1992 was promulgated to regulate the dangerous substances which were utilized in numerous varieties of activities may severely harm humans, animals, plants, properties, and environment. It was agreed to adjust the hazardous substance Acts for the coverage expansion of all hazardous substances; setting up criteria and methods to more appropriately control hazardous substances; and management set up of coordination between relevant hazardous substance control offices.

Economic Instruments for Environmental Management Act and draft strategic plan 2007 is the latest effort to deal with the environmental issues and has e waste implications.

3.5. E waste legislations in Japan

The Electronic product manufacturer leader, producing high percentage of worldwide produces, was one to confront the overwhelming amount of hazardous electronic waste. They have limited regulations aiming at e wastes.

As an initiative of E waste management in 1998, Japan enacted the Specified Home Appliance Recycling Law (SHARL). The law requires recycling rates of between 50-60 per cent by weight, which could be addressed by reusing and recycling product and its components. The amended Home Appliance Recycling Law in 2001 has ensured the proper treatment of waste home appliances.

The Waste Treatment Law was enacted to address the e waste management specially EEE having hazardous substances. The country advocates heavily on incineration and continued use based on cost comparisons to material recycling.

Japan enacted the Revised Law for Promotion of Effective Utilisation of Resources, which requires manufacturers of e products including computers and similar items, large electrical home appliances, which were not covered under SHARL to design for disassembly, recycling and waste reduction and longevity of use. Manufacturers are at liberty to charge consumers for e waste management costs.

3.6 E Waste Legislations in Korea

The estimated e waste in Korea grew up to 9455 thousand tons by 2010. Besides the acts and initiatives related to industry environment and pollution controls which have provisions for indirect regulations for EEE the specific available initiatives for e products and e wastes are as follows:

In 1992 the Waste Deposit-Refund System was introduced. Here deposit is levied on products sold for their collection and recycling, and refunded based on the amount of products recycled.

Guideline for Improvement of Material/Structure of Products for Stimulating Recycling was introduced in 1993 with aims for framing guideline on restriction of use of hazardous substances and recyclability rate.

Extended Producer Responsibility System was introduced in 2003 as “Act on the promotion of saving and recycling of resources” with aim of producers to recycle E-waste for themselves and report the results to the government.

With aim to supplementation and extension of existing initiatives the “Act on resource recycling of electric electronic equipment and vehicles” came in 2008. The act have provisions for design and production considerations of recycling with aim to Elimination of hazardous substances, Design of product to easy to dismantle and use of easy-to-recycle substance in Environment friendly collection, treatment & recycling atmosphere. The act consists of precautionary and end-of-pipe regulation along with life cycle of the product.

3.7 E Waste Regulations / Legislations in Bangladesh:

Country Status of E-waste is that the Reuse of E-equipment is a common practice in Bangladesh. E-equipment recycling and dismantling is a growing business. There is no E-waste dismantling facility in formal sector. All the recycling is being carried out by the informal sector. The Legal & Regulatory initiatives are as follows:

Bangladesh adopted its National Environmental Policy in the year of 1992 for regulation of all activities that pollute and destroy the environment.

The Environment conservation act, 1995, with aim to regulate, conserve and enhance the quality of environment and to control, prevent and mitigate pollution.

Medical Waste Management Rules, 2008 addressing the waste management issues for the medical sector including E-waste.

The latest initiative is Electrical and Electronic Waste (Management and Handling) Rules, 2011 which has the following features:

These rules apply to every producer(s), dealer(s), collection centre(s), refurbisher(s), dismantler(s), recycler(s), auctioneer(s) consumer(s) or bulk consumer(s) involved in the manufacture, sale, purchase and processing of electrical and electronic equipment or components.

It defines Responsibilities of the producer, Responsibilities of dealers, Responsibilities of refurbisher, Responsibilities of collection centers, Responsibilities of consumer or bulk consumer, Responsibilities of dismantler, Responsibilities of recycler/ reprocessor,

It describes Procedure for grant of authorization, Power to suspend or cancel an authorization, Procedure for registration/Environmental Clearance/Renewal, Procedure for storage of e-waste, Transportation of e-waste, Accident reporting and follow-up, Liability of the producer, collection centre, transporter dismantler and recycler of e-waste, The collection, storage, transportation, segregation, refurbishment, dismantling recycling and disposal of e-waste

The different schedules of the rules are as Schedule-1 Listing E-waste categories. Schedule-2: Listing the products covered under the categories given in schedule-I, Schedule-3: Deals about threshold limits for use of certain hazardous substances and Schedule-4: Discusses about authorities and corresponding responsibility

Bangladesh is a signatory to Basel convention prohibiting trans-boundary movement of hazardous waste.

Import of any kind of waste requires Government permission.

3.8. E waste regulations in Pakistan. The major Regulations / Legislations / Provisions are as follows:

Section 13 reads “Prohibition of import of hazardous waste.—No person shall import hazardous waste into Pakistan and its territorial waters, Exclusive Economic Zone and historic waters.”

Section 14 reads “Handling of hazardous substances.— Subject to the provisions of this Act, no person shall generate, collect, consign, transport, treat, dispose of, store, handle or import any hazardous substance except (a) under a license issued by the Federal Agency and in such manner as may be prescribed; or

(b) in accordance with the provisions of any other law for the time being in force, or of any international treaty, convention, protocol, code, standard, agreement or other instrument to which Pakistan is a party

National Policy, Legislation and Regulatory System in Pakistan includes

National Environment Policy 2005,

Import Policy Order 2009,

Day to day orders of Ministry of Commerce and Federal Board of Revenue (FBR) controls imports and exports,

The regulating powers of Ministry of Industries and Production oversees manufacturing addresses e waste,

As and when needed steps initiated by Ministry of Environment oversees environmental protection and controls import/export of restricted chemicals and waste.

3.9 E-waste regulations in India and comments

The environmentally sound management of waste is a significant challenge for India. The Regulations / Rules and Acts for waste control are primarily listed as

The Environmental Protection Act 1986

The Environmental Protection Rules 1986

The Hazardous Waste (Management and Handling) Rules

The Batteries (Management and Handling) Rules

Bio-Medical Waste (Management and Handling) Rules, 1998

The Water (Prevention and Control of Pollution) Act, 1974, amended 1988

The Water (Prevention and Control of Pollution) Cess Act, 1971 amendment 2003 Air (Prevention and Control of Pollution) Act 1981, Amended 1987 and the Air (Prevention and Control of Pollution) Rules, 1982

The Ozone Depleting Substances (Regulation and Control) Rules, 2000

The Noise Pollution (Regulation and Control Rules) 2000

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

The Plastics (Manufacture, Usage and Waste Management) Rules, 2009

The E-Waste (Management and Handling Rules) 2011

The growth of EEE and its extensive use and consequent growth of e waste from both domestically produced and imported EEE products needs to be considered. Till mid 2010 neither the central government nor the state governments enacted dedicated legislation for e-waste having comprehensive provisions. The listed acts / regulations / rules affecting the e wastes are well known and important efforts. Important ones of these can be explained as:-

After the Bhopal Gas Tragedy as first attempt for comprehensive environmental law “The Environment (Protection) Act” (EPA) was enacted in 1886. This for the first time defined hazardous waste in very broad terms. It conferred the power to enact regulations concerning environmental issues on the executive. Since then, the precautionary and the “polluter pays” principle both have become part of Indian environmental policy.

Two specific regulations established under the provisions – The Hazardous Waste (Management and Handling) (HWM) Rules and the Batteries (Management and Handling) Rules – are applicable to some extent on e waste. The Indian Municipal Solid Wastes (Management and Handling) Rules of 2000 have no special provisions covering e-waste. As per HWM Rules require companies or individuals receiving, treating, transporting or storing hazardous waste has to seek permission from the relevant State Pollution Control Board (SPCB) and bans the import of hazardous waste for disposal or dumping. The central government can issue authorisation for hazardous waste that is to be processed or reused. An amendment to the HWM Rules in 2000 expanded the scope of the Rules to include provisions on import and export of e-waste for the first time.

The Hazardous Wastes Management, Handling and Transboundary Movement Rules of 2008 which replaced the old HWM rules, contains additional provisions on e-waste handling. Every person or party planning to recycle or reprocess e-waste is required to obtain prior authorisation from the relevant SPCB. The Rules created confusion by mandating the responsibility to the states and the federal government about registration.

The Batteries (Management and Handling) Rules exclusively covering lead acid batteries have limited impact on e-waste. The Rules importance is that it was the first attempt to implement aspects of extended producers responsibility (EPR) in India through legislation. Under the Rules the manufacturers, importers and

assemblers have been made responsible for affecting a collective take-back system for batteries. The lack of an effective enforcement mechanism for the take back system led to poor implementation of the rule.

The Central Pollution Control Board (CPCB) released guidelines on e-waste management in 2008. These guidelines advocated the voluntary adoption of producer responsibility, restriction of hazardous substances (RoHS) in manufacturing and the adoption of environmentally sustainable technologies in e waste recycling.

The patchwork of regulations covering e-waste till now led to a number of problems that hamper WEEE regulation and enforcement. Imports in name of charity are often false claims and in span of two to three years instead of informal recycling lead to e waste. The consolidated efforts to address all development and shortcomings in the successful management of e waste worldwide lead to Rules 2011.

The E-waste (Management and Handling) Rules 2011 is most recent attempt to regulate e-waste in India. The scope of the Rules include all the stakeholders involved in e-waste handling with focus on producers, dealers, refurbishers, collection centres, consumers, dismantlers and recyclers. The Rules states that e-waste producers have to ensure that their waste products causes no harm and their products have been produced in line with the RoHS in the manufacture of electrical and electronic equipment requirements. The requirement of unique serial number or individual identification code and take responsibility for all previously generated waste branded with their name was mandated. Producers are responsible for implementing and financing an effective take-back system only involving authorised stakeholders. E-waste dealers, refurbishers, dismantlers, recyclers and collection centres are required to register with the relevant State Pollution Control Board (SPCB) or Pollution Control Committee (PCC). It is also required to detail the provisions on how to handle the e-waste to ensure that they do not create any health hazards or harm the environment. Dealers of electrical equipment are responsible for collecting e-waste by providing collection box and share information about the e-waste collected to the SPCB and/ or PCC. The liability on consumer has also been fixed in form of requirement to dispose of e-waste by taking it to authorised dealers and collection centres, Large consumers are at liberty to auction their waste with the restriction that may only auction it to authorised collection centres, dismantlers, recyclers or to the collection services offered by the producers. The rules assign all responsibility for ensuring enforcement to the respective SPCB or PCC. Every institution registered by the authorities has to submit annual report to concerned SPCB or PCC.

The rules 2011 deals with the imports and seeks total ban on illegal imports but it doesn't provide instrument to deal with such import ban. The rules address the informal sector and seek to formalise the informal sector by organising, registering and monitoring their activities rather than aiming to shut them down. The rules intend to shift recycling and metal-extraction activities to the formal sector and become part of the EPR solution. The provisions lack measures as how it will ensure that informal recyclers reduce their operations to dismantling and collection activities and the underlying incentives that result in the informal sector being able to outbid the formal sector remain unaddressed. Another drawback of the new rules implementation is a lack of awareness of the hazards of improper e-waste disposal. Most manufacturers currently ship their products without proper information about how to handle them at their end-of-life and consequently, consumers remains unaware of proper disposal methods. The positive aspect of the Rules 2011 is the inclusion of RoHS provisions. Addressing the toxicity of e-waste recycling by preventing pollutants from becoming part of the e-waste stream is likely to be enforceable and represents a further convergence of India's legislation.

In all, one can say that the rule 2011 is a comprehensive piece of regulation for dealing with the e waste that at least refers to all important issues which even the developed countries like EU, US, Japan, China, Thailand etc initiatives have not been able to address till now. The Rule is not able to address completely about the measures of monitoring and enforcement mechanisms, the role of informal recyclers in India or how the import ban can be enforced. Informal e-waste recycling dominates the industry, accounting for 90 to 95 per cent of all recycling. The formalization of collectors and dismantlers may be effective, but as long as informal recyclers are able to pay more for e-waste, an incentive exists for market participants to shirk compliance and illegally sell toxic material to informal recyclers. The regulation's effectiveness at reducing the role of informal recyclers will entirely rest on the ability of the respective bodies to present a credible threat of enforcement. The maintenance of the registry of authorised market participants and compliance with the regulation's requirements will pose financial constraints as these are likely to be expensive. Adding administrative costs to formal recyclers who are already struggling to survive will find it difficult to run organizations formally. By concentrating on actions related to e-waste sources and associated aspects, the auctions provide Indian regulators with the control and ability to target their enforcement to some extent.

IV. CONCLUSION

On the basis of the major initiatives and efforts by the different developed nations, Unions and such countries legislations and regulatory mechanism, it is evident that there are initiatives based on adhoc measures on one hand and certain aims and preparedness and lack of foreseeing the growing implications that is to be

faced by world on other hand. The realization of growing problem is not being taken care of in urgent manner. The initiative of shifting burden of e waste on developing nations in name of technology up gradation is clever bid of some developed nations. A stock of the measures and comparisons of the Acts / Regulations / Rules and enforcement successes and problems for the e wastes and comparison of rules to access the degree to which the developing and developed nations rules are addressing the complexity of the problem with attempt of the developed countries to combat illegal transmigration of e products in the fag end of its life can be visualized. The enforcement of any e-waste regulation may be hindered by economic incentives and lack of proper financial support for the formal sectors and may encourage non-compliance and favour illegal markets and informal sectors.

With regard to the import or illegal transmigration of product from the major stake holders i.e. developed countries, the laws are either not sufficient to handle e-waste purposefully or have been left loose so that the piling e waste can find easy excess to developing countries. One can argue that import or illegal transboundary migration of e waste ban or restrictions would contribute in solving the problem, but it seems less likely since it will be difficult and costly to implement and might destroy a potentially beneficial source of income for some of nations poor who depend on these activities. Efforts for finding ways to address the root causes behind the imports and the illegal recycling sector may be looked upon. The efforts for economic incentives to promote a more sensible use of EEE are required. The economic and environmental worldwide needs is to be seen and comprehensive regulations binding on all nations is need of hour for saving the mankind from the toxic and hazardous effects as degradation of environment will not follow the boundary division of nations and ones negligence will concern of all.

The attempt to observe the e waste problem as passing buck needs to end. The environmental degradation and hazards will see no nation's boundaries and will affect the entire human kind. The newer laws are trying to address initiatives in vigorous manner. The nations need to identify the e waste problem in major way and enact regulations dedicated to these with open eyes and aims to see the environment is safe and livable.

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