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## ELECTRONIC WASTES: MANAGEMENT AND REGULATIONS

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### ABSTRACT

Both industrialized and developing nations are grappling with the issue of electronic waste and have devised strategies to manage, address, and mitigate it. To assess readiness for handling it, regulations for managing e-waste in established and developing nations through regulations, rules, and legislative approaches—as well as the observation of consequences deriving from them—are crucial. It will take time to assess the impact and goals of a few developed country initiatives in comparison to those in underdeveloped nations, and to identify the advantages and disadvantages of e-waste rules. In order to effectively handle the reduction and justifiable handling of the e-waste problem, it is necessary and vital to incorporate innovative methods from many stakeholders in the rule-making process. The main requirements in an international forum that may address the economic reasons of illicit e-waste export and handling are the definition and analysis of the stock of e-waste, the source of inflow, limits in and out of the official and informal sectors, etc. It is necessary to assess the extent to which the rules have addressed the concerns raised by managing e-waste and determine whether more regulations are necessary. These three organizations include ensuring compliance, enforcing regulations, and removing health and environmental dangers associated to handling e-waste.

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

### I. INTRODUCTION

Electrical and Electronic Equipment (EEE) or e-products are products that include computers, cell phones, monitors, keyboards, video cameras, stereos, photocopiers, televisions, microwave ovens, washing machines, video cassette players, dishwashers, fax machines, digital cameras, and so on. The creation and reliance on e-products has grown dramatically in the last several years. The phrase "waste of electrical and electronic equipment" (WEEE), sometimes known as "e-waste," refers to the accumulation of garbage after an item is used and eventually ends its useful life. E-waste is a very complicated waste stream that includes both extremely precious and rare materials as well as extremely hazardous materials. According to a 2009 UN estimate, 20 to 50

million tons of e-waste are produced annually globally. E-waste from outdated computers is expected to increase 200–400% in South Africa, China, and India by 2020, while mobile phone garbage would increase by 18% in India and 7 times in China over the same period in 2007.

Regardless matter whether they are established, developing, or undeveloped, different nations build their own laws, rules, initiatives, and policies to successfully address the massive increasing issue of e-waste. The developed nations that have contributed to e-product projects to date, including the United States, the European Union, and other significant shareholder developed Asian nations, are as follows:

1. Electronic and electrical waste (WEEE). Control of Hazardous Substances by Directive



(RoHS) Direction

2. EU Energy-Using Products Directive (EuP)
3. Regulation, Evaluation, and Authorization of Chemicals (REACH) is an EU directive.
4. Regulations governing e-waste in the United States, Canada, Japan, China, India, Korea, and many other countries Basel Convention/s Basel Convention Partnership for Action on Computing Equipment (PACE) Mobile Phone Partnership Initiative (MPPI) Partnership on the ESM of E-waste in the Asia-Pacific area Asia's Regional 3R Forum for the StEP Initiative

Since the 1990s, the developing and moderately developed Asian and African nations have emerged as important markets for electronic goods from industrialized nations due to programs promoting globalization, technology transfer, and the opening of trade and markets on an international scale. The massive rise in e-waste, whether from local sources or outside, made the need for thorough control and regulatory standards imperative. Prior to September 2010, there was no comprehensive legislation in place in India regarding the management, recycling, and disposal of e-waste, aside from ad hoc rules aimed at various initiatives. As a result, a large portion of the imported and domestic WEEE is illegally dismantled, recycled, and disposed of. It is evident that personnel engaged in these operations, which endanger both their health and the environment, lack adequate facilities. To address the management of both imported and local e-waste in India, the e-waste (Management & Handling) Rules 2011 and associated regulations went into force on May 1, 2012.

The details demonstrating the benefits and drawbacks of e-waste regulations in developed nations and unions, especially those that export technology to India and could have an impact on or potentially pose threats to the efficacy of Indian regulations, are examined. Examples of WEEE management regulations and enforcement in major exporters such as the US,

China, Japan, Korea, Thailand, and the European Union (EU) are crucial. These countries are global leaders in product sales, whether in legal or illegal formats, and illegal cross-border shipments in India, which includes Bangladesh and Pakistan, are among the countries with common boundaries. Given that the WEEE directives are the original and essentially globally applicable, the EU's position is significant. The technology is processed by industrialized nations to handle their own e-waste, and it may be transferred to underdeveloped nations to lessen environmental and health risks.

The sources of e-waste are covered in the study, along with an analysis of the benefits and drawbacks of regulations in developed, emerging, and adjacent nations in comparison to Indian e-waste regulations and Acts. While the issue of illicit e-waste transboundary movement and handling due to economic reasons is addressed globally, it will continue to be challenging to enforce regulatory compliance and get rid of the health and environmental risks associated with e-waste deconstruction.

## II. ELECTONIC WASTE STOCKS: AN OVERVIEW

E-waste is the expanding category of outdated items categorized as

1. Electronic equipment, including TVs, monitors, mainframes, computers, servers, and display devices
2. Electrical appliances, including air conditioners, refrigerators, washing machines, microwave ovens, calculators, fax machines, printers, scanners, and audio and video equipment.
3. Storage devices like CDs, DVDs, floppies, cassettes, printer cartridges, electrical garbage from the military, and catalytic converters for cars.
4. Electronic parts including chips, CPUs, printed circuit boards, mother boards, and industrial electronics including alarms, sirens,

sensors, and security and vehicle electronics.

Because of industry and other participants' poor record-keeping and the complexity of e-waste movements, it is impossible to estimate the volumes of e-waste. But a study predicts that 7.1 million (m) PCs, 16 million TVs, and almost 190 million mobile phones would end up in India's e-waste pile in 2012. One million tons of electronic waste would be the equivalent in 2012. Although, a research that just considered electronic devices found that 400 thousand tons of e-waste were generated in 2007, with 50 thousand tons, or around 13% of that total, originating from illegal imports. The majority of the world's discarded electronic devices are still made in industrialized countries. Since 2008, the European Union has produced an average of 6.5 million tons of e-waste per year; by 2015, that number would almost increase to 12 million tons. On a yearly basis, the following countries generate the most e-waste per capita: the United Kingdom (15 kg), Germany (13.3 kg), Japan (6.7 kg), and China (1.7 kg).

About two thirds of the e-waste shipped into India is thought to come from the US, with the remaining five mostly coming from key IT-developed Asian nations including China, Thailand, Korea, and the EU. Since a significant amount of e-waste imported is illegal and is frequently routed via foreign countries, precise numbers are impossible to get. 150 th ton of the 400 th ton of e-waste that is thought to be produced in India is recycled and added to the e-waste stream. The widespread perception of electronic trash as a commodity results in customers' unwillingness to dispose of it right once, despite the use of small financial incentives and advertising campaigns to encourage disposal. The informal recycling sector in India outbids the formal sector, including state-of-the-art recyclers, for e-waste due to its modest recovery rates to formal recyclers, lower costs associated with complying with legislation, and the ability to externalize significant environmental costs. Thus, the recycling of e-waste in India is dominated by the informal sector.

To combat the dominance of informal recyclers over professional, state-of-the-art recyclers, laws are required to lessen the environmental impact of recycling electronic trash in India. Either regulating e-waste marketplaces so that informal recyclers can't access them or making it such that they can't externalize their costs is necessary legislation.

### III. E-waste Laws and Their Implementation in Different Nations

Different techniques to manage e-waste have been created by different nations and unions; these approaches range in terms of the efficiency of the tools and the extent of the legislation. The briefs of the benchmark countries, i.e., countries that facilitate illegal migration and are stakeholders in the IT industry, such as the US, EU, and Asian nations like China, Taiwan, and Korea, are visible. They are listed below.

#### 3.1 E-waste regulations European Union

The European Union (EU) has taken steps to address the issue of e-waste and has been enacting comprehensive and progressive e-waste laws since the 1990s. The primary methods are:-

The first e-waste law was the Waste Shipment law (WSR), which was approved in 1993 and revised in 2007. It highlights that no member state of the European Union may export hazardous electronic waste to nations outside of the Organization for Economic Cooperation and Development (OECD). Many e-waste components were nonetheless exported to non-OECD nations under other regulations since they did not meet the WSR's definition of a hazardous material.

The EU approved the e-waste Directive in 2003, which changed device designs, increased WEEE recycling rates, and limited the use of some hazardous compounds (RoHS). In an effort to remove dangerous materials like lead, mercury, and fire retardants from electrical and electronic items that are either imported or manufactured locally, the RoHS Directive tackles

the first phase of the EEE life cycle. The end-of-life phases of EEE are the focus of the WEEE Directive. By establishing the idea of Extended Producer Responsibility (EPR), the Directive aims to promote product designs that ease the recycling, repair, disassembly, and reuse of waste electrical and electronic equipment (WEEE). EPR is in charge of handling the financial obligations associated with gathering and handling WEEE in compliance with the producers' directive. When it comes to new items that are introduced to the market, individual producer responsibility, or IPR, is applicable. Producers bear financial responsibility for historical waste, defined as items that were placed on the market prior to August 13, 2005, based on their market share of a particular type of equipment (WEEE Directive, Article 8). The "polluter pays" theory, which aims to reflect a product's environmental consequences in its price by factoring in disposal and treatment expenses, provides the justification for producer responsibility.

In order to address the inadequate efficacy and efficiency of the Directive, the European Commission put up a revised version in 2008. A number of changes were made, which has assisted in lowering the amount of illicit e-waste sent to nations outside of the OECD. To combat the fraudulent labeling of WEEE as used EEE, increased required collection targets for e-waste, minimum monitoring requirements for shipments of WEEE, and the implementation of legally enforceable provisions for the differentiation between new, used, or trash items have all been implemented.

Two legislative measures were employed to incorporate the Packaging Directive on electronic waste management into UK statute.

1. According to the Packaging (Essential Requirements) Regulations 2003 (as modified), packaging must be kept to a minimum, be recyclable and recoverable, and be limited when it comes to hazardous materials like heavy metals.
2. Under the Producer Responsibility

Obligations (Packaging Waste) Regulations of 2007, all UK businesses handling more than 50 tons of packaging annually or with a turnover of £2 million or more are required to decrease packing.

### 3.2 E-waste regulations in the US

The US has seen the segment-wise drafting and passage of directives, rules, and regulations, despite the lack of federal legislation that notably targets the national management or export of waste electrical and electronic equipment (WEEE). Currently, the Resource Conservation and Recovery Act of 1976 (RCRA) and the CRT Rule of the Environmental Protection Agency (EPA) are the only two federal guidelines that deal with e-waste and its export.

Hazardous waste must be traced from "cradle to grave" according to RCRA standards. According to the legislation, everyone processing, exporting, or disposing of hazardous waste must obtain a permission or approval from the EPA and/or the nation of importation. There are essentially two gaps in the RCRA. The gaps are:

- a. WEEE disposal is managed by RCRA only in circumstances when the material fulfills the act's definition of hazardous waste. Most e-waste does not meet this criteria when discarded in US landfills; exposure to chemicals increased when e-waste is deconstructed overseas. For the export of some hazardous goods, the EPA has established exemptions.
- b. Hazardous waste producers, creating up to 220 pounds per month, may dispose of their rubbish in landfills.

When it comes to limiting the export or domestic disposal of municipal e-waste, the RCRA is less successful. The CRT regulation is currently in existence, yet it is less effective due to a few loopholes. Exports of unsorted CRT glass and CRTs that are destined to be recycled are controlled by this rule. When it comes to exporting full, unused CRTs for recycling or reuse, the EPA has no limits. Because the bulk of e-waste is not deemed harmful by the federal



government, American recyclers are allowed to export the devices overseas.

States in the United States have also begun to regulate and create effective management systems for their own e-waste. Legislation limiting the dumping of specified kinds of e-waste has been adopted in approximately 23 states. There are two reasons why the ambiguity of state regulation is generating a rise in the export of e-waste. First off, exports are growing as a result of state laws mandating recycling functioning within their defined limitations and a growth in the amount of e-waste collected for recycling in recent years. Second, the existing economic incentive to export e-waste is increased by the lack of federal e-waste legislation.

The US's intentional inactivity may be explained by the fact that American manufacturers and recyclers export their electronic trash to emerging and transitional nations, where labor costs are cheaper and hazardous elements can be recovered at a lower cost.

### 3.3. E Waste Regulations in China

Over the last ten years, the Chinese government has released a number of environmental laws, rules, standards, technical guidelines, and norms pertaining to the management of e-waste.

The government has implemented many measures to limit and outlaw the import of e-waste in an effort to address the issues brought about by this illicit practice. China is party to both the Basel Ban Amendment and the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, which is a multinational environmental pact.

Secondhand electronics and e-waste were included in the —List of Prohibited Goods to be Imported for Processing or Trade, which is continuously updated, as part of the initial policy depicted in Figure, the catalogue for controlling the import of wastes, which was enacted in 2000.

The objectives of the second major policy, the Technical Policy on Pollution Prevention and Control of WEEE, which was implemented in 2006, are to lower the amount of e-waste, boost the rate of repurposing abandoned electrical and electronic equipment, and raise recycling standards for e-waste. The 3Rs—Reduce, Reuse, and Recycle—as well as the Polluter Pays principle, which emphasizes the shared responsibility of producers, retailers, and consumers—were established with the intention of minimizing environmental pollution during the storage, recycling, and eventual disposal of e-waste for items on the list.

In order to lessen the use of toxic and hazardous materials in electronic appliances and to reduce the pollution produced during the production, recycling, and disposal of these products, the Ordinance on Management of Prevention and Control of Pollution from Electronic and Information Products was put into effect in 2007.

In order to reduce pollution from the storage, transportation, disassembly, recycling, and disposal of electronic waste, the Administrative Measures on Pollution Prevention of Waste Electrical and Electronic Equipment were implemented in 2008. This regulation was intended for e-waste recycling businesses applying for treatment permits. The onus of overseeing standard maintenance checks and balances was placed on the local authorities. The technical standards and specifications for various e-waste treatment processes and activities, including storage, transport, disassembly, and waste handling, as well as for equipment and material fractions, are provided in the Technical Specifications of Pollution Control for Processing Waste Electrical and Electronic Equipment.

2011 saw the enactment of the most recent regulation, "The Regulation on Management of the Recycling and Disposal of Waste Electrical and Electronic Equipment."It is a crucial component of national legislation in China that deals with e-waste management. According to



the rule, e-waste must be gathered via a variety of methods and recycled by businesses with the necessary licenses. A —specialized fund\_ is established by the rules to support the official collection and recycling of e-waste. Electronic goods manufacturers and importers are obliged to make contributions to this fund.

### 3.4 E Waste legislations in Thailand:

The following are the key initiatives in relation to these:

The purpose of the Industrial Product Standards Act of 1968 is to establish standards for industrial products that will aid in the development of industry, ensure public safety, and avoid harm to individuals, businesses, or the country's economy. The Industrial Standards Act has undergone numerous amendments to date, including those pertaining to the appointment and placement of the Secretary General of the Industrial Standards Institute, the makeup of the Industrial Product Standard Committee, the enhancement of staff and committee powers, the control of industrial products to ensure compliance with standards and penalties for misconduct, the imposition of penalties on juristic persons for misconduct and comparable trials, the addition of authority to set up conditions for permission certificate issuance, and the establishment of criteria to transfer permission certificate of industrial product standards resulting in production continua

The 1979 Export and Import of items Act gives the government the right to levy additional taxes on certain imported or exported items. It established guidelines for implementing international commerce that are trustworthy abroad and in perfect alignment with national economies and security. This law is a mechanism for export and import control that only permits the import of safe items. The Act validates the importer's or producer's right to return products. With the approval of the cabinet, the commerce minister is authorized to publish in the government gazette information regarding any one of the following: establishing

a list of goods that are prohibited for import or export; constructing a list of goods that require permission to be imported or exported; constructing a list of the types, kinds, quality, standards, quantity, sizes, weight, prices, commercial names, marks, original trade marks for export or import goods, including the country of origin or destination of the goods; Formalizing the categories and kinds of goods that are subject to special import or export fees; formalizing the list of goods that, upon agreement or international trade, require certifications of origin, quality assurance, or other requirements; and adopting other helpful actions for expert or import codes of conduct that comply with the Act.

The 1992 National Environmental Quality Act (NEQA): Improving and Preserving The goal of the NEQA is to promote environmental awareness among the public, government, and private sectors in order to reduce pollution and the state of the environment. Its objectives are to assist environmental policy frameworks, environmental impact assessments, planning for environmental quality management, and the establishment and upkeep of environmental quality standards.

The manufacturing Act of 1992 seeks to oversee manufacturing operations in an acceptable manner. The Act permits the Industry Minister to classify factories into one of three categories, as follows: Class 1 factories are those that are able to begin manufacturing immediately, without the need for formal request or permission; Class 2 factories are those that can begin manufacturing upon formal request; and Class 3 factories are those that can begin manufacturing with formal permission.

The Act mandates that factories follow the Establishment; Environment; factory structure and interior features; features and kinds of tools and equipment; knowledge required of workers according to factory types and sizes; codes of conduct; production process; instruments to stop, lessen, or eliminate risk, hardship, or harm to people, property, or other nearby locations;

Guidelines and procedures for limiting the discharge of pollutants into the environment; Document files for oversight and inquiry; Information required by the manufacturer to promptly notify the office, as well as additional data for implementation safety, etc.

The Substance Act of 1992 was enacted to control compounds that were considered harmful and used in a wide range of activities that might seriously damage people, animals, plants, properties, and the environment. It was decided to amend the hazardous substance acts to include all hazardous compounds, to establish standards and procedures for more effective control of hazardous chemicals, and to establish management coordination amongst pertinent hazardous substance control offices.

The most recent attempt to address environmental concerns and its consequences for e-waste is the Economic Instruments for Environmental Management Act and the draft strategy plan 2007.

### **3.5. E waste legislations in Japan**

The leading producer of electronic products in the world, accounting for a large portion of global production, was forced to deal with the massive volume of dangerous electronic trash. They only have a few laws that deal with electronic trash.

In 1998, Japan passed the Specified Home Appliance Recycling Law (SHARL) as part of its E-waste management strategy. Reusing and recycling the product and its components might help meet the legal requirement of 50–60% by weight for recycling rates.

Waste home appliances are treated properly thanks to the 2001 amendment to the Home Appliance Recycling Law.

The trash Treatment Law was passed in order to handle electronic trash, particularly that which contains dangerous materials in EEE. Based on cost-benefit analyses of incineration vs material recycling, the nation strongly supports its ongoing usage.

Japan passed the Revised Law for Promotion of Effective Utilization of Resources, which mandates that producers of electronic products—such as computers and related items, large electrical home appliances—that were not covered by SHARL design their products to be easily disassembled, recyclable, reduce waste, and have a long useful life. Manufacturers are free to bill customers for the costs of managing e-waste.

### **3.6 E Waste Legislations in Korea**

The estimated amount of e-waste in Korea climbed to 9455 thousand tons by 2010. In addition to the acts and initiatives related to industry environment and pollution controls that include provisions for indirect restrictions for EEE, the following specific activities are now available for e-products and e-wastes:

In 1992, the Waste Deposit-Refund System was initially put into place. In this instance, goods sold are subject to a deposit that is deducted from the sale and refunded in accordance with the amount of recycled materials.

The Guideline for Improvement of Material/Structure of Products for Stimulating Recycling was introduced in 1993 with the intention of establishing recommendations for the rate of recyclability and the limits of hazardous substance consumption.

With the establishment of the —Act on the promotion of conserving and recycling of resources in 2003, producers were mandated to recycle their own E-waste and submit the results of their efforts to the government through the Extended Producer Responsibility System.

The goal of the 2008 introduction of the —Act on resource recycling of electric electronic equipment and vehicles<sup>1</sup> was to expand and enhance pre-existing initiatives. In order to eliminate hazardous materials, create products that are easy to disassemble, and use easily recycled materials in an environment that supports recycling, collecting, and treatment,

the legislation includes requirements for recycling-related design and manufacturing considerations. The act addresses preventative and end-of-pipe controls in addition to the product life cycle.

### 3.7 E Waste Regulations / Legislations in Bangladesh:

Nation The current state of e-waste is that reusing e-devices is a widespread habit in Bangladesh. The business of recycling and disassembling electronic equipment is expanding. The formal sector does not have an E-waste dismantling plant. The unorganized sector is responsible for all recycling. The following are the Legal & Regulatory initiatives:

Bangladesh enacted its National Environmental Policy in 1992 to control all activities that harm the environment and cause pollution.

The Environment Conservation Act of 1995 was created with the intention of controlling, preventing, and mitigating pollution as well as regulating, conserving, and improving environmental quality.

The Medical Waste Management Rules of 2008 addressed e-waste and other waste management concerns specific to the medical industry.

The Electrical and Electronic Waste (Management and Handling) Rules, 2011 is the most recent initiative. It includes the following features:

Any manufacturer, dealer, collection center, refurbisher, dismantler, recycler, auctioneer, consumer, or bulk consumer engaged in the production, marketing, acquisition, or processing of electrical and electronic equipment or components is subject to these regulations.

It outlines the obligations of the manufacturer, dealers, refurbishers, collectors, consumers or bulk consumers, dismantlers, recyclers/reprocessors, and consumers.

It explains Procedures for granting authorization, having the authority to revoke or suspend one,

registering, renewing an environmental clearance, storing e-waste, moving electronic garbage, Reporting accidents and doing follow-ups, Producer, Collection Center, Transporter, Dismantler, and Recycler Liability The gathering, storing, moving, sorting, remodeling, taking apart, recycling, and getting rid of electronic garbage

The various schedules of the regulations are listed as E-waste categories in Schedule 1. Schedule II: Enumerating the goods falling under the classifications specified in Schedule I Schedule 3: Covers the usage of some hazardous chemicals and their threshold limitations. Schedule 4: Talks on authority and related accountability

Bangladesh is a party to the Basel Convention, which forbids the cross-border transportation of hazardous waste.

Any type of garbage import requires authorization from the government.

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

Hazardous waste cannot be imported. Section 13 states that no one is permitted to import hazardous waste into Pakistan or its ancient waterways, Exclusive Economic Zone, or territorial waters.

In Section 14, "Handling of hazardous substances" is mentioned. Subject to the provisions of this Act, no person may produce, gather, consign, transport, treat, dispose of, store, handle, or import any hazardous material unless doing so would violate any of the following two legal requirements: (a) it would violate the provisions of any other law that is currently in effect; or (b) it would violate the terms of any international treaty, convention, protocol, code, standard, agreement, or other instrument to which Pakistan is a party.

The Import Policy Order of 2009, the National Environment Policy of 2005, and other national laws and regulations comprise Pakistan.



The Ministry of Commerce and the Federal Board of Revenue (FBR) oversee imports and exports on a daily basis. The Ministry of Environment oversees environmental protection, controls the import and export of trash and prohibited materials as needed, and has regulatory responsibility over manufacturing. The Ministry of Industries and manufacturing also handles waste.

### 3.9 E-waste regulations in India and comments

Ecologically appropriate waste management is one of India's greatest issues. The primary collection of laws, rules, and regulations dealing to waste control is the Environmental Protection Act of 1986. The 1986 Environmental Protection Regulations

The Guidelines for the Control and Treatment of Hazardous Waste Guidelines for Organizing and Using Batteries

The 1998 Regulations for the Administration and Processing of Biomedical Waste

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

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

The Ozone Depleting Substances Regulation and Control Rules of 2000 The Guidelines for Control and Regulation of Noise Pollution from 2000

The 2008 Guidelines for the Handling, Management, and Cross-Border Transportation of Hazardous Waste The 2009 Rules Governing the Production, Utilization, and Handling of Plastic Waste

The Rules for the Management and Handling of E-Waste 2011

The growth of EEE, its extensive use, and the consequent growth of e-waste from both domestically produced and imported EEE products must all be considered. Both the

federal and state governments had not enacted comprehensive e-waste rules until the middle of 2010. The following laws, rules, and regulations are widely known and have a big influence on electronic waste. One of the most important was the Environment (Protection) Act (EPA), established in 1886 as the first attempt at a comprehensive environmental law after the Bhopal Gas Disaster. This was the first time a definition this wide for hazardous waste was given. It granted the government the power to enact legislation addressing environmental issues. Since then, the "polluter pays" and precautionary concepts have been included into Indian environmental policy.

The Hazardous trash (Management and Handling) (HWM) Rules and the Batteries (Management and Handling) Rules are two specific regulations that are partially applicable to electronic trash. These regulations guided the formation of these legislation. The Indian Municipal Solid Wastes (Management and Handling) Rules of 2000 do not directly include e-waste. Businesses or individuals handling, processing, transporting, or storing hazardous waste must get license from the relevant State Pollution Control Board (SPCB). Hazardous waste cannot be imported for dumping or disposal. The federal government may give permission for hazardous waste to be processed or reused. The HWM Rules were expanded in 2000 when they were revised to include limitations on the import and export of e-waste for the first time.

The Hazardous Wastes Management, Processing and Transboundary Movement Rules of 2008, which replaced the prior HWM rules, provide additional standards for handling e-waste. Before recycling or reprocessing electronic waste, permission from the relevant SPCB is required. There was ambiguity since the Regulations required the states and the federal government to manage registration.

The Batteries (Management and Handling) Regulations that are particular to lead acid batteries have minimal impact on e-waste. The

regulation is significant because it was the first attempt to implement extended producers responsibility (EPR) in India. Manufacturers, importers, and assemblers are required by law to put in place a mechanism of group battery take-back. The poor implementation of the regulation was partly caused by the weak enforcement mechanism of the takeback system.

The Central Pollution Control Board (CPCB) released guidelines for handling electronic waste in 2008. These proposals backed the voluntary acceptance of producer responsibility, the use of environmentally friendly technologies for recycling electronic waste, and the restriction of hazardous substances (RoHS) in manufacturing.

The disjointed body of legislation that has up to now governed e-waste has given rise to a number of problems that make WEEE enforcement and management difficult. Rather of being recycled informally, false statements regarding imports made in the name of charity often result in e-waste over the period of two to three years. The outcome of concentrated efforts to address all developments and shortcomings in the efficient worldwide management of e-waste is Rules 2011.

The E-waste (Management and Handling) Rules 2011 are an attempt to regulate e-waste in India. The regulations apply to all parties involved in the processing of e-waste, with a focus on manufacturers, distributors, refurbishers, collecting facilities, buyers, dismantlers, and recyclers. Manufacturers of e-waste are required by the requirements to ensure that their waste products are safe for human use and that they comply with RoHS requirements for the manufacturing of electrical and electronic equipment. They had to obtain an individual identification code or unique serial number and accept responsibility for any garbage that had previously been produced and labeled under their name. Producers have an obligation to plan and finance an effective take-back program that only includes parties

with permission. E-waste dealers, along with refurbishers, dismantlers, recyclers, and collection facilities, are required to register with the relevant State Pollution Control Board (SPCB) or Pollution Control Committee (PCC). Determining the protocols for managing e-waste is also essential to avoid health hazards and environmental harm. Dealers of electrical equipment are responsible for collecting electronic waste, providing collection boxes, and reporting the item to the PCC or SPCB. Big customers can auction their garbage, but they can only place bids against approved collection facilities, recyclers, dismantlers, and collection services offered by the manufacturers. The consumer's commitment also includes the requirement to carry e-waste to authorized dealers and collection locations in order to dispose of it. The regulations assign full responsibility for ensuring enforcement to the appropriate PCC or SPCB. For each institution registered with the government, annual reports must be sent to the relevant SPCB or PCC.

The 2011 regulations deal with imports and seek to outright forbid any unauthorized imports; they do not, however, provide any means of carrying out this import limitation. The rules aim to legalize the informal sector by coordinating, registering, and regulating its operations, instead than seeking to shut it down. The purpose of the legislation is to incorporate metal extraction and recycling into the EPR solution and bring them into the official economy. The regulations lack processes to ensure that informal recyclers restrict their operations to deconstruction and collection, and they overlook the underlying incentives that enable the informal sector to outbid the official industry. Lack of awareness on the dangers of improper disposal of e-waste is yet another drawback of the new rules. Since most manufacturers no longer include sufficient information on how to handle their items when their useful lives are coming to an end, consumers are still unaware of proper disposal methods. One of the good things about the Rules 2011 is the RoHS standards. An effective

strategy to mitigate the toxicity of e-waste recycling and further harmonize Indian law is to keep pollutants out of the e-waste stream.

All things considered, the rule 2011 is a thorough set of regulations for handling electronic trash that, at the very least, addresses all significant difficulties that even industrialized nations like the US, EU, Japan, China, Thailand, and so on have not been able to handle up to this point. The Rule does not fully address the methods of oversight and enforcement, the function of unofficial recyclers in India, or the means of enforcing the import prohibition. With 90 to 95 percent of all recycling going toward e-waste, this sector is dominated by informal recycling. Although the formalization of collectors and dismantlers could be beneficial, market actors would still have an incentive to flout regulations and sell dangerous material to informal recyclers at unlawful prices as long as those recyclers can offer higher prices for e-waste. The capacity of the relevant agencies to effectively threaten enforcement will be the only factor determining how effective the rule is in decreasing the role of informal recyclers. Financial restrictions will arise from the probable high costs associated with maintaining the registration of approved market players and adhering to the regulations. It will be difficult for formal recyclers to run organizations formally if they have to add administrative expenditures on top of their already tough survival. The auctions allow Indian authorities the power and capacity to target their enforcement to some degree by focusing on acts pertaining to e-waste sources and related factors.

#### IV. CONCLUSION

It is clear from the major initiatives and efforts made by the various developed countries, Unions, and such countries' legislation and regulatory mechanisms that some initiatives are based on ad hoc measures, while others are based on specific goals and preparation and fail to anticipate the growing implications that the world will have to deal with. There is a

developing problem that is not being addressed immediately. Some rich nations have made a cunning move by putting the onus of managing electronic waste on emerging nations in the name of technological advancement. It is possible to visualize a stock of the actions, comparisons of Acts, Regulations, and Rules, as well as enforcement successes and issues pertaining to e-waste and the degree to which the regulations of developed and developing nations address the complexity of the issue with the attempt of the developed countries to combat illegal transmigration of e-products at the end of their useful lives. Economic incentives and inadequate funding for the formal sectors may make it more difficult to implement any e-waste regulations, which might lead to non-compliance and favor the black market and unofficial sectors.

Regarding the import or illicit transmigration of goods from the main players, or wealthy countries, the regulations are either insufficient to manage e-waste in a meaningful manner or have been left open-ended, making it simple for the surplus e-waste to make its way to poor nations. One may argue that prohibiting or restricting the import of electronic waste or its illegal transboundary migration would help solve the issue, but this seems unlikely given how difficult and expensive it would be to put into effect and how it might end up destroying a potentially helpful source of income for some of the impoverished nations that depend on these activities. It may be investigated how to deal with the underlying issues that lead to imports and the illicit recycling industry. It is necessary to work on creating financial incentives to encourage the more responsible usage of EEE. Global economic and environmental needs must be addressed, and comprehensive international regulations that bind all countries are urgently needed to protect humanity from the harmful effects of environmental degradation. Degradation of the environment does not respect national borders, and one person's negligence affects all.

It is time to stop trying to view the e-waste issue



as a blame game. The threats and environmental deterioration will not respect national boundaries and will impact all of humanity. The more recent legislation make a strong effort to address initiatives. In order to ensure that the environment is safe and habitable, the nations must seriously recognize the issue of electronic waste and establish rules addressing it.

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