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**INTERNATIONAL TRADE IN ELECTRONIC WASTE
AND INDIA'S E-WASTE POLICY**

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I declare that this Dissertation titled “**International trade in Electronic Waste and India’s e-waste Policy**” is researched and submitted by me to the National University of Advanced Legal Studies, Kochi in partial fulfilment of the requirement for the award of Degree of Master of Laws in International Trade Law, under the guidance and supervision of Dr Mini S., and is an original, bona fide and legitimate work and it has been pursued for an academic interest. This work or any type thereof has not been submitted by me or anyone else for the award of another degree of either this University or any other University.

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LIST OF CASES

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CHAPTER I

INTRODUCTION

In the realm of globalization, electronics have become an indispensable part of our day-to-day life. Every year, millions of electrical and electronic devices are discarded as products break or become obsolete and are thrown away.¹ This results in the generation of e-waste. E-waste refers to all electrical and electronic equipment [E.E.E.] and its parts that have been discarded by its owner as waste without the intent to reuse [STEP initiative 2014]. Electronic waste is one of the fastest-growing waste categories globally. It covers a broad range of electronic devices, ranging from large household appliances, information technology and telecommunications equipment, lighting equipment, medical devices, monitoring and control instruments, automatic dispensers, and consumer electronics, such as electrical and electronic tools, toys, leisure and sports equipment, and mobile phones to computers. The Global generation of e-waste and its management has become a problem in the contemporary world.

The great Digital Revolution began in the 1980s, and it persists. The Digital Revolution provided user-friendly and affordable products that invaded our households and became indispensable to human beings.² The manufacturers in this area are competitive, and new models of gadgets with different purposes are available yearly. Technological advancements have reached a new peak, where ordinary equipment has acquired an electronic nature. Only a few years ago, it would have been challenging to consider a discarded flowerpot as electronic waste. But with our continuous technological evolution – including digital, self-watering plant pots – even ordinary products are being transformed.³ This leads to an immense generation of e-waste. Thus, a contemporary trend contributing significantly to the global electronic waste ("e-waste") issue is the rapid turnover of electronic devices. Specifically, electronics quickly become outdated, and as they become more compact and powerful, consumers frequently upgrade before their devices' useful lifespan ends—this pursuit of the latest technology results in massive amounts of waste to recycle.

The critical question is, what happens to the bulk of e-waste generated daily? One prominent answer to this question is international trade. As electronic devices are traded across countries, so is its waste. From an economic perspective, trading e-waste across countries is

¹ World Health Organisation, October 18, 2023

² Electronic Waste: A Case Study, Gupta Reena, Sangita and Kaur Verinder, International Science Congress Association, Research Journal of Chemical Sciences, Vol. 1(9), 49-56, Dec. (2011)

³ The U.N. Agency for Digital Technologies, April 8, 2024

not so bad. It promotes practical techniques like reuse and recycling. Further, exporting it to developing countries supplies them with reusable second-hand goods and economically affordable raw materials. But it's not as colourful as it sounds. The Basel Convention on Transboundary Movement of Hazardous Waste prohibits the movement of hazardous waste from developed and developing countries; the movement of e-waste meant for reuse is not banned. Thus, mere documentation proving the e-waste's purpose as refurbishment removes it from the Basel framework. The global e-waste is mostly processed by informal recycling industries in developing countries. These marginalized sectors remain excluded from official waste management systems, highlighting North-South development issues related to the globalization of e-waste.⁴ Thus, creating a pattern in the global e-waste trade.

The North-South divide in the global e-waste trade can be attributed to lax regulatory frameworks in the developing countries. Countries that do not impose strict measures to contain environmental injustices often fall prey to the dumping of obsolete e-waste. States have a legitimate obligation to safeguard their citizens and their environment and adopt measures to minimise and prevent the dumping of e-waste in the guise of international trade. WTO is the principal body that regulates the international trade amongst their member countries and its guiding principle is trade liberalisation. However, WTO has measures to safeguard the human health and environment under its mechanism. The GATS, Article XX can be invoked by the member states to impose trade restrictions, import bans etc. The framework under TBT Agreements can also be utilised by the developing nations to demand for a certification system stipulating the reusing capability of the traded e-waste.⁵ Additionally, the states can also enact national legislations in line with Basel Convention and WTO.

India is one of the largest generators of e-waste. As per the Global e-waste monitor, India ranks 3rd in the world with respect to e-waste generation only behind US and China. India has enacted electronic waste management rules, 2022 which came into effect in April 1 2023. The enormous volume of e-waste generation is the primary concern of India as well. Additionally, there is a huge flow of imports from developed countries. This stream accommodates not just the legal imports but also illegal imports. Under such a scenario the

⁴ Oladosu, Olayinka Amos, Olodo Abdulrahmon Abiodun, Oloruntoba, Emmanuel Olalekan, Oluwaseun Tolulope Opeodu, Adegoroye Ademola, Investigation of Efforts and Problems in Implementing the Basel Convention on the Control of Transboundary Movements of Wastes and Their Disposal in Nigeria, *Asian Journal of Geographical Research*, 10.9734/ajgr/2024/v7i1216, 7, 1, (69-84), (2024).

⁵ Gideon Emcee Christian, Trade Measures for Regulating Transboundary Movement of Electronic Waste, 33 *UTRECHT J. INT'L & EUR. L.* 103 (2017)

effectiveness and enforcement capability of the already existing legislations to minimise and prevent its generation and illegal dumping comes into question.⁶

1.1 OBJECTIVES

1. To understand the transboundary movement of e-waste and its impact on the developing countries
2. To analyse the international laws governing e-waste and its transboundary movement.
3. To ascertain the trade measures available under the WTO in regulating the Transboundary Movement of Electronic Waste
4. To analyse the environmental policies in India that governs e-waste movement and management.
5. To analyse the efficiency of Electronic Waste Management Rules, 2022 in regulating e-waste movement and preventing and minimising the waste generation in the country.

1.2 STATEMENT OF PROBLEM

With the growing of the digitalisation and the interdependence on electronic devices, the global e-waste generation is increasing enormously and there is an urgent need to address the challenges pertaining to the transboundary trade of E-waste. The existing International Policies and WTO framework are not sufficient enough to address this impact especially on the developing countries. Even on the part of developing countries, there are no sufficient national legislations addressing the e-waste movement like the Electronic Waste Management Rules, 2022 of India as it focuses more on e-waste management rather than movement.

1.3 RESEARCH QUESTIONS

1. Whether the current international laws and national legislations of developing countries are sufficient in addressing the transboundary movement of e-waste?
2. Is there should be a ban on the transboundary movement of e-waste considering its impact on environment or developing countries should economically proliferate?
3. What are the factors that needs to be considered if there needs a new legislation instead of the Electronic Waste Management Rules, 2022?

⁶ E-WASTE ISSUES AND CHALLENGES IN INDIA: A STUDY ON MANAGEMENT PERCEPTIVE, Dr.V. Ramanujam, ResearchGate, April 2020

1.4 HYPOTHESIS

The developing countries should govern transboundary movement of e-waste through their national legislation since there is no specific international framework on the same. In India, a new legislation replacing the Electronic Waste Management Rules, 2022 is needed to address the transboundary movement of e-waste in addition to the management and prevention of e-waste.

1.5 RESEARCH METHODOLOGY

The methodology proposed to be employed is purely doctrinal. To successfully complete this research work, the researcher will do an extensive and thorough study with the help of primary sources like international and Indian statutes and agreements. The researcher will also use secondary data from documents, reports, books, research papers, etc., which are available in online journals and on the official websites of organizations. Research materials in electronic databases and other general websites will also be used. The researcher will extensively study various WTO measures under the GATS and TBT agreements, along with an extensive and comprehensive study on electronic waste management rules for 2022.

1.6 CHAPTERISATION

1. Introduction
2. E-waste and International Policies
3. International Trade in regulating transboundary movement of E-waste
4. Electronic Waste generation in India and the effectiveness of The Electronic waste Management Rules, 2022
5. Findings and Conclusion

1.7 LITERATURE REVIEW

1. THE GLOBAL E-WASTE MONITOR 2024, Cornelis P. Baldé, Ruediger Kuehr, Tales Yamamoto, Rosie McDonald, Elena D'Angelo, Shahana Althaf, Garam Bel, Otmar Deubzer, Elena Fernandez-Cubillo, Vanessa Forti, Vanessa Gray, Sunil Herat, Shunichi Honda, Giulia Iattoni, Deepali S. Khatriwal, Vittoria Luda di Cortemiglia, Yuliya Lobuntsova, Innocent Nnorom, Noémie Pralat, Michelle Wagner (2024). International Telecommunication Union (ITU) and United Nations Institute for Training and Research (UNITAR). 2024. Global E-waste Monitor 2024. Geneva/Bonn.

This report has provided comprehensive analysis on different aspects of e-waste handling, including regulatory frameworks, disposal practices, environmental and health impacts, and technological innovations for recycling and waste reduction. The report has also provided region by region analysis on the e-waste generation, legislative framework challenges etc.

2. BASAL CONVENTION ON THE CONTROL OF TRANSBOUNDARY MOVEMENTS OF HAZARDOUS WASTE AND THEIR DISPOSAL, texts and Annexes, United Nations Environment Program

Basel Convention is the main international instrument governing the transboundary movement of hazardous waste including e-waste. The text provides the overall framework of the convention helping to understand various mandates and shortcomings that follows. It further contains annexes containing various wastes that are considered hazardous and non-hazardous helping to differentiate between e-waste that are prohibited for transboundary movement and e-waste that are not prohibited for transboundary movement.

3. White Paper on National EPR Framework for E-waste Management in India, Mehar Kaur, Abdullah Mohammed Atiq, Shweta Gautam, The Energy and Resources Institute (TERI), Setting Up Innovative Value Chain for E-Waste Management.

The paper provides a comprehensive analysis of the global legislative scenario of e-waste. It has detailed the several regional initiatives taken by regional powers like European Union, Belgium, Germany, Sweden, Japan and China to tackle e-waste. It has also provided the history of e-waste management beginning with Basel convention internationally along with the evolution of e-waste management in India.

4. Gideon Emcee Christian, Trade Measures for Regulating Transboundary Movement of Electronic Waste, 33 UTRECHT J. INT'L & EUR. L. 103 (2017).

This article has highlighted the need for differentiation between WEEE and UEEE. It has suggested trade restrictive and non-trade-restrictive measures to address the challenges associated with the transboundary movement of WEEE disguised as UEEE. It has further analysed various WTO provisions that may facilitate a restricted transboundary trade in UEEE. It has also proposed certain measures the importing and exporting, developing and developed countries can take in controlling transboundary movement of WEEE and UEEE.

5. Proposed Export Ban on Electronic Waste: Unsalvageable under WTO Analysis, Jeanette Leary, 26 GEO. INT'L ENVTL. L. REV. 435 (2014).

This article has highlighted how an export ban imposed by a e-waste generator country can help in tackling the issues surrounding transboundary movement of electronic waste. It has analysed such an export ban with the important WTO provisions like introductory chapeau of the agreement, general exceptions etc to understand whether such a restriction is salvageable under the provisions of WTO.

6. Overview and Critical Analysis of National Law on Electronic Waste Management, Karishma Chaudhary & Prem Vrat, 47 ENVTL. POL'y & L. 181 (2017).

This article has provided comprehensive analysis on the evolution of the electronic waste management system in India since the 1986. It has further provided shortcomings and comparisons of the existing rules until 2016. It also has identified the challenges prevailing in the e-waste sector in India and has suggested certain recommendations to mitigate those challenges.

7. CIRCULAR ECONOMY IN ELECTRONICS AND ELECTRICAL SECTOR ACTION PLAN, Ministry of Electronics and Information Technology Government of India New Delhi

This paper has comprehensively addressed the importance of circular economy in e-waste sector. It has suggested policy tools and best practices for enabling circular economy in EEE sector. It has also put forth various recommendations regarding product design, component manufacturing, encompassing all lifecycle stages.

8. Right to Repair: A Sustainable Solution for E-Waste Reduction, Swayam Nigam, 4 JUS CORPUS L.J. [627] (2023).

This paper has addressed the emerging concept of right to repair with regard to India's e-waste sector. It has highlighted various benefits arising out of integrating right to repair into the national framework along with citing its objectives. It has also addressed the positive impacts right to repair can bring by enabling circular economy, sustainable e-waste management and resource efficiency.

9. E-Waste Management Rules 2022: Issues and Solution for Environmental Protection, Mitu Bala, Rudrendra Nidhi, International Journal for Multidisciplinary Research (IJFMR)

This article has talked about the issues and challenges pertaining to the current e-waste management rules 2022. It has further addressed the impact of EPR framework on the informal e-waste industry in India. It has highlighted the importance of formalising the informal sector in e-waste management along with addressing the need for sustainable e-waste management and the various environmental protection measures for the sustainable e-waste practices. It has further provided solutions and recommendations for the better e-waste management in the country.

CHAPTER 2

ELECTRONIC WASTE AND INTERNATIONAL POLICIES

The world is undergoing a revolution of digitalization and electronification. The technology has profoundly changed the way we live and interact in a society. Many people own and use multiple electronic devices. Further, enhanced connectivity across both urban and distant regions is leading to an increased number of devices and items connected to the internet. This range not only encompasses the typical computers and smartphones but also extends to a wide array of objects such as home appliances, electric bikes, and scooters, health tracking devices, environmental monitoring sensors, electronics integrated into furniture and clothing, an expanding collection of toys and tools, and devices aimed at conserving energy like LED lights, solar panels, and heat pumps.⁷ Thus, it is inevitable that these electronic devices become obsolete and result in the generation of waste. However, e-waste is of great commercial value and results in the commercial trade of e-waste across national borders. However, the commercial value of e-waste has been significantly overshadowed by the adversities it creates when imported into other countries, particularly developing countries. In general, e-waste tends to be directed towards disadvantaged and historically marginalized regions. A study commissioned by the US Environmental Protection Agency (EPA) found that exporting e-waste to Asia was ten times cheaper than processing it within the United States. Consequently, the incentives for moving e-waste, both legally and illegally, are substantial.⁸ Developed countries often find it cheaper to export e-waste than to process it domestically due to stringent environmental regulations and higher labor costs. Developing countries, on the other hand, import e-waste to recover materials such as gold, silver, copper, and rare earth elements, which are extracted and sold. However, lax regulatory frameworks and inconsistencies and loopholes available in the national frameworks or, worse, no national framework, along with non-rigorous adherence to international agreements and obligations, create a safe ground for both legal and illegal imports of unwanted and non-useful e-waste into the boundaries of developing countries.

⁷ Cornelis P. Baldé, Ruediger Kuehr, Tales Yamamoto, Rosie McDonald, Elena D'Angelo, Shahana Althaf, Garam Bel, Otmar Deubzer, Elena Fernandez-Cubillo, Vanessa Forti, Vanessa Gray, Sunil Herat, Shunichi Honda, Giulia Iattoni, Deepali S. Khatriwal, Vittoria Luda di Cortemiglia, Yuliya Lobuntsova, Innocent Nnorom, Noémie Pralat, Michelle Wagner (2024). International Telecommunication Union (ITU) and United Nations Institute for Training and Research (UNITAR). 2024. Global E-waste Monitor 2024. Geneva/Bonn.

⁸ The global impact of e-waste: Addressing the challenge, the global impact of e-waste: Addressing the challenge, International Labour Organisation, Geneva 2012

Legal imports of e-waste involve legally documented transactions where e-waste is exported for recycling or refurbishment, often to countries with established recycling industries. Illegal trade includes undocumented exports, frequently facilitated by labelling e-waste as donations or second-hand goods. Such a scenario creates several environmental and health risks. Thus, an internationally binding legal framework that has the potential to curb the illegal dumping of e-waste from rich countries to marginalized countries became a necessity, and therefore, the Basal Convention was enacted globally.

The Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and Their Disposal, commonly known as the Basel Convention, is a critical international treaty aimed at regulating and reducing the movement of hazardous waste, including electronic waste (e-waste), between countries. The Basel Convention was adopted by the parties on March 22, 1989, as a response to growing concerns about toxic waste dumping, especially from developed to developing countries, and came into force on May 5, 1992. Initially, the Convention established a framework for controlling the transboundary movement of hazardous waste along with their disposal. In 1995, the Basel Convention's Conference of the Parties approved the Ban Amendment, which aimed to forbid the export of hazardous waste from countries that are belonging to the OECD to those not in the OECD. The Ban Amendment aimed to address the concerns of developing countries about the disproportionate burden of hazardous waste disposal and the environmental and health impacts of such waste. For such an instrument to become legally binding, it required ratification by at least three-fourths of the Parties that accepted it. This process faced delays and challenges as many countries were slow to ratify the amendment. Despite delays in formal ratification, many countries began to voluntarily comply with the principles of the Ban Amendment by restricting the export of hazardous waste to non-OECD countries.⁹ In September 2019, the Ban Amendment finally achieved the number of ratifications to enter into force. The formal entry into force strengthened the legal framework preventing hazardous waste exports from OECD to non-OECD countries, reinforcing the protection of developing countries from hazardous waste dumping.¹⁰

Despite the legal framework, enforcement of Basel Convention provisions is inconsistent across countries, particularly in developing regions with limited resources.

⁹ History and negotiations of the Basel Convention, Basel Convention official website, United Nations Environment Programme

¹⁰ Ibid

Significant quantities of e-waste are still illegally exported from developed to developing countries, often mislabelled as second-hand goods or donations. Also, many developing countries lack the necessary infrastructure for proper e-waste recycling and disposal, leading to unsafe practices and environmental contamination. Limited financial and technical resources are the two crucial factors that hinder the ability of developing countries to implement Basel Convention guidelines fully. On top of that, rapid technological change also results in continuous growth in e-waste volumes, challenging the existing regulatory frameworks.

2.1 DEFINITION OF E-WASTE

What constitutes e-waste? Or What is e-waste? It is an important question that requires an answer with precision and practicability. It is also important that we clearly understand what e-waste is as it has several consequences affecting environmental, economic, social, and regulatory aspects. Accurate definitions help identify harmful components in electronic devices, allowing for proper handling, recycling, or disposal of toxic materials such as lead, mercury, cadmium etc. It also encourages recycling valuable materials such as gold, silver, and copper, reducing the need for mining and preserving natural resources. Clear definitions also facilitate the segregation of hazardous e-waste, ensuring safe handling, storage, and disposal to prevent human exposure to toxic chemicals. Furthermore, e-waste management guidelines protect workers in recycling and disposal facilities from health risks associated with handling e-waste. It also forms the foundation for international and national regulations, ensuring global uniformity in e-waste management practices. Clear definitions also aid in developing and enforcing laws and regulations, making monitoring and controlling the flow of e-waste easier. This will facilitate accurate data collection and analysis on e-waste generation, recycling rates, and environmental impacts, as well as inform policy decisions and improvement strategies. Thus, definitions, in general, are imperative to regulate the overall aspects of electronic waste. Several international institutions have defined electronic waste.

“Waste Electrical and Electronic Equipment (WEEE) is defined under the Basel Convention as electrical or electronic equipment that is waste, including all components, sub-assemblies, and consumables that are part of the equipment at the time the equipment becomes waste.” The definition encompasses an array of electrical and electronic equipment that has become waste. It adds that the waste equipment's components, sub-assemblies, and consumables are electronic waste. This broadens the scope to encompass every part of the device. Components can include individual parts like microchips and circuit boards, sub-

assemblies refer to intermediate assemblies within the device, and consumables include items like batteries, toner cartridges, and other items that are used up and replaced regularly. Thus, the definition ensures that all parts associated with electronic equipment are considered, not just the primary device. This holistic approach is crucial for proper e-waste management, ensuring that hazardous materials in smaller parts are handled correctly. Concerning the definition, waste may mean any equipment no longer in use or intended to be discarded. This covers equipment that has reached the end of its life cycle, is obsolete, broken, or no longer desired by the owner. A holistic lifecycle perspective can also be inferred from "at the time the equipment becomes waste." It underlines the importance of managing the entire lifecycle of electronic products. It highlights the need for sustainable practices from production to disposal, ensuring that waste management strategies are integrated.¹¹

The United Nations Environment Programme defines electronic waste as "Any material from electronic devices and systems, generated as a waste stream in a processing operation or discarded after service."¹² The UNEP definition has also attempted to encompass all electronic devices. However, the key takeaway from this definition will be the inclusion of electronic waste from the producer's and consumers' ends. The phrase "generated as a waste stream in a processing operation" refers to materials that become waste during the production or processing of electronic devices. By doing so, the definition emphasizes the need for waste management practices throughout the entire lifecycle of electronic devices. Additionally, the term "waste stream" highlights the flow of waste materials through different stages of production and disposal. This encourages the identification and management of e-waste at various points in the life of electronic products.¹³

The United States Environment Protection Agency defines "E-waste," "electronic waste," "e-scrap," and "end-of-life electronics."¹⁴ These terms often describe used electronics approaching the end of their useful life and are often discarded, donated, or given to a recycler. Although "e-waste" is the term most commonly used, the Environmental Protection Agency (EPA) views e-waste as a subset of used electronics. The EPA acknowledges the significant value of these materials, emphasizing that they can be reused, refurbished, or recycled. By doing so, the waste that could end up in landfills or be improperly disposed of in unprotected

¹¹ Supra note 9 Page number 16

¹² The United Nations Environment Programme, UNEP

¹³ Ibid

¹⁴ Cleaning up Electronic Waste (e-waste), United States Environment Protection Agency EPA, last updated November 15, 2023

dump sites—domestically or internationally—can be significantly reduced. This approach not only aid in mitigating environmental impact but also initiates the efficient use of resources by extending the life cycle of electronic components and reducing the demand for raw materials.

Step Initiative, "E-Waste is a term used to cover items of all types of electrical and electronic equipment (EEE) and its parts that the owner has discarded as waste without the intention of reuse."¹⁵ It further defines EEE as "Any household or business item with circuitry or electrical components with power or battery supply."¹⁶ The Global E-waste Monitor also relies on the exact definition of e-waste and EEE. It stipulates EEE as one that encompasses a diverse range of products, each with distinct material compositions, disposal methods, and recycling processes. The term "discarded" is crucial in this definition, indicating an action to throw away or dispose of something deemed useless. It suggests that the item is regarded as excess or waste by its owner, signifying a change in its perceived value. When an item is discarded, it is no longer considered practical or functional by its owner and is thus classified as waste. This transition is significant because it marks the point at which the item ceases to be a product with potential utility and becomes part of the waste stream, necessitating appropriate waste management practices. Understanding this shift is essential for developing effective recycling and disposal strategies, as it underscores the importance of managing discarded items to minimize environmental impact and promote sustainable resource use.¹⁷

While most people have a basic understanding of electronic waste, it's often difficult to distinguish between what should be considered waste and what may still have practical use. This distinction is crucial for making informed economic and policy decisions. Although some electronics may still work, they often lack market value because they are obsolete or have been replaced by newer technology. On the other hand, not all electronics that are thrown away are beyond use; some of these items may still work perfectly well or could be fixed up and used again. Identifying which electronic items fall into which category is critically important, especially given the international and national laws that regulate how electronic products can be moved across borders. When electronic goods can be repaired and reused, allowing them to cross borders can help extend the life of electronic and electrical equipment, reducing its impact on the environment. However, wrongly classifying products as fixable or reusable when they're not or sending products to places without a market for them has led to an increase in the volume

¹⁵ Solving the E-Waste Problem (Step) White Paper, One Global Definition of E-waste, June 3, 2014, ISSN: 2071-3576 (Online) ISSN: 1999-7965 (In-Print)

¹⁶ Ibid

¹⁷ Ibid

of e-waste worldwide. This problem is especially acute in areas that lack the necessary infrastructure to carry out repairs and upgrades and eventually recycle and process e-waste properly. Therefore, correctly identifying what is waste and what is not is essential in developing sustainable approaches to manage and dispose of e-waste around the world.¹⁸

2.2 HISTORICAL EVOLUTION AND GLOBAL PATTERN IN ELECTRONIC WASTE

The concept of trading electronic waste emerged in the backdrop of the residues of digitalization and has undergone several phases, influenced by technological advancements, economic factors, environmental concerns, and regulatory changes. Initially, in the period from the 1960s to the 1980s, electronic devices such as televisions, radios, and early computers were not only expensive but built to last. This meant that the volume of e-waste generated was minimal because consumers held onto their devices for longer periods before disposing of them. As a result, there was little impetus to develop a trade for e-waste, as the quantities involved did not justify the effort. Countries managed their relatively small quantities of e-waste through domestic methods, predominantly landfilling and incineration. These methods, though not environmentally friendly by today's standards, were deemed sufficient due to the minimal volume of e-waste produced.

Electronic waste has existed for a long time, but the need for proper disposal became apparent in the mid-1970s. This led to the United States passing the Resource Conservation and Recovery Act (RCRA), which prohibited the dumping of electronic waste in the country. This legislation spurred the creation of the recycling industry, promoting the proper disposal and recycling of electronic waste and outdated electronic equipment. In 1976, the United States enacted the RCRA, followed by several other countries. According to the Environmental Protection Agency, the RCRA aimed to:

1. Protect the human health, the environment, from the obvious hazards of waste disposal.
2. To also help in the conservation of energy and of all natural resources

¹⁸ Cornelis P. Baldé, Ruediger Kuehr, Tales Yamamoto, Rosie McDonald, Elena D'Angelo, Shahana Althaf, Garam Bel, Otmar Deubzer, Elena Fernandez-Cubillo, Vanessa Forti, Vanessa Gray, Sunil Herat, Shunichi Honda, Giulia Iattoni, Deepali S. Khatriwal, Vittoria Luda di Cortemiglia, Yuliya Lobuntsova, Innocent Nnorom, Noémie Pralat, Michelle Wagner (2024). International Telecommunication Union (ITU) and United Nations Institute for Training and Research (UNITAR). 2024. Global E-waste Monitor 2024. Geneva/Bonn.

3. Help in reduction of the amount of waste generation.
4. To ensure all wastes are managed in a manner that protects our environment.¹⁹

To fulfil these objectives, the Environmental Protection Agency (EPA) initiated three interrelated programs: the underground storage tank program, the hazardous waste program, and the solid waste program, each with precise regulations to support the sustainable stewardship of Earth and all its inhabitants. The enactment of the RCRA catalysed a series of developments leading to the establishment of international laws on waste dumping. These developments underscore the critical role that global collaboration and regulatory frameworks play in tackling the escalating challenge of managing electronic waste.²⁰

Following this, in the 1980s, a sequence of global episodes prompted the creation of new regulations concerning the disposal of electronic waste. A particularly notorious case involved a Liberian vessel, the *Khian Sea*, which was tasked with removing 14,000 tons of burnt ash from Philadelphia. Initially, this cargo was destined for New Jersey. However, when local authorities rejected it, the ship redirected its course towards the Caribbean, where it illicitly offloaded 4,000 tons of the ash. The remainder of the waste met a similar fate, scattered in multiple locations as the *Khian Sea* journeyed towards Southeast Asia. This event drew significant public attention and outrage and played a vital role in the making and enactment of the Basel Convention. This landmark international agreement set forth stringent regulations on the disposal of hazardous waste, including e-waste, to protect human health and the environment from the detrimental effects of improper waste management. These regulatory measures have had a lasting impact, transforming what was once a small-scale recycling effort into a significant, profitable sector within the global economy. The growth of the recycling industry can be traced back to these regulations, highlighting the importance of ensuring the responsible and safe handling of e-waste.

The 1990s saw aggressive digitalization and significant expansion in the consumption of electronic devices worldwide, driven by technological advancements, decreasing costs, and increasing demand. However, this has also resulted in the proliferation of electronic devices that have a very short lifespan. With the rapid turnover of electronic devices due to shorter

¹⁹ Summary of the Resource Conservation and Recovery Act, United States Environment Protection Agency EPA, LAST UPDATED ON SEPTEMBER 6, 2023

²⁰ History of the Electronic Waste Recycling Industry, July 10, 2019, <https://www.streamrecycling.com/history-of-electronic-waste-recycling-industry/>

lifecycles and frequent upgrades, the volume of e-waste began to rise substantially. In developed countries where environmental laws were stringent, the disposal of electronic waste became difficult or a costly affair. Thus, the developed countries found a loophole by shipping them off to other countries where such laws are not so rigorous. Meanwhile, countries also started recognizing the commercial value of discarded and obsolete e-waste. This waste contains valuable metals like copper, silver, and gold. Thus, recycling the same can be a sustainable source of these metals, reducing the need for new mining. Copper and silver are especially important due to their excellent electrical and thermal conductivity. Recovering these metals meets current demands. Thus, acknowledging the commercial nature of electronic waste, the concept of trade in electronic waste emerged.²¹

The 2000s witnessed the emergence of global trade in e-waste, and large quantities of e-waste were exported to developing countries, particularly in Asia and Africa, recognizing the commercial value of the same. Informal recycling sectors in these regions processed imported e-waste to recover valuable materials, often under unsafe and environmentally damaging conditions. Concerns regarding the environmental and health related impacts of e-waste trade led to increased scrutiny and calls for regulation at the international level. An extensive amount of electronic waste from developed nations is often transferred to developing countries, where it is dismantled by workers with limited skills in the unofficial sector. This practice of informal e-waste processing in these locations tends towards specific areas, leading to considerable environmental contamination and significant health hazards at these sites. Reports by mainstream media and environmental organizations have highlighted numerous geographic regions in developing countries where informal e-waste recycling is prevalent. One notable example before governmental intervention was Guiyu town in China, one of the largest informal e-waste recycling hubs globally, annually dealing with millions of tons of e-waste, predominantly sourced from developed nations.²² Guiyu was called the “electronic waste graveyard of the world” by the media and environmental groups. The recycling methods used

²¹ Kahar INS, Othman N, Noah NFM, Suliman SS. Recovery of the copper and silver from industrial e-waste leached solutions using sustainable liquid membrane technology: a review. *Environ Sci Pollut Res Int.* 2023 May;30(25):66445-66472. doi: 10.1007/s11356-023-26951-0. Epub 2023 April 27. PMID: 37101217.

²² Xu X, Yang H., Chen A, Zhou Y, Wu K, Liu J, Huo X. Birth outcomes related to the informal e-waste recycling in Guiyu, China. *Reprod. Toxicol.* 2012; **33**:94–98. doi: 10.1016/j.reprotox.2011.12.006.]

in such informal settings are primarily primitive, with open burning being the most harmful to the environment, followed by mechanical processing and chemical leaching methods.²³

Understanding the trade of electronic waste in the early 2000s warrants a detailed look into Lagos. By 2001, Lagos evolved from a quiet suburb into a dynamic electronic hub.²⁴ The market for refurbished computers, mobile phones, and handheld devices grew rapidly across the country, creating a parallel economy. Around the same time, Nigeria experienced a great demand for mobile phones and computers. From having less than 35,000 mobile users in 1999, Nigeria saw this number skyrocket to more than nine million by 2004.²⁵ This surge in demand has aided in the development of a vibrant industry around the importation of second-hand electronic equipment through the Port of Lagos, with Ikeja, located near the Murtala Mohammed International Airport, becoming a central market for these goods. Unfortunately, it also served as a dumping ground for unrepairable electronic wastes as well. Most of this equipment, designed for short-term use, comes from the United States and Europe. According to the Basel Action Network (BAN),²⁶ Lagos received an estimated 500 shipping containers of used electronic goods each month in the year 2005, filled with potential e-waste. Local experts believe 25 to 75 percent of these imports are waste²⁷. This influx is accelerated due to weak export and import regulations, allowing a flow of e-waste mixed with functioning electronics.²⁸

2.3 INTERNATIONAL POLICIES GOVERNING E-WASTE

Basel Convention, 1989

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, adopted on March 22, 1989, and entered into, on May 5, 1992.²⁹ The management of hazardous wastes has been a key focus of the international environmental agenda since the early 1980s. It was identified as one of the three priority areas in the United Nations Environment Programme's initial Montevideo Programme on Environmental Law in

²³ Wang K, Qian J, Liu L. Understanding the Environmental Pollutions of Informal E-Waste Clustering in the Global South via a Multi-Scalar Regulatory Frameworks: A Case Study of the Guiyu Town, China. *Int J Environ Res Public Health*. 2020 Apr 18;17(8):2802. doi: 10.3390/ijerph17082802. PMID: 32325760; PMCID: PMC7215866.

²⁴ Sullivan, Jack. "Trash or Treasure: Global Trade and the Accumulation of E-Waste in Lagos, Nigeria." *Africa Today*, vol. 61, no. 1, 2014, pp. 89–112. *JSTOR*, <https://doi.org/10.2979/africatoday.61.1.89>. Accessed June 5, 2024.

²⁵ *Ibid*

²⁶ *Ibid*

²⁷ *Ibid*

²⁸ *Ibid*

²⁹ History and negotiations of the Basel Convention, Basel Convention official website, United Nations Environment Programme

1981. Thus, “*The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal*,” known as the Basel Convention, was established in 1989 in response to public outrage over toxic waste being dumped in Africa and other developing regions. In the 1970s and 1980s, growing environmental awareness and stricter regulations in industrialized countries led to public resistance against hazardous waste dumping, known as the NIMBY (Not In My Back Yard) syndrome. This resistance, along with rising disposal costs, prompted some operators to look for cheaper disposal options in Eastern Europe and developing countries, where environmental awareness and regulations were much weaker.

In 1986, tons of municipal incinerator ash, potentially including e-waste due to the presence of lead, cadmium, mercury, arsenic, etc., from Philadelphia was dumped on a rural Haitian beach by the barge *Khian Sea*. The ship had entered the port under the pretence of unloading fertilizer. However, this so-called "fertilizer" contained toxic chemicals, including dioxins, furans, and metals such as lead, cadmium, mercury, and arsenic. As workers began piling the ash just yards from the ocean, one crew member even ate a handful of the ash to demonstrate its supposed safety. Nearly one-fourth of the 13,000 tons of waste had been unloaded before the Haitian government intervened, ordering the ash to be reloaded. However, the *Khian Sea* disappeared at night, leaving approximately 3,000 tons of toxic ash on the beach. The ship returned to Philadelphia with the remainder of its hazardous cargo.³⁰

For the next two years, the *Khian Sea*, renamed the *Pelicano*, travelled the globe in vain, searching for a place to dump its deadly load. It crossed the Atlantic, sailed along the West African coast, through the Mediterranean, down the Suez Canal, and into the Indian Ocean. When it finally arrived in Singapore, it had a new name, a new owner, and an empty hull.³¹ The *Khian Sea* incident is a notorious episode of the international hazardous waste trade but far from an isolated case³². In Koko, Nigeria, 3,800 tons of highly poisonous waste, including potentially lethal polychlorinated biphenyls (PCBs), were found in drums at an open site, dumped by a local businessman who forged cargo papers and bribed port officials. Further, an American chemical company sold 3,000 tons of fertilizer to Bangladesh, which contained 1,000 tons of ash from copper smelting furnaces, resulting in dangerous levels of lead and cadmium.

³⁰ The International Trade In Toxic Waste: A Selected Bibliography Of Sources, Lewis, Deanna L. Chepesiuk, Ron, *Electronic Green Journal* UCLA, 1(2), 1994

³¹ History and negotiations of the Basel Convention, Basel Convention official website, United Nations Environment Programme

³² *Ibid*

Similarly, several hundred mysterious barrels washed up on the Turkish shore, causing nausea and skin rashes among locals who opened them, with a few even exploding. Numerous other poor, less developed countries have been targeted, including South Africa, former East Germany, China, Romania, Poland, Thailand, Ukraine, and others. The promise of foreign currency in the international waste trade is highly tempting for cash-strapped developing countries.³³

Against the backdrop of this, the Basel Convention was negotiated in the 1980s. The Basel Negotiation Process began in 1987 and lasted until 1989 before its adoption³⁴. In June 1987, the UNEP Governing Council approved the Cairo Guidelines, a non-binding tool to help governments develop and implement their hazardous waste management policies. Concurrently, based on a proposal from Switzerland and Hungary, the Council tasked the UNEP Executive Director with forming a working group to create a global convention on controlling hazardous waste movements, using the Cairo Guidelines and input from relevant bodies. The Council also authorised the Executive Director to organise a diplomatic conference in the beginning of 1989 to adopt and sign the Convention. The United Nations General Assembly later endorsed this decision and the subsequent negotiations. The Governing Council set a timeline of less than two years for drafting and negotiating the Convention. Working Group of Legal and Technical Experts, an Ad Hoc group was tasked with preparing the global Convention began its work with an organizational meeting in October 1987 and held five negotiation sessions from February 1988 to March 1989.³⁵

The Conference of the Plenipotentiaries on the Global Convention on the Control of Transboundary Movement of Hazardous Wastes, held in Basel at the Swiss Government's invitation from March 20 to 22, 1989, included representatives from 116 states and reviewed the final draft of the Convention submitted by the Working Group. On March 22, 1989, the Basel Convention got unanimously adopted by the Conference. Additionally, the Conference passed eight resolutions to further develop and implement the Convention. European Economic Community (EEC) and one hundred and five states signed the Final Act of the Basel Conference. By March 22, 1990, when the Convention closed for signatures per its article 21,

³³ Supra note 31 Page Number 24

³⁴ Supra note 31 Page Number 24

³⁵ Supra note 31 Page Number 24

fifty-three states and the EEC had signed it. The Convention later came into force on May 5, 1992, following the twentieth instrument of accession as stipulated in Article 25.³⁶

Important provisions in the Basel Convention

The Basel Convention's primary objective is to protect human health and the environment arising from the harmful effects of hazardous wastes. It covers a broad range of hazardous wastes, identified by their origin, composition, and characteristics, as well as household waste and incinerator ash classified as "other wastes."

The Convention's provisions focus on three main aims: reducing hazardous waste generation, promoting environmentally sound management of hazardous wastes, and restricting transboundary movements of hazardous wastes unless it adheres to environmentally sound principles.³⁷ Article 6 of the Basel Convention outlines the notification and consent procedures for hazardous waste trades, including what is now practiced as **prior informed consent**. Exporting countries must notify transit and importing countries and provide detailed information about waste. The Convention prohibits exportation until the importing and transit countries give their written consent. Even with consent, the Convention goes beyond traditional informed consent rules by prohibiting exports if the exporting country believes the importing country cannot manage the waste in an environmentally sound manner.³⁸

The parties can form bilateral or multilateral agreements on waste management if these agreements are as environmentally sound as the Basel Convention (Article 11). However, permissible transboundary movements must follow environmentally sound solutions and the principles of non-discrimination and sound management. The regulatory system, a core component of the Basel Convention, is based on prior informed consent. Before export, the exporting state must notify the importing and transit states' authorities, providing detailed information about the movement. The movement can only proceed with written consent from all concerned states (Articles 6 and 7). The Convention further promotes cooperation between parties, including information exchange and technical assistance, particularly to developing countries, facilitated by the Secretariat (Articles 10, 13, and 16). In cases of illegal

³⁶ Supra note 31 Page Number 24

³⁷ Choksi, Sejal. "The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal: 1999 Protocol on Liability and Compensation." *Ecology Law Quarterly*, vol. 28, no. 2, 2001, pp. 509–39. *JSTOR*, <http://www.jstor.org/stable/24114136>. Accessed June 6, 2024.

³⁸ Ibid

transboundary movements or incomplete foreseen movements, the Convention assigns responsibility to one or more states involved and mandates safe disposal, either by re-importation or other means (Articles 8 and 9). Additionally, the Convention provides for establishing regional or sub-regional centres for training and technology transfer concerning hazardous waste management and minimization (Article 14).

As article 15 mandates the establishment of a Conference of parties {COP}, "*A Conference of the Parties is hereby established. The first meeting of the Conference of the Parties shall be convened by the Executive Director of UNEP not later than one year after the entry into force of this Convention. Thereafter, ordinary meetings of the Conference of the Parties shall be held at regular intervals to be determined by the Conference at its first meeting*". Article 15 (5) of the Convention further stipulates that "*The Conference of the Parties shall keep under continuous review and evaluation the effective implementation of this Convention.*" Thus, evaluating the effectiveness of the Convention as such is a mandate of the Convention. This is a general overview of the aims and objectives of the Basal Convention.

Shortcomings of the Basel Convention

Article 14 stipulates that "*The Parties shall decide on the establishment of appropriate funding mechanisms of a voluntary nature*" and "*establishment of a revolving fund to assist on an interim basis in case of emergency situations to minimize damage from accidents*"³⁹. Many environmental organizations and developing countries argue that the Convention's biggest flaw is its lack of funds to mitigate damage from international hazardous waste accidents, as outlined in Article 14. If environmental damage occurs and the responsible party is unknown or lacks funds, developing countries may struggle to afford proper clean-up, and victims may not receive adequate compensation. Under such a scenario, the provisions under Article 14 would have helped developing countries mitigate the damages. However, the provisions provided under Article 14 of the Convention remain only in text.⁴⁰

Another area of criticism is Article 11, which stipulates that "*Parties may enter into bilateral, multilateral, or regional agreements or arrangements regarding transboundary*

³⁹ Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, Secretariat of the Basel Convention, 1989

⁴⁰ Choksi, Sejal. "The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal: 1999 Protocol on Liability and Compensation." *Ecology Law Quarterly*, vol. 28, no. 2, 2001, pp. 509–39. *JSTOR*, <http://www.jstor.org/stable/24114136>. Accessed June 6, 2024.

movement of hazardous wastes or other wastes with Parties or non-parties."⁴¹. The flexibility to enter into various agreements allows countries to tailor their waste management practices to specific bilateral or regional contexts and enables regional cooperation. The requirement that agreements must not derogate from '*environmentally sound management*'⁴² is somewhat vague and open to interpretation. This could lead to inconsistencies in enforcement and potentially weaken environmental standards if not properly monitored. Such a loophole might attract risks, as some countries might use these agreements to circumvent stricter regulations under the Basel Convention, especially if the agreements are with countries that have less stringent environmental standards.

A third criticism is the lack of a formal enforcement mechanism for Basel Convention regulations. The Convention does not establish an official authority to enforce compliance; instead, it relies on Parties to implement national legislation and self-police illegal waste activities. Compliance and enforcement depend on good-faith cooperation between nations, with Parties expected to self-regulate, notify the Secretariat of breaches, and honour each other's national waste listings. Further, Article 20 settlement of disputes stipulates that "*shall seek a settlement of the dispute through negotiation or any other peaceful means of their own choice.*"⁴³ and "*If the Parties concerned cannot settle their dispute through the means mentioned in the preceding paragraph, the dispute, if the Parties to the dispute agree, shall be submitted to the International Court of Justice or to arbitration.*"⁴⁴. Such a mechanism relies heavily on the mutual agreement of the parties in dispute to submit the case that is presented before International Court of Justice (ICJ) or to arbitration. This voluntary nature can be a significant barrier if one party refuses to consent, effectively stalling the resolution process. Additionally, the lack of a compulsory arbitration clause means that parties can indefinitely delay resolution by refusing to agree to arbitration or ICJ submission, leading to prolonged disputes undermining the effectiveness of the Convention.

Another area where the Basel Convention failed to meet its expectations is the 'prior informed consent.' The PIC mechanism is designed to ensure that transboundary movements of hazardous wastes do not occur without the consent of the importing state. This mechanism

⁴¹ Basel Convention on Control of Transboundary Movement of Hazardous Wastes and Their Disposal, Secretariat of the Basel Convention, 1989

⁴² Ibid

⁴³ Ibid

⁴⁴ Ibid

aims to protect human health and the environment by making sure that all parties involved are properly informed about the nature and risks of the wastes being transported. Article 6 mandates that "*The State of export shall notify, or shall require the generator or exporter to notify, in writing, through the channel of the competent authority of the State of export, the competent authority of the States concerned of any proposed transboundary movement of hazardous wastes or other wastes*" The Basel Convention outlines procedures for prior informed consent (PIC) by requiring countries for appointing a nationally competent authority to oversee these processes. Primarily involving environmental or foreign affairs departments. These authorities handle notifications from exporting states regarding the movement of hazardous waste to intended import and transit countries. While most parties have designated competent authorities to manage the PIC procedure, many lack the expertise and resource to carry out their duties effectively. Instances of mislabelling hazardous wastes to dodge the PIC procedure have been documented, undermining the effectiveness of the system.

Mobile Phone Partnership Initiative (MPPI)

The Basal Convention bans the import of hazardous waste, including e-waste, into developing countries. The Basel Convention began addressing e-waste issues in 2002 with the Mobile Phone Partnership Initiative (MPPI) adopted at the sixth COP6. Thus, the Mobile Phone Partnership Initiative (MPPI) was launched in 2002 when ten mobile phone manufacturers signed a Declaration to establish a sustainable partnership with the Basel Convention during the sixth meeting of the Conference of the Parties. This initiative established a tripartite working group of experts from Parties and Signatories, mobile phone manufacturers, and the Basel Convention Secretariat, focusing on the environmentally sound management of end-of-life mobile phones. The main objective of MPPI was to support the Basel Convention's goals in managing end-of-life mobile phones environmentally. Specific aims further included improving product stewardship, encouraging environmentally friendly consumer behaviour, promoting reuse, refurbishing, material recovery, recycling, and proper disposal, and gaining political and institutional support for environmentally sound management.⁴⁵

Under the MPPI, five technical guidelines were established. Namely, collection of used and end-of-life mobile phones, awareness raising and design considerations, transboundary

⁴⁵ Mobile Phone Partnership Initiative, Basel Convention official website, United Nations Environment Programme

movement of collected mobile phones, refurbishment of used mobile phones, and material recovery/recycling of end-of-life mobile phones. To guide the efforts under the MPPI, the Mobile Phone Working Group (MPWG) was formed, comprising participants from Parties and Signatories to the Basel Convention, mobile phone manufacturers, and environmental non-governmental organizations (NGOs).

Refurbishment/Repair of Used Mobile Phones: - MPPI aimed to establish a guideline for the environmentally sound management of reusable mobile phones. The MPPI provided guidelines for refurbishment facilities, organizations involved in buying or selling refurbished phones, repair facilities, regulatory agencies and authorities, environmental and community groups, telecom operators, manufacturers, consumers of refurbished phones, and phone distributors.⁴⁶ It provides advice and guidance on several areas:

- Procedures for product handling and refurbishment at refurbishment facilities.
- Management of components and materials removed from end-of-life wireless devices, including administrative measures.
- Guidance on the handling and refurbishment of mobile phones and devices.
- Strategies for the remarketing of refurbished mobile devices.⁴⁷

Collection and Transboundary Movement: - The primary objectives behind this project were to provide guidelines on environmentally sound management of end-of-life mobile phones and to provide guidelines on transboundary movement of end-of-life mobile phones. The guideline on the collection of used mobile phones aims to raise awareness and encourage countries to establish collection schemes tailored to their needs, ensuring that most, if not all, end-of-life mobile phones are collected and diverted from municipal landfills. The second guideline addresses the transboundary movement of collected mobile phones and offers assistance to regulatory agencies and authorities, manufacturers, telecom operators, and repair, refurbishment, and recycling facilities involved in the international movement of used and end-of-life mobile phones.⁴⁸

Material Recovery and Recycling of end-of-life Mobile Phones: - The project aimed to develop a guideline for the environmentally sound material recovery and recycling of end-of-

⁴⁶ Lessons Learned from the MPPI and Benefits of Future Private-Public Partnerships in the Framework of the Basel Convention, John Myslicki, Federal Environment Agency (Germany), March 2010

⁴⁷ Ibid

⁴⁸ Ibid

life mobile phones, identify state-of-the-art recycling technologies, and provide recommendations for future development and investment in recycling infrastructure. The project had the scope to address the recycling process from the point when used mobile phones are sorted and designated for material recovery and recycling encompassing, processing, recycling, or disposal of all mobile phone components, including the phone, charging stations, accessories, and batteries. The intended guidelines evaluate the capacity of the material recovery and recycling infrastructure and its ability to prevent end-of-life mobile phones from becoming part of landfills, incineration, or other improper disposal methods. It also provides recommendations to national authorities regarding environmentally sound recovery of the materials and recycling of the end-of-life mobile phones.⁴⁹

Awareness raising and design considerations: - The project aimed to create guidelines for raising awareness regarding design considerations and making sure that the particular design of the mobile phone does not pose any health risk to its users. Additionally, it aimed to recommend designs that help with extended usage and suggest efficient material recovery and recycling techniques. The guideline examines the impact of the end-of-life of mobile phones and how design changes can reduce such impacts. It further details the evolution of design changes since the advent of the modern mobile telephone in the 1980s and the current forces driving design changes⁵⁰

In addition to these five technical guidelines, a holistic Guidance Document on Environmentally Sound Management of Used and End-of-Life Mobile Phones was prepared. This Guidance Document summarizes the information contained in all five technical guidelines. Section 4 of the overall Guidance Document contains the issue of transboundary movement of end-of-life mobile phones. This issue has undergone extensive discussions as different stakeholders presented different points of view on the applicability of the legally binding Basel Convention's provisions on transboundary movements of used goods. However, a compromise was reached, giving the individual countries the liberty to decide it on the basis of two factors, i.e., the condition of the mobile phones and the category under which it falls under the Basel Convention.⁵¹

⁴⁹ Supra Note 46 Page Number 30

⁵⁰ Supra Note 46 Page Number 30

⁵¹ Supra Note 46 Page Number 30

Nairobi Declaration

The Basel Convention's eight meeting of the COP adopted the Nairobi Declaration on the environmentally sound management of electrical and electronic waste in December 2006. This represents a significant international commitment to addressing the challenges posed by electronic waste. The declaration provides 12-point commitments to achieve the same. The 12 points include,

1. The declaration shall promote awareness at all levels and address the challenges and issues surrounding e-waste.
2. The declaration shall encourage information sharing and technology transfer between developed and developing countries. Particularly economies in transition
3. The declaration shall promote green technology and sustainable design while phasing out the use of hazardous substances during production and their inclusion in its components. It shall also promote stewardship and producer responsibility throughout the lifecycle of electronic devices.
4. The declaration acknowledges the Basel Convention as the main legal instrument and stipulates that it shall be respected.
5. The declaration acknowledges the illicit trade in e-waste as a concern that requires urgent action with respect to the implementation of the Basel Convention.
6. The declaration shall encourage comprehensive actions at national, regional, and global levels for the ESM of e-waste with shared responsibilities and commitments from all stakeholders.
7. The declaration shall promote integrated waste management to reduce the harmful effects of hazardous components in e-waste through proper collection and separation of household or municipal waste while coordinating with municipal non-governmental organizations.
8. The declaration shall improve waste management by establishing robust national policies and legislation, ensuring diligent enforcement.
9. The declaration shall prevent and combat illegal traffic of e-waste while recognizing the benefits of harmonizing national laws at the regional level.
10. The declaration shall encourage and support strategic partnerships within the Basel Convention on matters regarding e-waste.

11. The declaration shall develop and consolidate national, regional, and international cooperation to support the implementation of activities aimed at the environmentally sound management of e-waste.
12. The declaration welcomes the decision VIII/2 of the Conference of the Parties on the environmentally sound management of the EEE.⁵²

The Nairobi Declaration was the first international policy to address the growing concerns surrounding e-waste. By promoting environmentally sound management practices and emphasizing the need for robust legal frameworks and international cooperation, the declaration has played a vital role in shaping policies and initiatives aimed at reducing the environmental and health impacts of e-waste.

Partnership for Action on Computing Equipment (PACE)

COP8 followed COP9, and it established a Partnership for Action on Computing Equipment (PACE). PACE is a partnership agreement that aims to promote the environmentally sound management of end-of-life computing equipment. Such computing equipment covers Personal Computers (PCs) and associated displays, printers, and peripherals. PACE has adopted three working principles to further the agenda. They are,

1. Promote dialogue amongst governments, industries, NGOs, and academia on initiatives that could be carried out in different UN regions.
2. Seek innovative solutions, showing concrete and practical results consistent with the Basel Convention, and make recommendations.
3. Coordinate and cooperate, as appropriate, with other bodies involved in e-waste activities.

The PACE was implemented to develop guidelines on several things, including the environmentally sound refurbishment/repair, including criteria for testing, certification, and labelling. Additionally, guidelines for environmentally sound recycling and material recovery should be created, ensuring facility certification. Promote and develop pilot schemes for the environmentally sound management of the used and end-of-life computing equipment, aligning

⁵² Nairobi Declaration on environmentally sound management of electrical and electronic waste, Basal Convention, United Nations Environment Programme

these efforts with the attainment of Millennium Development Goals. Furthermore, awareness-raising and training program activities should be initiated to support these initiatives.

Partnership for Action on Computing Equipment (PACE) was active until COP13. At COP14 in 2019, a new partnership, the Follow-up Partnership to PACE, was created to continue raising awareness about e-waste and promote Environmentally Sound Management of mobile phones and computing equipment. The first phase of PACE contributed significantly, but the challenges pertaining to environmentally sound management remained. Parties recognized this and implemented an action-oriented approach through the work of the new Partnership.

At COP15 in 2022, this Partnership's mandate was expanded to include additional electronic devices such as television screens, audio and video equipment, refrigerators, and cooling and heating equipment, and it was renamed to be Partnership for Action on Challenges relating to E-waste (PACE II). Finally, in 2022, the Parties adopted made amendments to II, VIII, and IX Annexes of the Basel Convention in order to list hazardous and non-hazardous electronic waste. Non-hazardous e-wastes are listed in Annex II under the code Y49, while hazardous electronic wastes are listed under as a new code in Annex VIII: A1181. Starting January 1, 2025, all cross-border movements of both hazardous and non-hazardous e-waste will be regulated by the Prior Informed Consent Procedure (PIC) as per the Basel Convention.⁵³

Though the Basal Convention bans the transfer of hazardous waste, including e-waste, to developing countries, the Ban Amendment adopted in 1995 only became binding on its member states in 2019.⁵⁴ The Ban Amendment, introduced during the third Conference of the Parties in 1995, made significant additions to the Basel Convention. It added a new paragraph to the preamble, an extra paragraph to Article 4, and created Annex VII. This amendment mandates that parties listed in Annex VII (which includes EU members, OECD countries, and Liechtenstein) must prohibit the transboundary movement of hazardous wastes to states not.

⁵³ Follow-up Partnership to the Partnership for Action on Computing Equipment, Basel Convention official website, United Nations Environment Programme

⁵⁴ Basel Convention official website, United Nations Environment Programme, Entry into force of an amendment to UN treaty boosts efforts to prevent waste dumping, December 13 September 2019

Major Regional Initiatives

Several regional powers like European Union, Germany, Belgium, China etc. have enacted several legislations to tackle the e-waste crisis especially the transboundary movement of it.

European Union: - At the regional level, the European Union (EU) is at the forefront establishing rules and regulating the e-waste. The WEEE directive standardizes e-waste management across member states, encompassing processes for separate collection and storage, treatment requirements for specific materials and components, and the recycling and recovery of resources, all of which are reported and overseen by the National Enforcement Authority. Additionally, the directive promotes upstream improvements, such as designing products for easier recycling, and is founded EPR, which holds producers accountable for recycling their end-of-life products. The EU enacted the WEEE Directive in 2012, providing a comprehensive framework that serves as a model for e-waste legislation in developing countries, including those in Asia. Additionally, Directive on the Restriction of Hazardous Substances (RoHS) is another European Union Initiative in this area. The RoHS Directive seeks to mitigate the environmental and health hazards linked to the manufacturing, use, and disposal of electronic products by restricting specific harmful substances in these items. Its primary intent is to encourage the making of safer and more eco-friendly electronic equipment. According to EU law, manufacturers, importers, and distributors of Electrical and Electronic Equipment (EEE) must ensure their products comply with the RoHS Directive. This directive bans the use of hazardous substances, including lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBBs), and polybrominated diphenyl ethers (PBDEs), in EEE. By doing so, RoHS aims to reduce the risks such substances cause to human health and the environment.

Germany: - ElektroG, the German regulation, oversees the environmentally sound disposal and return of electrical and electronic equipment (EEE). It includes a series of rules to ensure that these devices are manufactured, marketed, collected, and disposed of in an eco-friendly way. This act is implemented in Germany following EU WEEE directives. Thus, the "*Act Governing the Sale, Return and Environmentally Sound Disposal of Electrical and Electronic Equipment (Electrical and Electronic Equipment Act, Elektroggesetz/ElektroG)*" was passed in 2005. The "Elektroggesetz" regulates various aspects of electrical and electronic equipment (EEE) management. It defines the scope of the law, specifying which equipment, producers, importers, and resellers are affected. It sets requirements for the design and production of new

EEE, outlines the roles and responsibilities of the national Clearing House ("Stiftung EAR"), and mandates labelling for registered products. The law also governs the collection, return, and recovery of WEEE, sets deadlines for different organizations, and details sanctions for violations, along with control and enforcement measures⁵⁵.

Belgium: - In Belgium, the management of waste electrical and electronic equipment (WEEE) is regulated through specific legislative measures in each Administrative Region. In the Flanders (Flemish) Region, amendments to the Waste Prevention and Management Ordinance (VLAREA) were introduced and became effective on December 1st, 2004. Similarly, in both the Wallonia Region and the Brussels Capital Region, amendments were made to the prevalent Producer Responsibility Decree, which came into force on June 3rd, 2005. These regulations aim to ensure proper handling, collection, and recycling of WEEE, aligning with broader environmental goals and responsibilities placed on producers within each region. Additionally, a Producer Responsibility Decree was also passed in Wallonia Region and Brussels Capital Region in the year 2005. These regulations together require the manufacturers to fund the gathering, processing, recycling, and reclaiming of waste electrical and electronic equipment, ensuring their environmentally responsible collection and disposal, whether carried out collectively or individually.

Sweden: - In Sweden, the Ordinance (2014:1075) on producer responsibility for electrical and electronic equipment came into effect in October 2014, aligning with the WEEE directive. Under this ordinance, Producers are compelled to assume responsibility for addressing the issues arising from electrical waste and are encouraged through incentives to implement measures aimed at waste prevention. This regulatory requirement not only assigns accountability to producers for managing the impacts of electrical waste but also motivates them to adopt proactive strategies to reduce waste generation. By doing so, producers contribute to sustainable practices that minimize the environmental and social consequences associated with discarded electrical products. Additionally, Ordinance on producer responsibility for batteries (SFS 2005: 209, 210 and SFS 2008: 834) was also passed in 2008. Under this ordinance, Battery producers are required to establish and operate one or more appropriate national collection systems to ensure the collection of all used batteries. This

⁵⁵ Act Governing the Sale, Return and Environmentally Sound Disposal of Electrical and Electronic Equipment (Electrical and Electronic Equipment Act, Elektroggesetz/ElektroG), <https://www.elektroggesetz.com/>

obligation mandates that producers take responsibility for the retrieval of spent batteries, ensuring they are gathered in accordance with regulatory standards across the country.

China: - China, as one of the largest global producers of electronic waste (e-waste), has implemented legislative measures to combat the issue of illegal e-waste imports. These laws encompass prevention and control of pollution from WEEE, management strategies based on the "3R" principles (reduce, reuse, recycle), and the "Polluter Pays" principle. These initiatives emphasize eco-design, improved formal collection, secure storage, and safe recycling practices aimed at increasing reuse rates and preventing pollution during end-of-life (EoL) management activities. The Circular Economy Promotion Law and the Administrative Rules on Prevention of Pollution by WEEE, established in 2008, introduced the Extended Producer Responsibility (EPR) principle. This principle was formalized in 2012, mandating manufacturers to ensure environmentally sound management of the products at the end of their lifecycle. Further, various legislations include, Catalogue for managing the import of wastes in 2000 banned the import of WEEE. Technical Policy on Pollution Prevention and Control of WEEE in 2005 which establish the "3R" (reduce, reuse, recycle), "Polluter Pays" principles, promote eco-design, and outline provisions for environmentally responsible collection, reuse, disposal, and recycling of WEE. Also, China has also come up with "Requirements for Concentration limits for certain hazardous substances in electronic information products" in 2006 which stipulates regulations on concentration limits on certain six hazardous substances found in electrical and electronic equipment. They also specify requirements for labelling and packaging-controlled substances during the recycling process. These measures ensure that hazardous materials are handled responsibly throughout the recycling chain, promoting safer disposal practices and reducing environmental and health risks associated with electronic waste. Additionally, *Administrative measures for the prevention and control of environmental pollution by electronic waste* in 2008 prioritising the prevention of pollution during the dismantling, recycling, and disposal of e-waste. They also establish a licensing framework for e-waste recycling firms and require environmental impact assessments for projects involving the dismantling, utilization, and disposal of e-waste. Additionally, these regulations define the responsibilities of manufacturers, importers, and retailers in managing electronic waste throughout its lifecycle⁵⁶.

⁵⁶ White Paper on National EPR Framework for E-waste Management in India, Mehar Kaur, Abdullah Mohammed Atiq, Shweta Gautam, The Energy and Resources Institute (TERI), Setting Up Innovative Value Chain for E-Waste Management

Thus, China has implemented various policies and regulations and initiated efforts to handle e-waste. One of its primary policy measures was introducing the EPR principle in 2008, with subsequent updates expanding its coverage to more types of electrical and electronic equipment (EEE)⁵⁷. Alongside EPR, a comprehensive regulatory framework for e-waste management has been established, incorporating laws such as the Circular Economy Promotion Law and the Solid Waste Law. These laws offer guidance on the safe and efficient management of e-waste. The Chinese government has also made substantial investments in developing infrastructure for e-waste management. For instance, the Ministry of Ecology and Environment has launched a national pilot program for e-waste recycling aimed at establishing a standardized and regulated recycling system⁵⁸. The program seeks to create a network of authorized recycling facilities nationwide and incentivize manufacturers to design products that are easier to recycle⁵⁹. Another significant initiative involves the creation of the National Hazardous Waste List, which identifies the hazardous substances found in EEE and provides directives for their proper management.

Japan: - Japan has established a robust regulatory framework for managing e-waste, centered around the Resource Circulation Act⁶⁰. This law places responsibility on manufacturers and importers to collect and recycle electronic waste, while consumers must separate their e-waste for proper disposal. In 2021, the government announced plans to amend the Resource Circulation Act to enhance manufacturer and importer accountability for the proper disposal of their products. The revisions also aim to enforce more detailed reporting on e-waste collection and recycling efforts, demonstrating Japan's ongoing commitment to improving e-waste management practices⁶¹. Additionally, Japan plans to expand designated collection sites and improve recycling rates for e-waste. To promote the use of environmentally sustainable products, Japan has implemented eco-labelling programs such as Eco Mark, which certifies products meeting specific environmental standards⁶². These programs encourage

⁵⁷ Junming Zhu, Chengming Fan, Haijia Shi and Lei Shi. 2018. Efforts for a Circular Economy in China: A Comprehensive Review of Policies. *Journal of Industrial Ecology*, Yale University, vol. 23(1), February, pp. 110-118.

⁵⁸ Zhen Wang and Jiazhen Huo. 2023. Do government intervention measures promote e-waste recycling in China? *Journal of Environmental Management*, vol. 342, 118138

⁵⁹ Wang Qixiang, Linghui Kong, Jin Li, Bangyi Li and Fan Wang. 2020. Behavioral Evolutionary Analysis between the Government and uncertified Recycler in China's E-Waste Recycling Management. *International Journal of Environmental Research and Public Health* 17, No. 19.

⁶⁰ Akinaga, K. 2022. Japan's E-waste Management: Current Status and Challenges. *Recycling*,

⁶¹ Basu, A. &. 2021. A review of status, trends, and challenges. *Journal of Material Cycles and Waste Management*, pp. 261-278.

⁶² Eco Mark Office. 環境マーク. Eco Mark application. Retrieved from https://www.ecomark.jp/acquire/appli_eng/

manufacturers to produce eco-friendly goods and consumers to choose more sustainable options. However, a significant challenge persists among Japanese consumers due to insufficient awareness about proper e-waste management, leading to improper disposal of many devices. Moreover, recycling e-waste in Japan is costly, often prompting manufacturers to export it to countries with lower recycling expenses. Japan has also set ambitious targets for e-waste management, aiming to recycle 70% of specified items under the Home Appliance Recycling Law by 2025⁶³. To achieve this goal, Japan has implemented various measures, including expanding recycling programs, introducing regulations, and providing guidelines to ensure the correct disposal and recycling of e-waste. In 2020, revisions to the Act on the Promotion of Recycling of Small WEE mandated that retailers accept old electronic and electrical equipment from consumers at no charge, thereby boosting e-waste collection for recycling. Furthermore, Japan is advancing a circular economy approach to e-waste management, encouraging the reuse, refurbishment, and recycling of electronic and electrical equipment (EEE) to recover valuable resources like rare metals. The government is actively encouraging manufacturers to design products with recyclability in mind, supporting efforts to create a more sustainable e-waste management system in the country.

Emerging nations like China and India, have adopted similar regulations in anticipation of significant increases in e-waste. However, having such legislation does not automatically ensure successful implementation or the availability of proper e-waste management systems. Asian countries, which are not only major generators of e-waste but also frequent targets for illegal e-waste dumping, exhibit varying levels of economic development that impact their waste management capabilities. To address these challenges, strong national and region-specific legislation is essential across nations to prevent illegal e-waste import and export, manage domestically generated e-waste sustainably, and uniformly monitor e-waste management activities.

⁶³ Industrial Structure Council, C. E. 2022. Report of Progress on the Home Appliance Recycling Law. Ministry of Economy, Trade and Industry, Japan.

CHAPTER 3

INTERNATIONAL TRADE IN REGULATING TRANSBOUNDARY MOVEMENT OF ELECTRONIC WASTE

International trade in electronic waste is an economically lucrative business. The trade measures regulating the movement of electronic waste have historically been focused on bans. Due to the lack of economic incentives and the inability of the importing countries to enforce them, such bans have never been effective. Thus, there arose a need to explore trade measures that find a middle ground between social, environmental, and economic factors. Trade measures that soften the externalities while creating economic growth are relevant in this chapter. Thus, the chapter explores non-trade-restrictive and trade-restrictive measures available in regulating the transboundary movement of electronic waste. The discussion on facilitating trade shall only be limited to UEEE as the trade in obsolete e-waste is banned under international law as it is considered hazardous waste.

3.1 NON-TRADE-RESTRICTIVE MEASURES

International trade law under the auspices of WTO is founded on the principle of trade liberalization. It is a well-established fact that liberalization in trade boosts economic growth. Thus, exploring non-trade-restrictive measures facilitating trade between developed and developing countries is essential. To understand such measures, the difference between UEEE and WEEE shall be understood. UEEE stands for used electric and electronic equipment, and WEEE stands for waste electric and electronic equipment. Using certain non-trade-restrictive trade measures can facilitate the trade in UEEE fully and WEEE to an extent.⁶⁴

There are several non-trade restrictive measures that developing countries can adopt to gain economic benefits while safeguarding health and the Environment. Such a system facilitates trade in UEEE coupled with a domestic process for the safe disposal and management of WEEE that will inevitably follow the used goods. The latter process will require state-of-the-art incineration, landfilling, or recycling technology to curtail the health and environmental risks. As per the WTO provisions, the trading partners who are on the disadvantageous side must exhaust all available alternative remedies before moving towards

⁶⁴ Gideon Emcee Christian, Trade Measures for Regulating Transboundary Movement of Electronic Waste, 33 *UTRECHT J. INT'L & EUR. L.* 103 (2017)

trade-restrictive measures. This is known as the 'least-trade-restrictive-approach'. Hence, it is important to examine whether such a non-trade-restrictive framework that does not entail any obstacles to international trade is feasible in addressing the impact on health and environmental from the transboundary movement of e-waste to developing countries. Let's examine a series of 'remedial measures' for the safe disposal and management of obsolete e-waste, along with the examination of associated risks and availability of resources or technology that are needed for the implementation of the measures.

Landfilling

This refers to digging a giant hole in the ground, then filling it with waste, and covering it with soil⁶⁵. Landfilling is a potential e-waste disposal mechanism where pits are lined with a leachate basin to prevent toxic waste from leaching into the surrounding Environment. The effectiveness of such a disposal mechanism heavily depends upon efficient and organized e-waste collection, transportation, and disposal. Such disposals must only be done in a designated landfill, meeting all the possible measures. However, it is not news that landfills are not considered a sustainable means of waste disposal, particularly e-waste, and the same has garnered immense attention. Various studies have revealed that toxins could leak from landfills and cause health and environmental consequences. It also has severe adverse implications for groundwater as well. Electronics in landfills release heavy metals like mercury, arsenic, and lead, a heavy metal known to damage the central nervous system. This risk persists in developed countries with advanced state-of-the-art landfilling facilities, and the situation worsens in developing countries⁶⁶. In developing countries, e-waste is often disposed of indiscriminately in open landfills and stagnant water bodies, leading to underground and freshwater contamination. Therefore, landfilling e-waste in developing countries, though not a trade-restrictive measure, is not an effective way to prevent or mitigate the adverse health and environmental impacts of international trade in UEEE.⁶⁷

⁶⁵ What happens to electronics in Landfills? ERI, August 12, 2019

⁶⁶ Ibid

⁶⁷ Supra Note 64 Page Number 40

Incineration

Incineration is one of the most common methods of disposal of e-waste. It is prevalent in both formal as well as informal sectors. Incineration of electronic waste involves burning e-waste at high temperatures to reduce its volume. This process requires specialized facilities equipped with advanced technology to handle the hazardous materials found in e-waste. Proper incineration can effectively reduce the amount of e-waste, but it carries significant risks and challenges. One major concern is the release of toxic emissions, such as dioxins, furans, and heavy metals like mercury, cadmium, and lead, into the atmosphere. These substances can pose severe health and environmental risks. To mitigate these risks, incineration plants must have advanced system to control air pollution to be able to capture and neutralize harmful emissions. Another issue is the disposal of residual ash, which can contain concentrated levels of toxic substances. This ash needs to be carefully managed and disposed of in hazardous waste landfills to prevent environmental contamination. Despite these challenges, incineration is often considered a viable option for e-waste management, particularly in developed countries with the necessary infrastructure and regulatory frameworks. However, in developing countries, the lack of such infrastructure and regulations can lead to unsafe incineration practices. In these regions, e-waste may be burned in open fires or rudimentary incinerators, releasing harmful pollutants directly into the Environment. Therefore, while incineration can be an effective e-waste management strategy, its implementation must be carefully controlled and monitored to ensure it does not cause more harm than good, especially in developing countries.

Recycling

Recycling, like in any other field, is also the most sustainable means of treating of e-waste. E-waste recycling involves dismantling electronic equipment to recover valuable materials for reuse in manufacturing. E-waste collected through authorized commercial or municipal collection points and pick-up services is typically recycled at facilities equipped with advanced technology and infrastructure for the safe and efficient extraction of useful materials, leading to formal recycling. Conversely, e-waste collected outside the formal system by individual waste companies or dealers is often processed and recycled under suboptimal conditions using primitive techniques, usually without measures to prevent the emission of hazardous chemicals into the Environment, and results in informal recycling

Recycling e-waste in developing countries poses significant hazards to human wellbeing and the Environment due to exposure to high levels of fumes and dust containing hazardous substances. It also presents occupational hazards for workers involved in processing the waste. For instance, workers who informally dismantle CRTs may be exposed to phosphor powder on the inner surface of the front panel, barium oxide in the electron gun, and lead in the glass. Research studies have reported high levels of heavy metals in communities near informal e-waste processing sites in China, highlighting the health and environmental dangers associated with informal e-waste recycling in developing countries.

These are the three non-trade-restrictive measures that are currently in practice. Though efficiency behind these practices cannot be guaranteed, particularly in developing countries, these measures facilitate trade. Out of the three measures discussed, recycling seems the most efficient option. However, the informal recycling industries functioning all over the world tell a different story. In conclusion, whatever incineration, landfilling, or recycling we have today will not lead to environmentally sound e-waste management; for that, highly efficient state-of-the-art facilities are needed. Installing such facilities in developing countries would require funding, which is scarce for them.

3.2 TRADE RESTRICTIVE MEASURES

In the previous head, we explored the non-trade-restrictive measures that regulates the management of transboundary movement in e-waste and concluded that the environmentally sound management of the same is not possible in the current system. Thus, it is essential to explore trade-restrictive measures in line with WTO regulations that could possibly result in better management of the transboundary movement of e-waste. A system that differentiates functional UEEE from obsolete e-waste is imperative to facilitate trade. Thus, exploring technical regulations and documentation procedures that could aid in differentiating the same can be trade-restrictive but an efficient means of the transboundary management of e-waste. This could also encourage the developers of obsolete e-waste the opportunity to dispose of the same in the origin country itself.

Certification, documentation, and labelling

Certification, documentation, and labelling of e-waste as UEEE is a means to disintegrate prohibited e-waste from UEEE. The proposed certification system aims to

establish standards that used electrical and electronic equipment (UEEE) must meet before being exported to developing countries. This certification framework could be modelled after the e-Stewards certification system. The e-Stewards system was created by a coalition of electronic equipment recyclers, environmentalists, industry leaders, health and safety experts, and technical specialists in collaboration with the Basel Action Network (BAN), an NGO dedicated to stopping the transboundary movement of e-waste to developing nations.⁶⁸

Such a certification process ensures that certified recyclers and exporters consistently meet established standards. It prohibits certified recyclers from exporting e-waste to developing countries. Only UEEE that has been tested and proven fully functional can be exported to these regions. This mechanism offers assurance that UEEE exports from e-Stewards certified recyclers and exporters meet certain standards, thereby preventing the export of obsolete e-waste. Thus, a certification system in line with the e-stewards system can be incorporated with certain additions. Such additions can attain the form of labelling and certification marks. The developed countries that export the functional UEEE's can implement the certification marks and labelling followed by a regulatory regime in the importing country scrutinising the legitimacy of the said certification mark and labelling. The use of certification labels in the electronics industry has a long history. The European Commission's Waste Electrical and Electronic Equipment Directive and Restriction of Hazardous Substances Directive (RoHS Directive) are successful regional efforts to enforce environmentally sound product standards.⁶⁹ However, the viability of such certification marks and labels shall be in line with technical regulations under the WTO; otherwise, it may attract dispute settlement procedures. Thus, it is important to analyse relevant various WTO regulations and agreements regarding certification marks and labelling in international trade.⁷⁰

Certification and labelling under WTO: - Within the WTO Agreements, labelling schemes can be divided into two main categories, mandatory or voluntary. A mandatory scheme is established by law or a regulatory instrument and enforced by a regulatory mechanism. It can take the form of 'negative content' labelling or 'content neutral' labelling. Mandatory 'negative content' labelling informs consumers about the adverse health or environmental effects of the

⁶⁸ The e-Stewards® Standard for Ethical and Responsible Reuse, Recycling, and Disposition of Electronic Equipment and Information Technology, Basel Action Network (BAN), February 25, 2020, Version 4.0

⁶⁹ The EU Directives on WEE and on the Restriction of Use of Certain Hazardous Substances in Electrical and Electronic Equipment: Adoption Achieved, Hedemann-Robinson, Martin, 2003/02/01, European Energy and Environmental Law Review, volume 12

⁷⁰ Supra Note 64 Page Number 40

product and requires the disclosure of product information that otherwise remains hidden. This disclosure enables consumers to make informed purchasing decisions and incentivise manufacturers towards better product standards. When evaluating the applicability of certification and labelling schemes under the GATT/WTO agreements, it is crucial to determine whether the scheme is mandatory or voluntary and whether it constitutes a 'technical regulation' or a 'standard.' The applicability of these schemes is specifically governed by the TBT Agreement and generally by the provisions of GATT.

Applicability of the TBT Agreement: - The TBT Agreement's aim is to ensure that technical regulations, conformity assessment, and standards procedures would not create unnecessary obstacles to international trade.⁷¹ Thus, the proposed certification mark and labelling must conform to the TBT agreement when the UEEE are traded between countries. Such an agreement has a mandatory "technical regulation" that must be adhered to the voluntary "standard" where the compliance is voluntary. Since the proposed certification marks and labelling is intended to be mandatory, it shall be analysed with respect to technical regulation under the TBT Agreement. The TBT Agreement defines 'technical regulation' as:

*"A document which lays down product characteristics or their related processes and production methods, including the applicable administrative provisions, with which compliance is mandatory."*⁷²

While interpreting the certification mark and labelling, recourse shall be given to its proper interpretation. It shall be interpreted in good faith by giving its ordinary meaning while giving due regard to its context, aim, and purpose. Further, two factors with regard to this definition shall be considered to ensure that the proposed labelling and certification come under the technical regulation making it mandatory. The first aspect is the interpretation as to the word '*characteristics*'. For better understanding, the ordinary meaning of the said word is a distinguishing trait, quality, or property⁷³. Annex 1.1 of the TBT Agreement lists some of these characteristics to include '*terminology, symbols, packaging, marking or labelling requirement*.' Thus, the analyses depict that the proposed mark and label come under '*technical regulation*' under the TBT Agreement.

⁷¹ TBT, Agreement on Technical Barriers to Trade, 1868 UNTS 120

⁷² Ibid

⁷³ Merriam Webster online dictionary, <https://www.merriam-webster.com/dictionary/characteristic>, accessed June 2024

However, implementing certification and labelling requirements for UEE as proposed will have certain legal implications. The legality of a trade measure classified as a technical regulation depends on Article 2 of the TBT Agreement. It states that⁷⁴,

“in respect of technical regulations, products imported from the territory of any Member shall be accorded treatment no less favourable than that accorded to like products of national origin and to like products originating in any other country” and “technical regulations are not prepared, adopted or applied with a view to or with the effect of creating unnecessary obstacles to international trade..... technical regulations shall not be more trade-restrictive than necessary to fulfil a legitimate objective..... Such legitimate objectives are, inter alia, national security requirements; the prevention of deceptive practices; protection of human health or safety, animal or plant life or health, or the environment”.

Article 2.1, with respect to the proposed labelling and certification mark, has two implications. Firstly, whether new and used electrical and electronic equipment are deemed 'like products' and secondly, whether the proposed certification mark and label creates an *unnecessary obstacle to international trade*. New and used electrical and electronic equipment imported into developing countries differ significantly in several aspects, including the level of health and environmental risks they pose and consumer tastes and preferences. Thus, within the context of Article 2.1 of the TBT Agreement, these two types of products are not considered 'like products' Further, a detailed examination of Article 2.2 reveals that protecting human health and the Environment as the primary goals of the proposed certification and labelling scheme, are legitimate objectives explicitly recognized in this provision. Applying the TBT and GATT principles, the technical regulation's aim to protect human health and the Environment is both 'vital' and 'important to the highest degree.' The measure is 'necessary' as it will facilitate the importation of functional UEEE into developing countries while preventing the importation of e-waste that poses health and environmental hazards and would not amount to an *'unnecessary obstacle to trade.'*

Thus, the detailed analysis of the proposed certification marks and labelling reveals that it is a viable means to regulate the transboundary movement of UEEE while efficiently separating them from the WEEE.

⁷⁴ Supra Note 71 Page Number 45

Import restrictions

As discussed, the proposed certification and labelling scheme aims to establish a method for distinguishing between functional UEEE and obsolete e-waste, which poses risks to public health and the Environment in developing nations. While this paper supports unrestricted trade in functional UEEE in the former part, the latter part suggests that developing countries shall implement an import prohibition concerning obsolete e-waste. This trade restriction is motivated by the adverse health and environmental effects linked to e-waste in developing countries. Such an express ban on UEEE can contravene WTO provisions under Article XI:1 of the GATT. It states⁷⁵,

“No prohibitions or restrictions other than duties, taxes or other charges, whether made effective through quotas, import or export licenses or other measures, shall be instituted or maintained by any contracting party on the importation of any product of the territory of any other contracting party or on the exportation or sale for export of any product destined for the territory of any other contracting party.”

Article XI:1 forbids 'prohibition' and 'restriction' in relation to the importation of goods from Member states. Thus, a proposed ban in this chapter could amount to 'prohibition' and 'restriction' under Article XI:1. However, the WTO provisions generally prohibit trade-restrictive measures like import bans by member states, WTO regulations and legal interpretations recognize specific situations where such measures may still be deemed necessary and justified. Thus, the WTO contains certain exceptions to this general rule and the subsequent part of the chapter discusses the same.

General exceptions Article XX of GATT: - Article XX of the GATT enshrines various measures a member state can legitimately implement in pursuit of state policies beyond trade liberalization. It provides a framework for the resolution of conflicts between trade and other legitimate policy objectives that a member state might pursue, such as protecting human health or the Environment. It is important to note that the exceptions in Article XX are both 'limited and conditional'. They are limited because they apply only in specific circumstances, and they

⁷⁵ GATT 1994: General Agreement on Tariffs and Trade, 1994, April 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1A, 1867 UNTS 187, 33 ILM 1153 (1994)

are conditional because a measure's validity under Article XX depends on it not being an arbitrary or unjustifiable discrimination or a disguised restriction on international trade.⁷⁶

The relevant provision of Article XX states:

'Subject to the requirement that such measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade, nothing in this Agreement shall be construed to prevent the adoption or enforcement by any contracting party of measures:

(b) necessary to protect human, animal, or plant life or health⁷⁷;

Thus, Article XX(b) affirms the member states right to take necessary measures to safeguard human, animal or plant life or health. It thus provides an appropriate platform to test whether the proposed ban is in contravention to the provisions of WTO or can be incorporated as an exception under the Article XX(b) of the GATT. The wording '*human, animal or plant life or health*' connotes a health risk. The Panel in EC - Asbestos⁷⁸ noted that the notion of 'protection' and the use of the phrase 'policies designed to protect human life or health' implies the existence of a health risk⁷⁹. If no health risk is found, it implies that the measure was not intended to protect against any health risk. In such cases, the measure may clearly be protectionist and thus a disguised restriction on international trade, which goes against the principles and philosophies of trade liberalization. Here, an import ban on e-waste cannot be considered a disguised restriction on international trade as the health risk associated with obsolete e-waste is established through various research and studies internationally. However, whether an import ban on UEEE amounts to a disguised restriction on international trade must be looked into. Once a health risk requiring safeguarding is identified, the subsequent stage entails evaluating evidence to establish whether the measure in question was formulated to provide protection against the identified risk. After determining both, what is left to be

⁷⁶ Supra Note 64 Page Number 40

⁷⁷ Supra Note 75 Page Number 47

⁷⁸ European Communities - Measures Affecting Asbestos and Asbestos-Containing Products, Appellate Body Report and Panel Report, adopted on April 5, 200

⁷⁹ WTO | Environment - disputes 9, https://www.wto.org/english/tratop_e/envir_e/edis09_e.

considered is whether the measure is necessary to fulfil the stated policy objective under Article XX(b).⁸⁰

Now the question is whether the proposed ban is necessary to achieve the intended objective, i.e., protecting '*human, animal or plant life or health*'. While analysing this it is necessary that the member state must exhaust all available means before resorting to trade restrictive measures. Here, the alternative non-trade-restrictive measures are already discussed in the first part of the chapter and includes landfilling, recycling and incineration. We also established the associated health and environmental risks. It was further observed that those measures require state-of-the-art facilities for better results, which is lacking in developing countries. Additionally, it is also evident that such alternative measures do not result in the level of protection an outright ban provides. Thus, the proposed import ban is 'necessary' to fulfil the policy objective of protecting human health within the context of Article XX(b) GATT⁸¹.

Another probable justification for the ban on e-waste exports is found in paragraph (g) of Article XX, which allows exceptions for measures "related to the conservation of exhaustible natural resources, provided such measures are enforced alongside restrictions on domestic production or consumption." The Appellate Body in United States-Shrimp held that "exhaustible natural resources" must be read "in light of contemporary concerns of the community of nations about the protection and conservation of the environment." This suggests that an import ban intended to protect the Environment from the damaging effects of e-waste can be considered an exception under the Article XX(g)⁸².

Conformity with the Introductory Chapeau: - Article XX starts with an introductory paragraph or chapeau:⁸³

"Subject to the requirement that such measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade, nothing in this

⁸⁰ Supra Note 64 Page Number 40

⁸¹ Ibid

⁸² Jeanette Leary, Proposed Export Ban on Electronic Waste: Unsalvageable under WTO Analysis, 26 GEO. INT'L ENVTL. L. REV. 435 (2014).

⁸³ Supra Note 75 Page Number 47

Agreement shall be construed to prevent the adoption or enforcement by any contracting party of measures.”

A GATT-inconsistent measure, deemed necessary under any of the paragraphs in Article XX, must meet the conditions outlined in the introductory chapeau to be considered valid. Specifically, the measure must not be applied in a way that results in arbitrary or unjustifiable discrimination between countries with similar conditions, nor should it serve as a disguised restriction on international trade.⁸⁴ Determining this requires two separate examinations first, whether the import ban in our case constitutes arbitrary or unjustifiable discrimination. Second, whether the import ban acts as a disguised restriction on international trade, these chapeau requirements are essential to prevent the misuse of Article XX exceptions and ensure they are not exploited as a means of protectionism. Thus, the proposed import ban is neither arbitrary nor unjustifiable discrimination nor as a disguised restriction on international trade as it is not arbitrarily imposed on a single country or a group of countries but on any country, who intends to import e-waste. Thus, the only legitimate objective of the measure is to protect health and Environment, particularly in developing countries.

Export Restrictions

As developing countries have the legitimate obligation to regulate the import of e-waste from the developed countries, the exporting countries do, too have the responsibility to not to dump the e-waste generated in their country into a developing country. Similarly, like import bans, export bans can be a viable method to regulate the transboundary movement of e-waste into developing countries. Under this head an export ban implemented by a developed country is proposed. Such a ban may bring significant change in the area as records show that certain developed countries are the major generators of e-waste. However, the viability of such provisions with respect to the WTO shall be analyzed.

Export ban on specific e-waste to developing nations conflicts with several fundamental principles of the WTO under GATT, particularly Articles I and XI, pertaining to MFN treatment and the elimination of quantitative restrictions, respectively. By specifically targeting developing countries, the proposed ban would violate the MFN treatment principle of Article I of the GATT. This article mandates that "*any advantage, favour, privilege or immunity*

⁸⁴ Supra note 82 Page Number 49

*granted by any contracting party to any product originating in or destined for any other country shall be accorded immediately and unconditionally to the like product originating in or destined for the territories of all other contracting parties.*⁸⁵." Thus, an export ban targeting only the developing countries can be in violation to this provision.

Additionally, Article XI mandates that "*No prohibitions or restrictions other than any duties, taxes or other charges, whether made effective through quotas, import or export licenses or other measures, shall be instituted or maintained by any contracting party on the importation of any product of the territory of any other contracting party or on the exportation or sale for export of any product destined for the territory of any other contracting party*"⁸⁶". The stated purpose of the proposed ban is to prohibit the exportation of e-waste from a particular developed country to a developing country is at odds with this provision.

General exception under GATT XX(b): - Despite being in contravention to MFN principle and amounting to quantitative restriction, the proposed ban can be exempted under the general exceptions GATT XX of WTO. This implies that for the proposed export ban to qualify as an exception to the principles prohibiting quantitative restrictions and MFN treatment, it must fall under one of the specific exceptions listed in Article XX and satisfy the requirements under the introductory "chapeau". For the proposed export ban, GATT XX(b) and GATT XX(g) shall be analysed⁸⁷.

Article XX(b) provides an exception for trade measures "necessary to protect human, animal, or plant life or health." Harm to human health is frequently mentioned as a potential consequence of exporting e-waste to countries that are not equipped to manage it safely. It is well established throughout the chapter that e-waste handling could lead to lead poisoning, inhalation of carcinogenic gases, and the buildup of other toxins in workers' bodies. Thus, an export ban implemented by a developed country who are typically the major contributors towards e-waste can result in protecting protect human, animal, or plant life or health. For example, as per the Global E-waste Monitor 2024, "the Americas is one of the regions with the highest levels of e-waste generation globally, at 14 billion kg."⁸⁸.

⁸⁵ Supra Note 75 Page Number 47

⁸⁶ Ibid

⁸⁷ Ibid

⁸⁸Cornelis P. Baldé, Ruediger Kuehr, Tales Yamamoto, Rosie McDonald, Elena D'Angelo, Shahana Althaf, Garam Bel, Otmar Deubzer, Elena Fernandez-Cubillo, Vanessa Forti, Vanessa Gray, Sunil Herat, Shunichi Honda, Giulia Iattoni, Deepali S. Khatriwal, Vittoria Luda di Cortemiglia, Yuliya Lobuntsova, Innocent Nnorom, Noémie Pralat,

The next aspect that is needed to be considered is whether such an export ban "necessary" to protect human, animal, or plant life or health. The provision essentially stipulates that a member country of the WTO must exhaust all the available non-trade restrictive measures before resorting to trade restrictive measures. As we have discussed in the first part of the chapter, the alternative means are landfilling, incineration and recycling in developing countries and the effectivity of the same in protecting the health and managing the e-waste is highly questionable. Thus, the proposed export ban can be deemed necessary under the WTO. Mere justification of the export ban as *necessary* does not make it an exception under GATT XX(b), as the proposed export ban should achieve the intended objective. It is uncertain whether the trade ban will effectively protect human, animal, or plant life, and some suggest it could even be counterproductive. Unilateral measures are generally ineffective in addressing environmental damage. The export ban imposing the state will be just one of the many potential sources of e-waste, and the health and environmental risks are similar regardless of the waste's origin. Additionally, the measure could merely shift, rather than reduce, the trade in e-waste, as other countries might fill the demand for UEEE with their own exports.⁸⁹

Additionally, an export ban might not be what a developing country desire. While protecting human life and health is considered "important to the highest degree" and may receive some deference over trade liberalization, one country setting these goals for another sovereign nation may undermine this objective. The interests are not shared; the protected interest lies solely within developing countries, outside the jurisdiction of the policymaking country. It may deny the developing countries the ability to decide their trade measures. Additionally, the health risks are not caused by the electronic products themselves but by their handling after importation. Some countries affected by the ban might have the proper handling capabilities to eliminate these risks. However, since the measure is an outright export ban, the most trade-restrictive measure possible, it is likely to disrupt more trade than necessary to achieve its aim. Considering these factors, it is unlikely that the US export ban could be provisionally justified under Article XX(b) as necessary to protect human, animal, or plant life or health.

General exception under GATT XX(g): - The provisions in GATT XX(g) provide more meaningful justification for the proposed export ban as opposed to the GATT XX(b). It

Michelle Wagner (2024). International Telecommunication Union (ITU) and United Nations Institute for Training and Research (UNITAR). 2024. Global E-waste Monitor 2024. Geneva/Bonn.

⁸⁹ Supra note 82 Page Number 49

provides exceptions for measures "*relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption.*"⁹⁰ In United States-Shrimp, the Appellate Body dismissed the notion that "exhaustible natural resources" should be restricted to finite resources like minerals, rather than biological or renewable resources. Instead, the term "exhaustible natural resources" should be interpreted "in light of contemporary concerns of the community of nations about the protection and conservation of the environment." Thus, the proposed export ban aims to protect the Environment from the harmful effects of poorly managed hazardous waste, water, and soil, which may be considered exhaustible natural resources under paragraph (g).

Another issue is with regard to the territorial nexus. The proposed export ban is implemented by a developed country for the protection of the exhaustible natural resources of other countries, thus raising questions regarding jurisdiction and nexus. The GATT does not have any provisions specific to territorial nexus; however, in the GATT XX(g) it is stated that that such measures shall be "made effective in conjunction with restrictions on domestic production or consumption," suggesting that the proposed export ban should have some kind of relationship to domestic policies or interests.

In United States-Shrimp⁹¹, the Appellate Body, while examining the jurisdictional limitations to Article XX(g), indicated the need for a territorial nexus. The Appellate Body found a sufficient nexus since sea turtles generally migrate through multiple countries' waters and the high seas, with some presence in US waters, even though not all populations of the endangered species entered US waters. Similarly, the water we use and the air we breathe are considered to be common pool resources, i.e., nobody owns them and also pollution in developing countries may reach developed countries. However, groundwater and soil pollution in developing countries may have little-to-no geographic connection to the imposing country and thus may not have a territorial nexus.

Introductory chapeau: - Assuming the proposed export ban can be provisionally justified under one of the discussed exceptions, it must then meet the requirements of the introductory chapeau of Article XX. The chapeau mandates those measures "are not applied in a manner

⁹⁰ Supra Note 75 Page Number 47

⁹¹ United States - Import Prohibition on Shrimp and Shrimp Products, Recourse to Article 21.5 by Malaysia, Appellate Body Report and Panel Report, adopted on November 21, 2001

that would constitute arbitrary or unjustifiable discrimination between countries where the same conditions prevail or a disguised restriction on international trade."⁹²

The export measure in question leads to discrimination, as exports are treated differently depending on their destination. The export to developing countries are banned, while those to developed countries are not. The key issue is whether there is a rationale behind this discrimination that prevents it from being arbitrary and unjustifiable. A look into the World Trade Organization, Ministerial Decision on Trade and Environment, "rules to enhance the positive interactions between trade and environmental measures, for the promotion of sustainable development, with special considerations to the needs of developing countries, in particular those of the least developed among them"⁹³ read along with introductory chapeau shows that the proposed export ban could be justifiable under the introductory chapeau.

The international trade in used UEEE has evolved to be a channel for the transboundary disposal of e-waste in developing nations, leading to detrimental effects on human health and the Environment. This pattern emerges due to the lack of an effective regulatory framework to differentiate between functional UEEE and obsolete e-waste. The above identified trade-restrictive as well non-trade-restrictive measures may be adopted to regulate the transboundary movement of e-waste. Further, under the non-trade-restrictive measures, landfilling, incineration, and recycling are available options. But concluded that such measures require state-of-the-art facilities for it to be effective, which is explicitly lacking for developing countries. Then the trade-restrictive measures have proposed a certification mark and labelling mechanism that can aid in the regulation of the transboundary movement of the UEEEs and has analysed the conformity of the same with respect to the technical regulations under the TBT agreement. The latter part explored the import bans that could be implemented by the developing countries and the export bans that could be implemented by the developed countries as a means to regulate the transboundary movement of e-waste. Under the import ban, the conformity of the same with regard to the WTO GATT provisions, particularly GATT XX(b) and GATT XX (g) and introductory chapeau, was looked into and analysed. The same was also analysed with regard to the proposed export ban by developed countries, along with an analysis of territorial nexus.

⁹² Ibid

⁹³ World Trade Organization, Ministerial Decision on Trade and Environment, April 14, 1994

Thus, it is sufficient to conclude that several trade-restrictive and non-trade-restrictive measures can be implemented by developing and developed countries to properly regulate the transboundary movement of e-waste. Acknowledging the commercial potential that the trade in UEEE offers to developing countries, adequate measures shall be implemented by the developing countries to facilitate the same. The chapter noted the inability of developing countries to regulate the flow of e-waste towards their country. This inability can be attributed to economic incapability; understanding such an economic incapability, international organizations and developed countries shall aid developing countries through technology transfer, knowledge sharing, information sharing etc.

CHAPTER 4

ELECTRONIC WASTE GENERATION IN INDIA AND THE EFFECTIVENESS OF THE ELECTRONIC WASTE MANAGEMENT RULES, 2022

India, as per the Global E-waste Monitor, is the world's third largest generator of electronic waste only behind the United States and China. India is also a forerunner in the region when it comes to e-waste legislation and infrastructure for collection and recycling⁹⁴. The chapter thus, analyses the evolution of the laws governing electronic waste in India in the first part and then analyses the effectiveness of the Electronic Waste Management Rules, 2022 giving specific focus to its shortcomings.

4.1 EVOLUTION OF THE LAWS GOVERNING ELECTRONIC WASTE

India over the past 30 years have been subject to immense globalisation, digitalisation and economic liberalisation. Indians are also forerunners in technology usage as well. An average Indian uses multiple electronic gadgets daily and those devices have become indispensable to their day-to-day life. Thus, accumulation of large quantities of electronic waste is inevitable. For a long period of time the concerns surrounding electronic waste was overlooked in India. However, the current scenario depicts India as a forerunner. Thus, it is essential to analyse the evolution of the laws governing the electronic waste in India.

The Water (Prevention and Control of pollution) Act of 1974⁹⁵ and The Air (Prevention and Control of pollution) Act of 1981⁹⁶, indirectly deals with electronic waste. As the non-environmentally sound management of electronic waste leads to environmental pollution including air and water, the penal provisions under both the acts are applicable here as well. Specifically, The Air Act includes five penal provisions namely, sections 37, 38, 39, 40, and 41. Additionally, sections 21, 22, and 31A are also of significance. Sections 37, 38, and 39 address individual liability, penalizing those who fail to comply with sections 21 and 22, and directions issued under section 31A. Finally, Section 40 establishes company liability, while

⁹⁴ Cornelis P. Baldé, Ruediger Kuehr, Tales Yamamoto, Rosie McDonald, Elena D'Angelo, Shahana Althaf, Garam Bel, Otmar Deubzer, Elena Fernandez-Cubillo, Vanessa Forti, Vanessa Gray, Sunil Herat, Shunichi Honda, Giulia Iattoni, Deepali S. Khatriwal, Vittoria Luda di Cortemiglia, Yuliya Lobuntsova, Innocent Nnorom, Noémie Pralat, Michelle Wagner (2024). International Telecommunication Union (ITU) and United Nations Institute for Training and Research (UNITAR). 2024. Global E-waste Monitor 2024. Geneva/Bonn.

⁹⁵ The Water (Prevention and Control of pollution) Act of 1974, effected on 23rd March, 1974

⁹⁶ The Air (Prevention and Control of pollution) Act of 1981, effected on 29th March, 1981

section 41 imposes liability on government departments. Similarly, the Water Act contains seven penal provisions namely, sections 41, 42, 43, 44, 45A, 47, and 48. Important related sections include 20(2), 20(3), 26, 24 32(1)(c), 33(2), and 33A⁹⁷, which form the basis of various offences under the Act. These provisions are relevant indirectly, as improper dismantling, recycling and transboundary movement of electronic waste could lead to air and water contamination and pollution.

Further penal provisions under the Indian Penal code⁹⁸ relating to pollution is also applicable to the pollution caused by the improper handling and transboundary movement of electronic waste. To an extent, sections 268, 269, 270, 277, 278, 284 and 290 dealing with offences relating to public health and safety and are applicable to E-wastes. To be specific, section 269 stipulates that, “*Whoever unlawfully or negligently does any act which is, and which he knows or has reason to believe to be, likely to spread the infection of any disease dangerous to life, shall be punished with imprisonment of either description for a term which may extend to six months, or with fine, or with both*⁹⁹”. Further, section 277 of IPC, “*Whoever voluntarily corrupts or fouls the water of any public spring or reservoir, so as to render it less fit for the purpose for which it is ordinarily used, shall be punished with imprisonment of either description for a term which may extend to three months, or with fine which may extend to five hundred rupees, or with both*¹⁰⁰”. These provisions directly deal with health and environment and the which is exactly what the concerns related to electronic waste is also about.

These are the laws that indirectly govern the issue of electronic waste in India. Now let’s analyse specific legislations that have a direct bearing on the electronic waste issue in India.

Environment Protection Act, 1986

India had witnessed the Bhopal gas tragedy on the wake of 2nd and 3rd December in the year 1984. In the wake of the tragedy India has enacted the Environment Protection act, on November 19, 1986, which is an umbrella legislation that governs several rules. The Act grants the Central Government extensive authority to implement any measures it considers necessary or appropriate for protecting and enhancing environmental quality. This includes preventing,

⁹⁷ Indian Law on E waste: The mismatching variable?. <https://www.legalserviceindia.com/legal/article-5563-indian-law-on-e-waste-the-mismatching-variable-.html>

⁹⁸ The Indian Penal Code, 1860 (Act 45 of 1860), s. 300.

⁹⁹ The Indian Penal Code, 1860 (Act 45 of 1860), s. 269

¹⁰⁰ The Indian Penal Code, 1860 (Act 45 of 1860), s. 277

controlling, and reducing environmental pollution, setting environmental quality standards, and establishing procedures and safeguards for handling hazardous substances, manufacturing processes, and materials¹⁰¹. The Hazardous Waste Management Rules, 1989 under the act is the first legislation that deals specifically about hazardous substances and since electronic waste from its very nature itself is a hazardous waste the rules became directly applicable to e-waste as well.

Hazardous waste Management and Handling rules, 1989

As per the section 6, 8 and 25 of the Environment Protection Act, 1986, the Hazardous Waste Management Rules, 1989¹⁰² was introduced by the Central Government in July 18, 1989. The rules were notified by the Ministry of Environment and Forests to bring focus towards, classification of hazardous waste based on its diverse nature and transboundary movement of such waste¹⁰³. The rules have undergone several amendments over the years. Particularly, 2000, 2003, and 2008¹⁰⁴. The 2008 amendment is of importance because, the rules began to address e-waste directly. By 2008, the rules became The Hazardous Waste (Management, Handling and Transboundary Movement) rules, 2008. 2008 is of significance as it directly addressed e-waste in the Indian scenario.

Batteries (Management and Handling) Rules, 2001

May 16, 2001 the ministry of Environment and Forests notified the rules to prevent the potential environmental and health hazards caused by the informal management and handling of used lead-acid batteries. *The Rules make it mandatory for consumers to return used batteries and make manufacturers/assemblers/reconditioners/importers responsible for collection of batteries*¹⁰⁵. Thus, making all the manufactures, consumers, assemblers, reconditioners, and importers under the purview of this rules.¹⁰⁶ The rules were subsequently amended in 2010 to

¹⁰¹ Dr.Md. Zafar Mahfooz Nomani & Anis Ahmad Need for electronic waste laws in India <http://www.countercurrents.org/nomani310508.htm> visited on 28th Feb 2012.

¹⁰² MoEF. 2008. "Guidelines for Environmentally Sound Management of E-waste". New Delhi: Ministry of Environment and Forests; and MoEF. 2015. "Hazardous Substances Management (ISM): Introduction", at <http://www.mtoef.gov.in/division/introduction-12>.

¹⁰³ CENTRAL POLLUTION CONTROL BOARD, NATIONAL POLICY ON HAZARDOUS WASTE, <https://mpcb.gov.in/sites/default/files/focus-area-reports-documents/NationalPolicy.pdf>

¹⁰⁴ MoEF. 2008. "Guidelines for Environmentally Sound Management of E-waste". New Delhi: Ministry of Environment and Forests; and MoEF. 2015. "Hazardous Substances Management (ISM): Introduction", at <http://www.mtoef.gov.in/division/introduction-12>.

¹⁰⁵ BATTERIES (MANAGEMENT AND HANDLING) RULES, 2001 NOTIFIED by MoEF, May 16, 2001 in order to regulate the collection and recycling of the used lead-acid batteries in the country.

¹⁰⁶ Chattetjee. S. 2012. "India's Readiness on ROHS Directives: A Strategic Analysis". Global Journal of Science Frontier Research 10(1): 14 26.

include, an expanded definition of bulk consumers to incorporate,” *departments of central and state governments, boards and other agencies or companies who purchase hundred or more batteries per annum. The new batteries shall only be sold only to the registered dealers*”. Additionally, also brought importers who are registered for more than 5 years under the expanded definition, giving emphasis to transboundary movements as well. The importers registered for 5 years and subsequent cancellations, the amended rules also mandated the submission of already made records connected to used batteries, sources, quantities and metal yield to be available to the SPCB for inspection.

Subsequently, the rules were further amended with the publication of draft rules in 2020 and the new legislation became, Battery Waste Management Rules, 2022. The new rules brought the following changes, firstly, all the primary (non-rechargeable) and secondary (chargeable) cells were brought under the purview of the law. The legislation further expanded the extended producer responsibility along with bringing an online portal for EPR certificates. The new rules also set targets for recovery of battery materials namely, 70% by 2024-25, 80% by 2026, and 90% by 2026-27.

The Hazardous Waste (Management, Handling and Transboundary Movement) rules, 2008

Until with incorporation of provisions specific to e-waste into The Hazardous Waste (Management, Handling and Transboundary Movement) rules, 2008, the issue of e-waste was more or less neglected. The rules have addressed the hazardous nature of the e-waste carrying harmful substances like lead, mercury and cadmium. In the Part B, **List of hazardous waste applicable for import and export not requiring prior informed consent**, entry B1110 has addressed the import and export of **electric and electronic assemblies**. Such assemblies containing lead, mercury, cadmium and polychlorinated biphenyl are prohibited from transboundary movement. Additionally, Schedule IV of the Hazardous Waste Rules, 2008 mandated that e-waste recyclers must register with the CPCB.¹⁰⁷

Guidelines for Environmentally sound management of E-waste

Central Pollution Control Board (CPCB) issued guidelines for the environmentally sound management of e-waste in April 2008. The guideline gave emphasis to the need for separate legislation pertaining to the e-waste management incorporating principles of Extended Producer Responsibility (EPR) and Restriction of Hazardous Substances (RoHS). This main

¹⁰⁷ Central pollution control board (CPCB), statutory organisation, was constituted in September, 1974 under the Water (Prevention and Control of Pollution) Act, 1974.

purpose of the guideline was to provide assistance on identifying various sources of e-waste and to outline procedures for handling e-waste in an environmentally responsible manner. These Guidelines were applicable to all stakeholders namely, generators, collectors, transporters, dismantlers, recyclers, and other stakeholders, regardless of their scale of operation¹⁰⁸

The electronic waste Management rules

The management of electronic waste in India has been a topic of discussion among stakeholders since 2003. At that time, existing regulations were inadequate to address the specific challenges posed by e-waste, given its unique characteristics. E-waste, being post-consumer and hazardous when improperly recycled, shared traits with both Municipal Solid Waste and Hazardous Waste. Categorizing e-waste under either category would result in regulatory gaps. Thus, initial discussions evolved from treating non-hazardous e-waste as municipal solid waste and hazardous fractions as hazardous waste, to recognizing e-waste as a distinct waste category requiring specific laws. Thus, the upcoming part of the chapter outlines the process leading to the development of e-waste policy. Currently, e-waste is acknowledged as a significant challenge in the Government of India's waste management policies, driven by high increased usage of electronic and electrical appliances, increased disposal rates, and greater awareness of the toxicity and hazards associated with improper disposal¹⁰⁹.

The issue of transboundary movement of e-waste was first brought by the Basel Action Network (BAN) and¹¹⁰ Toxics Link in 2003¹¹¹. They raised concerns about the dumping of electronic and electrical appliances (EEE) in developing countries under the guise of charity and donation, the backyard recycling practices, the toxic hazards of improper disposal, and occupational health and safety issues. The issue was further accelerated when India emerged as a hub for both the production and consumption of EEE, characterized by high levels of

¹⁰⁸ Central Pollution Control Board, India releases 'Guidelines for Environmentally sound management of E-waste' - Good Electronics. <https://goodelectronics.org/central-pollution-control-board-india-releases-guidelines-for-environmentally-sound-management-of-e-waste/>

¹⁰⁹ Policy Cycle – Evolution of E-waste Management and Handling Rules, Ashish Chaturvedi, Rachna Arora, Sharon Ahmed, National Conference on Sustainable Management of E-waste 14-15 December 2010, Annexure 5.2, Bhaskaracharya College of Applied Sciences

¹¹⁰ BAN is a Seattle based not for profit organisation named after the Basel convention which works to control the export of hazardous waste from technology and other products from industrialized countries to developing countries.

¹¹¹ Toxics link is a not-for-profit organisation based on New Delhi that works dedicated to bring toxics-related information into the public domain.

obsolete e-wastes. While acknowledging the business potential in e-waste management, the first formal recycling unit, E-Parisara¹¹², was established in Bangalore¹¹³.

The issue of e-waste started gaining recognition from the policy makers in 2004 with a focus of incorporating the same into the regulatory framework for hazardous waste management. The government showed initial reluctance to formulate a separate legislation since e-waste was already dealt under hazardous waste regulations. Following the amendment of hazardous waste rules in 2008, and with the incorporation of e-waste specific mandates, it was believed these rules would be sufficient for managing e-waste. Consequently, the government issued draft guidelines for the environmentally sound management of e-waste. These guidelines, included important e-waste policies such as Extended Producer Responsibility (EPR) and Restrictions of Hazardous Substances (RoHS), however, these were not made mandatory. The primary reason behind the callous nature is due to the lack of awareness of the harmful effects of the e-waste on human health and environment. Secondly, there was scepticism regarding the impact of a separate e-waste legislation reliant on current management practices, anticipating that mere formulation of a separate legislation would not amount to its implementation.

Subsequently, a consortium of four organizations, GTZ¹¹⁴, Toxics Link, Greenpeace, and MAIT¹¹⁵ was entrusted with the formulation of a draft legislation. After extensive deliberation, the draft rules and a justification note endorsed by industry and environmental groups outlining the need for separate legislation was submitted to the government of India. Following this, the government took a proactive role in advancing the legislation. After a thorough review and significant amendments, the government notified the draft rules in May 2010.

¹¹² E-Parisara Pvt. Ltd, founded on September 2005, is an organisation working in recycling, handling, and reusing of Waste Electrical and Electronic Equipment (WEEE) in eco-friendly way.

¹¹³ Policy Cycle – Evolution of E-waste Management and Handling Rules, Ashish Chaturvedi, Rachna Arora, Sharon Ahmed, National Conference on Sustainable Management of E-waste 14-15 December 2010, Annexure 5.2, Bhaskaracharya College of Applied Sciences

¹¹⁴ G T Z (INDIA) PVT LTD is a Private Limited Company, incorporated under the Companies Act. It is classified as non-govt company and is registered at RoC-Kolkata.

¹¹⁵ Established in 1982, MAIT is the apex industry body representing the Electronic H/W sector in India. A not-for-profit body, MAIT closely works with policy makers of Central and State Government to enable the growth of the Electronic System H/W Design & Manufacturing sector in India.

The E-waste (Management and Handling) Rules, 2011

The E-waste (Management and Handling) Rules proposed in 2010 was officially notified in May 2011, and came into effect on May 1, 2012. The rules aim was to address e-waste management issues, promote environmentally sound management of e-waste, and result in the reduction of the use of hazardous materials in the manufacturing of electronic devices is India's first exclusive rules dedicated to e-waste. The guidelines proposed by the rules consisted several treatment options and technologies along with entrusting the state Pollution Control Boards (PCBs) and Pollution Control Committees (PCCs) to grant consent to establish and authorize units for recycling electronic waste¹¹⁶. Though the concept of extended producer responsibility was suggested in the CPCBs environmentally sound management of e-waste 2008, the 2011 rules have introduced it while holding the producers of electronic and electrical equipment (EEE) accountable for management of the electronic device when reach their end life. Such regulations were applicable to all the producers, consumers, bulk consumers, collection centres, recyclers, and dismantlers involved in the manufacturing, selling, purchasing, and processing of EEE or its components.

Under the introduced EPR, producers have the responsibility to educate the consumers about the hazardous nature of the devices they are purchasing and provide assistance and instructions regarding the proper handling of the end-of-life equipment. Such a process shall be undertaken through providing booklets that detail practices to prevent e-waste from being discarded with household trash. Producers are also required to establish e-waste collection centres and create take-back systems to help consumers in process. According to the rules, bulk users must ensure that the e-waste they generate is directed to authorized collection centres or returned to the producers.

Restriction of Hazardous Substances (RoHS): - RoHS is a significant component of the E-waste Rules, 2011. The concept aims to limit the use of hazardous substances such as lead, mercury, cadmium, and brominated flame retardants in EEE. The Restriction of Hazardous Substances (RoHS), effective since May 2014, imposes the same maximum concentration limits for six substances as the European Union¹¹⁷ but covers a different range of products

¹¹⁶ MoEF. 2010. "Report of the Committee to Evolve Road Map on Management of Wastes in India". New Delhi: Ministry of Environment and Forests.

¹¹⁷ EU regulations limit the use of specific hazardous substances in electrical and electronic equipment through the RoHS Directive. This directive as of now restricts the usage of ten substances namely, lead, cadmium, mercury,

making the EEE producers responsible in ensuring that the newly made products do not contain lead, mercury, cadmium, hexavalent chromium, polybrominated diphenyl, or ethers above 0.1 percent in weight in a homogeneous material of lead, mercury, and hexavalent chromium, and 0.01 percent by weight for cadmium. EEE components manufactured or on the market six years prior to these rules were exempted. Any reduction in hazardous materials in EEE must be reflected in the product information. Imports or market placements of new EEE were permitted considering the said rules. Manufacturing and supplying EEE for defence and similar strategic applications were excluded. The rules also mandated that the reduction of hazardous substances in manufactured or imported EEE must be achieved within two years from May 1, 2014 and the rules covering the guidelines for reducing hazardous substances in EEE manufacturing was dealt under Chapter V.

Shortcomings: - Although e-waste management rules 2011 filled the legislative gap regarding the e-waste concerns that were prevalent, it suffered from several setbacks. Firstly, A study by the Department of Electronics and Information Technology in India identified over 3,000 scrap dealers competing with official waste disposal agents showing how the rules failed in integrating the informal e-waste collection, segregation, and dismantling processes into the framework¹¹⁸. They also failed to provide an action plan for the integration of the informal sector which is imperative for the scientific disposal and sustaining informal sector livelihoods.

Secondly, the rules failed to address the transboundary movement of e-waste. Specifically, it ignored the concerns regarding imported e-waste. During that time, largest share of e-waste came from US and China followed by the European Union with China and US contributing 42% and 30% respectively followed by EU who stood at 18% along with the remaining 10% coming from Japan, Thailand etc. Such import not only included UEEE but also included WEEE which was prohibited for transboundary movement under the Basel Convention. India being a signatory should have promptly addressed the issue through the legislation and yet it failed in that manner. The e-waste management rules, 2011.

hexavalent chromium, polybrominated biphenyls (PBB), polybrominated diphenyl ethers, bis(2-ethylhexyl) phthalate, butyl benzyl phthalate, dibutyl phthalate, and Di isobutyl phthalate (DIBP).

¹¹⁸ See website of Ministry of Electronics and Information Technology at <http://meity.gov.in/esdm/policies>.

Thirdly, the applicability of the rules was limited towards the e-waste that were generated prior to 2012. Thus, leaving the historical e-waste out of the equation. Thus, also excluding the disposal, management or handling of the same.

Fourthly, Section 15 of the Environment Protection Act outlines penalties for violators, including 5-7 years imprisonment and fines up to Rs 1 lakh (100,000 rupees). However, lax regulatory and monitoring systems result in poor compliance, with only seven out of the top 50 electrical producers having sustainable e-waste management system.

Finally, the manufacturers and producers were obligated to make certain that their e-waste is disposed of in an environmentally sound manner. However, the rules failed to address what specific technology or process shall be used for e-waste recycling.

Electronic waste Management rules, 2016

The new electronic waste Management rules, 2016 came into effect in October 1, 2016. The new legislation expanded to include manufacturers, dealers and refurbishers. The inclusion of manufacturers was a new addition depicting that the rules acknowledge the difference between producers and manufacturers. The previous amendment only included EEE and the new rules incorporated, components, consumables, spare and parts of EEE. The e-waste rules, 2016 further focussed on the scientific management of e-wastes like CFL and other lamps that contain mercury. Under the previous rules exemption was given to micro and small business sectors with respect to EPR, the 2016 rules also followed the same. However, they were made part of the responsibility of manufacturers without giving them the obligation of EPR. Earlier rules not only made the producers obligated to implement collection centres but included any person, agency or association. The 2016 rules made it the sole responsibility of the producer to establish collection centres. Further, EPR targets were established aiming, 30% of e-waste collection by the first two years, 40% by third and fourth year, 50% by fifth and sixth years, and 70% by seventh year. PROs were also established under that, they acted as Producer Responsibility Organisations established and funded by producers to aiding in the handling and environmentally sound management of collected end-of-life products.

Additional features, such as the Deposit Refund Scheme (DRS), the simplification of authorization and registration processes, and the exemption of collection centres from such processes were seen as an encouragement for more stakeholder participation. Although the new

regulations brought all relevant stakeholders under purview of the legislation, regulatory gaps remained. Inclusion of manufacturers as stakeholders and Producer Responsibility Organisations (PROs), were certainly a positive step. However, given India's geographical spread, the producers would not find it economically feasible or beneficial to set up a nation-wide PRO. A transition from collection centres to a collection mechanism approach can also be seen in the 2016 rules. Additionally, an adoption of a target-based approach for the implementation of EPR, as seen in countries like Japan, the UK, and Korea, has also been adopted. Overall, the e-waste rules are more comprehensive and has placed more responsibility on Pollution Control Boards (PCBs), necessitating increased manpower and technical support for better compliance.

The rules were further amended in 2018 with the inclusion of the following, a revised collection target stipulating, 10% by 2017-18 and 10% increase every year until 2023. After 2023, the E-Waste collection target was fixed at 70% of the waste generation¹¹⁹. Further, separate collection targets were brought for new producers, particularly those with sales operations lesser than the average life of their product.

Shortcomings: - Although the e-waste management rules brought several positive additions and steps towards the intended goal it failed in several ways as well. Firstly, the dominance of the informal sector in e-waste management was largely left unnoticed and required urgent attention. Long-term policies like the e-waste management rules should give emphasis on the proper integration and coexistence of the informal sector as several stakeholders are involved and several factors are to be taken into account.

Secondly, although the new rules were successful in outlining various stakeholders and their roles, their proper implementation posed several persisting challenges. Some of them can be attribute to lack of personals, lack of monetary support, and staggering technical resources, particularly within Pollution Control Boards (PCBs). The rules also failed to address the limited monitoring and regulatory capacity, which hampers the ability to control pollution and manage waste effectively. Assigning more responsibilities to PCBs without enhancing their capacity will strain these already overstretched officials and reduce regulatory effectiveness. Additionally, the regulatory costs of identifying and monitoring numerous refurbishers, manufacturers, and dealers may pose a major challenge for PCBs.

¹¹⁹ EPR Recycling Targets in India | Extended Producer Responsibility. <https://enterclimate.com/epr-recycling-targets>

Thirdly, while the inclusion of manufacturers, dealers, and refurbishers as key stakeholders is a positive step, it raises concerns about outcomes. Many refurbishers, along with some manufacturers and dealers, operate within the informal sector. Inclusion of all these stakeholders without identifying, monitoring, and regulating all these stakeholders in the informal sector will pose a significant challenge for the proper implementation, monitoring and compliance. Fifthly, the effective implementation of the rules largely depends on producers. While some have take-back systems in place, others have not taken steps to collect e-waste from consumers. If producers approach the Deposit Refund Scheme (DRS) with the same reluctance, the policy will fail. Additionally, many firms might hesitate to increase purchase prices, foreseeing a loss in sales and diminishing market share. Sixthly, consumer awareness remains crucial. Without increased consumer awareness and motivation to recycle e-waste through formal channels, initiatives like PRO and DRS may face significant challenges. Lastly, there is a need to include end-of-life (EOL) solar panels as e-waste. With India's goal to install 20 gigawatts of solar power capacity by 2022, an accountable EOL solar panel management system is necessary to address the resulting waste problem.

4.2 THE ELECTRONIC WASTE MANAGEMENT RULES 2022 AND ITS EFFECTIVENESS

As the world's third-largest e-waste producer, India generates around 3.2 million tonnes each year, mirroring the country's growing digital presence. This increasing volume is primarily driven by the IT sector, which accounts for 8% of the nation's GDP and is marked by rapid technological progress and the quick obsolescence of electronic devices. The scale of the e-waste crisis poses a significant environmental and public health threat. With merely about 5% of India's e-waste being officially recycled, the majority is processed in informal recycling centres, resulting in dangerous environmental and health consequences. As India advances in technological innovation, it faces the urgent challenge of establishing sustainable and efficient e-waste management solutions. This need extends beyond environmental responsibilities, becoming crucial for the responsible development of its electronics industry and the health of its citizens. After discussing about the legislative evolution of the e-waste governance in India. A detailed analysis about the current legislation in action i.e. The E-Waste (Management) Rules, 2022 is necessary.

The rules were published by the Ministry of Environment, Forest and Climate Change, vide notification number S.O. 360 (E), in the Gazette of India, dated the 19th May, 2022¹²⁰. The rules came into force in the 1st day of April, 2023. The rules currently are applicable to, *every manufacturer, producer refurbisher, dismantler and recycler involved in manufacture, sale, transfer, purchase, refurbishing, dismantling, recycling and processing of e-waste or electrical and electronic equipment listed in Schedule I, including their components, consumables, parts and spares which make the product operational but shall not apply to waste battery, atomic waste and micro enterprises*¹²¹.

Responsibilities: - Chapter III of the rules have delineated the responsibilities of the producers, manufactures, bulk consumers refurbishers, recyclers and the state government or union territories. All the manufacturers, producers, bulk consumers, recyclers and refurbishers are mandated to register to the portal¹²² and file annual and quarterly returns. Manufacturers are mandated to, *collect e-waste generated while the manufacture of any EEE and ensure that its recycled or properly disposal off*.¹²³ Further, the producers of electronic and electrical equipment are responsible for, *obtaining and implementing extended producer responsibility targets*¹²⁴ as mandated by the rules. Additionally, the rules have also made the producers responsible to create awareness through various medias, publications, advertisements etc. Recyclers have additional responsibilities including, ensuring that recycling facility is in accordance with the CPCB, ensuring that the un-recycled materials are sent to the registered recyclers, and to keep record of waste collected, dismantled and recycled. Further, just like the producers the recyclers are also held responsible for educating the public and spreading awareness.

Procedure for storage of electronic waste: - Procedure for storage for electronic waste is dealt under chapter IV of the rules. Rule 11 stipulates that, *every manufacturer, producer, refurbisher and recycler may store the e-waste for a period not exceeding one hundred and eighty days and shall maintain a record of sale, transfer and storage of e-wastes and make*

¹²⁰MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE NOTIFICATION, New Delhi, the 2nd November 2022, E-Waste (Management) Rules, 2022

¹²¹ ibid

¹²² 'portal' means the online system developed by the Central Pollution Control Board for the purposes of these rules, MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE NOTIFICATION, New Delhi, the 2nd November 2022, E-Waste (Management) Rules, 2022

¹²³ Chapter III rule 5.2, MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE NOTIFICATION, New Delhi, the 2nd November 2022, E-Waste (Management) Rules, 2022

¹²⁴ Chapter III rule 6.2, MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE NOTIFICATION, New Delhi, the 2nd November 2022, E-Waste (Management) Rules, 2022

*these records available for inspection and the storage of the e-waste shall be done as per the applicable rules or guidelines for the time being in force*¹²⁵. Thus, the rules regarding the transboundary of movements of e-waste comes under this head and the rules specific to the same are dealt in detail under The Hazardous Waste (Management, Handling and Transboundary Movement) rules.

Management of solar photo-voltaic modules or panels or cells: - Chapter V rule 12 deals with the same. The rule is applicable to solar photo-voltaic modules or panels or cells. As per the rules, every manufacturer and producer of solar photo-voltaic modules or panels or cells shall, register in the portal and file annual returns. It further mandates that, every such manufacturer and producer shall store solar photo-voltaic modules or panels or cells waste generated up to the year 2034- 2035 as per the guidelines laid down by the Central Pollution Control Board.

Extended Producer Responsibility Framework: - Chapter II of the rules deals with the extended producer responsibility framework. It includes four categories of entities, namely, manufacturers, producers, refurbishers, and recyclers. The rules make these entities must register on the Central Pollution Control Board's (CPCB) dedicated online portal mandatorily. Further, each entity is required to register under its respective category, and conducting business without registration is strictly forbidden. Additionally, registered entities are prohibited from engaging with any unregistered manufacturers, producers, recyclers, or refurbishers.

Chapter VI further talks about the modalities of extended producer responsibility regime, Extended producer responsibility Certificate Generation w.r.t recycling and refurbishing, and Transaction of extended producer responsibility certificates. Producers EPR policy is stipulated under schedule III and schedule IV of the rules. Rule 13 has talked about PROs. The rule stipulates that, *“all producers shall fulfil their extended producer responsibility obligation as per Schedule-III and Schedule-IV, in doing so they may also take help of third-party organisations such as **producer responsibility organisations**, collection centres, dealers etc”*¹²⁶. Further, rule 13.3 stipulates that *the producer shall fulfil their extended producer*

¹²⁵ Chapter IV rule 11, MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE NOTIFICATION, New Delhi, the 2nd November 2022, E-Waste (Management) Rules, 2022

¹²⁶ Chapter VI rule 13, MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE NOTIFICATION, New Delhi, the 2nd November 2022, E-Waste (Management) Rules, 2022

*responsibility through online purchase of extended producer responsibility certificate from registered recyclers*¹²⁷. Thus, moving on to the EPR certificates, rule 14 of the same chapter talks about, Extended producer responsibility Certificate Generation with regard to recycling and refurbishing. The CPCB is entrusted with the generation of extended producer responsibility certificate through their portal.

Reduction in the use of hazardous substances: - Chapter VII of the act deals with Reduction in the use of hazardous substances in the making of EEE and their components or consumables or parts or spares. Rule 16 mandates that every such producer listed in Schedule I shall ensure that, new EEE and their consumables, components, parts, spares should not contain Lead, Mercury, Hexavalent Chromium, Cadmium, polybrominated biphenyls and polybrominated diphenyl ethers more than a maximum concentration value of 0.1 per cent by weight in a homogenous material for lead, mercury, hexavalent chromium, polybrominated biphenyls and polybrominated diphenyl ethers and of 0.01 per cent by weight in homogenous materials for cadmium¹²⁸. However, components or consumables or parts or spares required for the EEE placed in the market prior to the 1st May, 2014 is exempted from this rule if such spares and parts are not available. Further the chapter VII mandates that such products that adhere to the said rules on RoHS shall only be placed in the market through imports. Manufacturers are also under the purview of this rules.

Environmental Compensation: - Chapter VIII rule 22 deals with environmental compensation. The Central Pollution Control Board (CPCB) is tasked with creating guidelines for imposing and collecting environmental compensation on entities that violate e-waste management rules. These guidelines, include penalties for non-compliance with producer responsibilities and the use of false extended producer responsibility certificates. Compensation will also be levied on unregistered entities involved in e-waste activities. Payment of these compensations does not exempt producers from their responsibilities, and unfulfilled obligations will carry over up to three years, with partial refunds available for delayed compliance. Repeat offenses or false information can lead to permanent revocation of registration. Further, funds collected from environmental compensation will be held in an Escrow account and used for e-waste management, including collection, recycling, research,

¹²⁷ Id

¹²⁸Chapter VII rule 16, MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE NOTIFICATION, New Delhi, the 2nd November 2022, E-Waste (Management) Rules, 2022

and support for local waste management projects, as determined by a Steering Committee with Ministry approval.

Steering Committee: - Chapter VIII rule 25 deals with Steering Committee. Such a committee is chaired by Central Pollution Control Board (CPCB) chairman, will oversee the implementation of e-waste management rules. The committee includes representatives from the MoEFF, Ministry of Electronics and Information Technology, Ministry of New and Renewable Energy, Ministry of Housing and Urban Affairs, two representatives each from the electrical and electronic equipment producers and recyclers associations, a representative from a State Pollution Control Board or Pollution Control Committee, and the Head of the relevant CPCB division as the Member-Convener. The committee is tasked with monitoring and supervising the rules' implementation, resolving disputes, and referring significant issues to the Ministry. Additionally, it will review and update guidelines, extended producer responsibility targets, and the list of regulated electronic equipment in response to technological advancements, with the Central Government's approval. The committee will take all necessary actions to ensure proper rule enforcement.

Shortcomings

These are the general provisions that are covered under the E-Waste (Management) Rules, 2022. Though all may seem good in text, the reality is far from it. In the upcoming part of the chapter shortcomings of the said rules are looked into. When the discussion is about India's e-waste governance the informal sector should be a part of it. It is not a secret that India's e-waste management sector is dominated by the informal sector. Driven by economic growth and consumption habits, India has seen a 60 percent rise in electronic waste (e-waste) since 2016. In 2019, the nation generated 3.2 million. The informal sector, which operates outside government regulation and taxation, dominates the Indian e-waste market, handling about 90 percent of the waste processing. However, the massive amounts of e-waste, combined with inadequate and hazardous working conditions and low environmental standards, pose significant risks to both people and the environment¹²⁹.

The E-waste management rules does not have any provisions that directly addresses in the informal sector. The term 'recycler' is mentioned in Chapter I of the rules and it says all those who are engaged in recycling of EEE who have *facilities as elaborated in the guidelines*

¹²⁹ RLG Impact Series: Formalizing India's Informal Electronic Waste Sector - Reverse Logistics Group. <https://rev-log.com/us/rlg-impact-series-formalizing-indias-informal-electronic-waste-sector/>

of the CPCB. But a detailed look into any informal sector e-waste recycling process shows that they do not possess any facilities that are needed for the environmentally sound or scientific management of the e-waste. Thus, the rules have fallen short in this regard. It was anticipated that the rules would streamline waste channels and allow the formal sector to dominate. However, the informal sector continues to play a vital role in e-waste recycling and management and receives e-waste from both informal and formal sources. For example, scrap dealers account for 38% of the e-waste entering the informal sector, while the formal sector, including producers, manufacturers, and showrooms, contributes 28% of the e-waste¹³⁰.

Further, chapter II rule 4 has stipulated that any recycler, producer, refurbisher, and manufacturer must register with the portal of the CPCB and has further mandated that any such registered entities must not engage in any activities with any unregistered entities of the same nature. The provision aims to eliminate the informal system from the e-waste management and hopes to formalise them into the system. However, the provision making it compulsory for such entities to register with CPCB have in fact not considered the informal sector in a holistic way as it has merely hoped that a registration system within the confines of the CPCB would bring the informal sector and formal sector together for the environmentally sound management of the e-waste. Hoping for the informal sector to act proactively and integrate themselves into the system is different with regard to bringing stringent mandates that ensures their integration into the system. The proof is that rules lack any provisions that mandates that the consequences of not registering within the system.

Further, in chapter III, the responsibilities of the state and the union territories have been mandated and it stipulates that they should ensure the recognition and registration of workers involved in the dismantling industry. However, the dismantling industry does not represent the whole informal e-waste sector in India and the connotation is rather too narrow. An elaborate and true representation of informal sector would have done better in the formalisation of the same. Also, the duty to recognise the industry is delineated to the state government. A national level system to recognise the informal sector activities and ensure registration would have been more effective in the integration of the informal and formal sector.

The large majority of e-waste in India, up to 95% as per various reports¹³¹ goes to informal recyclers. End-of-life electronic products change several hands, going from collectors

¹³⁰ Mahesh, P. B., & Mukherjee, M. (2019). *Informal e-waste recycling in Delhi*. Toxics Link. <http://www.indiaenvironmentportal.org.in/files/file/Informal%20E-waste.pdf>

¹³¹ Tackling informality in e-waste management: The potential of cooperative enterprises. ILO Report, <https://www.ilo.org/publications/tackling-informality-e-waste-management-potential-cooperative-enterprises>

and aggregators to dismantlers, who might scavenge parts for reuse. Specialized dismantlers and recyclers recover precious and other metals, often using harmful and dangerous processes with few environmental safeguards. Technology development and commercialization should be encouraged in PPP mode for effective rolling out of best suited technology in India. There are evidences of systemic leakages from many formal authorised recyclers to the informal sector aggregators/recyclers. The CPCB has taken action against many such recyclers and cancelled their authorization. However, in the absence of traceability and visibility of material flows channelled through the system, recyclers and dismantlers simply cherry pick the valuable fractions that are profitable, while leaving the more difficult to treat and often hazardous fractions to the informal sector recyclers. The capacity constraints in formal recycling coupled with the probability of leakages has made it very difficult to ensure sound recycling defeating the objectives of the rules. Thus, this stage requires measures to increase the recycling capacity and policy frameworks to plug leakage of material to informal sector.

Additionally, the two stages in efficient e-waste recycling 'component recovery' (efficient extraction of rare earth metals to reduce reliance on new resources) and 'residual disposal' (safe disposal of leftover materials) are recognised in the rules, they lack explicit requirements for ensuring effective recovery. To maximize efficiency, recyclers' activities should be documented along with periodical tracking of the quantity of e-waste recycled and the actual recovery. The new notification also eliminated PROs and dismantlers, assigning all recycling responsibilities to authorized recyclers. Thereby stipulating that the recyclers must collect e-waste, recycle it, and generate digital certificates via a portal. PROs previously served as intermediaries, securing recycling contracts from producers and ensuring certified, authorized recycling.

The informal sector, which handles 95% of India's e-waste, is not recognized in the new rules due to its 'illegality'. Despite this, the informal sector plays a crucial role and has the potential to enhance e-waste management. For example, 'Karo Sambhav', a Delhi-based PRO, has integrated informal aggregators into its collection system, safely incorporating e-waste into a structured system while providing the informal sector with financial and legal security.

The transboundary movement of the e-waste which is a major issue is not addressed anywhere in the rules and has mandated that The Hazardous Waste (Management, Handling and Transboundary Movement) rules shall be adhered to. A separate framework regarding the transboundary movement of e-waste that comes under the e-waste rules specifically addressing the concerns regarding e-waste must have been desirable. Under the current system all waste of hazardous nature is dealt under the said rules and e-waste just forms a part of it.

Extended Producer Responsibility is considered an important tool to tackle the issue of e-waste nationally and internationally. The biggest challenge for EPR systems dealing with e-waste in India is the lack of information about how much waste there is and where it goes. Different tracking and reporting methods make it hard to get a clear picture of the situation and the waste flow, which is necessary for effective planning and implementation of EPR. The rules have failed to address what are the various tracking methods that are to be adopted and has also failed in coming up with an effective reporting method that can be universally adopted by the e-waste industry in India. The rules however have come up with a computation method that determines the what quantity is eligible for EPR certification.

India only recognizes 21 categories of e-waste devices, compared to 54 in developed countries. This makes it difficult to calculate accurate estimates and shows a lack of full understanding of the e-waste problem. This limited scope can result in significant amounts of e-waste not being properly managed or recycled, thus undermining the effectiveness of the rules in addressing the full spectrum of e-waste. Citizens are also not well-informed about proper disposal methods, which is partly due to municipalities and producers failing to educate them and communicate about collection systems. In the e-waste rules the producers, refurbishers and CPCB are obligated to spread awareness through programmes, media, advertisements etc. However, an average household in India are still not empowered or aware enough to understand the importance of separate disposal of e-waste. Most households considering them as just another solid waste and disposing it off with only limited caution is proof to it. There is also a lack of administrative and institutional capacity needed to manage waste properly and enforce EPR policies. While EPR regulations under the current system has improved formal waste collection, the informal sector remains dominant, creating stiff competition and a shortage of e-waste for the formal sector. Disposal challenges persist due to inadequate recycling facilities as well. Despite an increase in recycling facilities from 312 with a capacity of 780,000 MT in 2018-2019 to 407 with a capacity of 1.11 million MT in 2019-2020, many recyclers are processing less than 50% of their licensed capacity. Thus, significant quantities of e-waste still end up in the informal sector due to leakage from the collection system and e-waste auctions by bulk consumers, which need stricter monitoring. The rules have made CPCB the main agency regarding every other aspect be it registration, issual of EPR certificates or spreading awareness. However, the CPCBs is not an agency that is solely dedicated towards tackling e-waste. Thus, a separate agency that carefully monitors and implements various provisions of the rules would have been desirable. The scarcity of technology and lack of local e-waste processing centres is another issue that the rules have

failed to address limiting the recyclers' ability to ensure proper recycling and thus result in ineffective implementation of the rules.

Additionally, the regulations have stipulated unclear roles and responsibilities, poor data quality among stakeholders, and varying understandings of recycling. This has created a scenario which allows producers to shift the responsibility to customers or partners instead of taking it on themselves. Additionally, the lack of strict penalties for producers means problems in e-waste collection and processing often go unaddressed, leading to waste ending up in informal channels.

4.3 RECOMMENDATIONS FOR THE BETTER E-WASTE MANAGEMENT IN INDIA

These are the current rules that address e-waste in India. Though there are several shortcomings, it is evident that India has taken several legislative actions regarding the e-waste management. However, the current e-waste management rules 2022 is not sufficient to address the discussed shortcomings making the implementation of a new e-waste legislation important. Though India is lagging legislatively, emerging ideas such as circular economy, right to repair and sustainable e-waste management has become part of the e-waste policy. The Government of India recognizes the need for transitioning to a circular economy. The NITI Aayog has released multiple strategy papers outlining the government's approach to promote a resource-efficient and circular Indian economy. Specifically, Electronics and Information Technology Ministry has issued a strategy paper on the circular economy and EEE, highlighting key areas for intervention, especially regarding the end-of-life management of electronics. It further proposes a comprehensive action plan to improve resource efficiency and circularity in the sector. The overall circular economy strategy also promotes repairability. The Ministry of Consumer Affairs has established a committee to develop a right-to-repair framework, initially focusing on mobile phones, tablets, and consumer durables. The Right to Repair Portal India, under the Department of Consumer Affairs, Food & Public Distribution, provides consumers in India with warranty and post-sales information by brand. Further, the circular economic framework itself promotes resource efficiency and thus results in sustainable e-waste management. Another area that needs attention is the area of transboundary movement. Transboundary movement of e-waste with regard to India is of importance as India has emerged as a global destination for several manufacturing and other related activities. Thus, the absence of the provisions regarding the same under the e-waste management rules is a

severe setback. Additionally, India has vibrant informal sector behind the e-waste management. Formalising the same by bringing them in line with environmentally sound principles of management can result in economic growth as well, making it another area that needs immediate attention.

To enhance e-waste management in India, several recommendations have been proposed to ensure a more efficient and effective system. Firstly, it is essential to raise awareness through roadshows, seminars, and educational programs, involving stakeholders and the public, and linking e-waste management to the Swachh Bharat Mission. The informal sector should be recognized and integrated into the formal framework. These informal workers, including scrap dealers and waste pickers, have a high collection rate and extensive reach. By leveraging their strengths and incorporating their skills into the "Skill India" program, the rules can better address e-waste management challenges. The MoEF should clearly define terms like "waste generator," "institutional generator," and "bulk consumer," and expand the "bulk consumer" category to include multi-storey apartments and malls.

Additionally, there should be provisions for capacity enhancement and incentives to integrate the informal e-waste economy into the formal sector, facilitated by Producer Responsibility Organizations (PROs). Recognizing the refurbishing industry, which consists mainly of small vendors and service centres, is also vital, and simplifying disclosure norms for them can support their operations. Establishing minimum criteria for e-recyclers, dismantlers, and collection centres based on investment and technology is crucial, along with implementing health and safety standards for workers in the e-waste sector.

Strict enforcement of the E-waste Rules, 2022, is necessary, with stringent action against producers failing their Extended Producer Responsibility (EPR) obligations. Producers should be mandated to set up centralized facilities and a broad network for e-waste collection, and the infrastructure at the Central Pollution Control Board (CPCB) and state levels should be improved. Identifying strategic locations for e-waste collection bins, such as "Mother Dairy" booths in Delhi, can enhance collection efficiency. Strengthening the legislative framework, ensuring law implementation, maintaining a national e-waste inventory, and investing in human, monetary, and technological resources are essential administrative, legislative, and technological changes needed.

Amending current landfill provisions to promote resource recovery, following examples from Japan and Switzerland, can further improve e-waste management. Large retail chains should ensure vendors participate in the recycling system to prevent freeloading. Developing infrastructure for e-waste management aggressively, focusing on collection, processing, and recycling, and implementing "Design for Environment" strategies to facilitate recycling and environmentally friendly product design, are also critical. Establishing more collection points in shopping malls, metro stations, and other strategic locations can address collection challenges. Including solar panels in e-waste management, given future disposal challenges, and having the proposed Solar Research Unit collaborate with international solar recycling organizations, will address emerging issues. Finally, setting up a dedicated Central Regulatory Authority for E-waste Management in India, with zonal authorities, can ensure efficient handling and regulatory enforcement of e-waste management.

Manufacturers and product development processes must adhere to Design for Environment (DFE), a strategy aimed at minimizing a product's impact on human health and the environment throughout its life cycle. Consumers should practice the three Rs: Reduce, Reuse, and Recycle, aligning with the circular economy paradigm. E-waste management in India, like in affluent countries, must be prioritized, utilizing zero-landfill technologies. Many e-waste manufacturers operate informally, and the formal industry often lacks raw materials. MoEF has mandated proper disposal of e-waste per regulations, emphasizing producers' responsibility. Departments involved in e-waste management must register with the Central Pollution Control Board (CPCB)¹³².

Government and public cooperation are crucial for effective e-waste management. Citizens play a vital role by separating and properly disposing of e-waste, rather than burning it or mixing it with regular trash. Public awareness is essential to educate people about the harmful effects of e-waste on health and the environment. According to an ASSOCHAM study (2017), the government can collaborate with companies to streamline processes and support young businesses with technical assistance and advanced strategies. There must be synergy between the formal and informal sectors, where informal parties collect e-waste and formal

¹³² E-Waste Management Rules 2022: Issues and Solution for Environmental Protection, Mitu Bala, Rudrendra Nidhi, International Journal for Multidisciplinary Research (IJFMR)

parties process it. The government can integrate these sectors, ensuring secure recycling and disposal of e-waste for the benefit of residents and the environment¹³³.

E-waste is the largest growing waste stream globally, and for a developing country like India with high consumption of electronic products, there is an urgent need to improve e-waste management. Implementing schemes like the circular economy, which encourages reuse and recycling, can support sustainable economic development and create new enterprises and jobs. E-waste Recycling Credits (ERCs) can incentivize illegal firms to legalize their activities and link them to recognized recycling centres. Two types of incentive programs, advanced recycling fee (ARF) and advanced disposal fee (ADF), charge buyers at the point of sale to cover collection, restoration, and disposal costs. The effectiveness of ARF/ADF depends on how revenues are used, ideally to promote environmentally responsible recycling¹³⁴.

A deposit refund scheme (DRS) can also be effective, where buyers pay an additional deposit when purchasing electronic products, which is refunded with interest when the equipment is returned at the end of its life cycle. This ensures proper collection and distribution to authorized dismantlers. Producer Responsibility Organizations (PROs) can help manufacturers meet Extended Producer Responsibility (EPR) requirements by working with recyclers and dismantlers and promoting e-waste recycling awareness. Adopting PROs will formalize informal sector processes and improve e-waste collection, addressing EPR challenges and integrating formal and informal sectors under EPR.

Sustainable e-waste management: - Achieving sustainable e-waste management involves reducing e-waste by limiting the use of electronic materials and equipment. This approach helps conserve natural resources and energy typically extracted to produce electronic goods. Instead of relying on recycling or mining, repurposing precious metals from outdated devices like cell phones can significantly save energy. Waste reduction can be further accomplished by re-evaluating used products, recycling electronics and batteries at designated campus bins, reusing large electronics, donating used electronics to social programs, purchasing environmentally friendly electronics, and extending the lifespan of existing devices. Several strategies can be implemented for environmental protection within sustainable e-waste practices. Firstly, Green Manufacturing shall be promoted amongst manufacturers. They

¹³³ Id

¹³⁴ Supra Note 132 Page Number 76

should be incentivized to produce environmentally friendly products that are easy to refurbish, upgrade, and recycle, thereby minimizing their environmental impact. Secondly, Governments need to strictly enforce e-waste management laws, penalize illegal dumping or exporting of e-waste, and ensure safe and responsible treatment of e-waste. Thirdly, specialized recycling facilities should be established to handle, recycle, and dispose of e-waste safely, ensuring high standards of worker safety and environmental protection. Fourthly, Effective campaigns and educational programs must be organised to raise awareness about e-waste issues and teach responsible disposal methods of the older electronics to general public. Fifthly, regular e-waste collection campaigns should be held to encourage proper disposal of old gadgets, preventing them from ending up in regular landfills. Sixthly, collaborations within the electronics industry shall be facilitated to enable the sharing of best practices, innovations, and advancements in environmentally friendly e-waste management. Collectively, these measures can mitigate the harmful effects of e-waste and promote a more sustainable approach to its management.

Right to repair: - The right to repair seeks to increase access and affordability for product repairs. Imagine purchasing an expensive new mobile phone, only to find its performance significantly deteriorates once newer models are released. This common issue often forces consumers to buy new phones. Additionally, brands frequently void warranties if devices are repaired outside authorized service centres. Such practices by electronics companies aim to boost sales and revenue. However, if legislation mandated manufacturers to disclose product details to consumers, individuals could either repair their devices themselves or seek third-party assistance. This scenario exemplifies the right to repair, which posits that owners should be able to fix their products themselves or with their chosen technicians. While older cars and appliances are typically repairable, modern technology, especially devices with chips, often isn't. The right to repair grants consumers and businesses the legal right to repair their own devices without facing manufacturer restrictions, offering a cost-effective alternative to purchasing new products¹³⁵.

Originating in the USA with the Motor Vehicle Owners' Right to Repair Act of 2012, this legislation required manufacturers to provide necessary repair information. A 2021 study by the US Public Interest Research Group estimated that consumers could save up to \$40 billion annually by repairing devices instead of replacing them, highlighting the environmental and

¹³⁵ 'Right to Repair India' (Ministry of Consumer Affairs, Food & Public Distribution)

economic benefits¹³⁶. The right to repair also counters 'planned obsolescence,' where products are intentionally designed to become outdated, pushing consumers to buy newer models¹³⁷. The judiciary has supported this right, as seen in the case of *Shamsher Kataria v Honda Siel Cars India Ltd.*¹³⁸, where the Competition Commission of India (CCI) held 14 automobile manufacturers accountable for anti-competitive practices, including restricting spare parts sales. The CCI suggested that 'consumer rights' under the Consumer Protection Act, 2019, could encompass the right to repair¹³⁹.

The growing issue of toxic waste can be addressed through the right to repair, as it enables more people to reuse older products that only need repairs to function properly. Repairing products reduces e-waste and extends the lifespan of devices. Human activities significantly impact the environment, with electronic product manufacturing contributing to air pollution through the release of toxic gases. Clean energy sources like nuclear, wind, and solar power, combined with right-to-repair legislation, can mitigate these negative effects¹⁴⁰. Extending the longevity of electrical equipment will lessen environmental pressure. This right will also spur innovation and technological development, helping to tackle the rising problem of toxic e-waste. Right-to-repair laws will help reduce improper disposal of electronic equipment and promotes an efficient use of resources for environmental protection¹⁴¹. For example, if your laptop's battery fails after three years but is repaired to last another two years, you reduce e-waste by not purchasing a new one. Similarly, if people replace their phones every two years, they might go through over 30 phones in a lifetime. Repairing instead of replacing can significantly cut down on this waste¹⁴².

Various nations worldwide have acknowledged the right to repair and have taken steps to implement it, including the United States (US), United Kingdom (UK), Australia, and the European Union (EU). The US Senate passed the Fair Repair Act of 2022, which aims to secure the right to repair and protect consumers, farmers, and small businesses¹⁴³. Similarly, the European Commission has introduced new rules and tools under the European Green Deal to

¹³⁶ T Jagannathan, 'India is still taking baby steps on right to repair', *Mobility Outlook*, 29 June 2023

¹³⁷ Sakshi Shrivastava, 'THE RIGHT TO REPAIR & PLANNED OBSOLESCENCE: NEW HORIZONS IN THE INDIAN IP LANDSCAPE (NMIMS University Law Review Journal and blog, 08 September 2021)

¹³⁸ *Shamsher Kataria v. Honda Siel Cars India Ltd* (2014) SCC Online CCI 95

¹³⁹ Susmit Kundu, Vidya Mukharjee, 'Right to Repair- a concept and the Indian roads ahead', *Lexplosion*, 19 October 2022

¹⁴⁰ Nicolas Cates, 'Right to repair: What It Really Means for Users and Companies'(Screen Rant, 23 August 2022)

¹⁴¹ Ziya ur Rahman Karimi, 'Right to Repair' (iPleaders, 20 September, 2022)

¹⁴² H L Noss, 'Why is Right to Repair Good for the environment', *Sustainability Nook*, 15 December 2022

¹⁴³ 'Wyden Introduces Legislation to Protect Consumers by Ensuring Right to Repair' (Lujan, 16 March 2022)

make 'repair' an accessible and easy option for consumers¹⁴⁴. India is also progressing in this direction, with the government launching an online portal where major manufacturers must list public information regarding service, warranty, and other essential repair details for their products. The Government of India adopted the Lifestyle for the Environment (LiFE) initiative in November 2021 to promote sustainable production and consumption. Following this, the Department of Consumer Affairs established a committee in July 2022 to develop a comprehensive policy on the right to repair. In December 2022, the Department launched an RtR portal to provide consumers with information about their products and facilitate easy access to repairs by serving as a centralized repository of repair-related information. The portal includes customer care numbers, publicly available warranty and post-sales service information, and details about service networks, including the locations of service centers for onboarded companies. It also offers a centralized consumer grievance redressal mechanism by listing contact details from the Ministry of Consumer Affairs to local district-level commissions, allowing consumers to seek help at various government levels. Additionally, the portal features blogs on consumer awareness, aspiring to be a one-stop destination for customers seeking repair information¹⁴⁵.

Resource Efficiency and Circular Economy: - E-waste, or WEEE, contains 60 elements from the periodic table, including rare earths, hazardous, and precious metals in complex forms. Thus, the intrinsic material value of global e-waste is substantial. India, which relies heavily on imports for many of these raw materials for EEE production, must transition to a circular economy to meet resource demands by reusing materials recovered through urban mining. The increasing volumes of e-waste and the growing EEE manufacturing industry make this shift imperative. Enhancing resource efficiency is also crucial for ensuring resource security and sustaining growth. Flagship missions like Make in India, Digital India, and Swachh Bharat aim to transform India into a resource-efficient and circular economy by establishing it as a manufacturing hub, promoting digital technology use, and managing end-of-life resources. Strategic and tactical approaches should facilitate the interplay between these initiatives. For instance, the demand created by Digital India can be met by Make in India, which can source

¹⁴⁴ Trisha Ray, 'India's embrace of "right to repair" can transform the electronics sector' (Atlantic Council, 28 August 2023)

¹⁴⁵ Right to Repair: India's Step in the Right Direction – LSQUARE. <https://newsletter.iimbaa.com/right-to-repair-indias-step-in-the-right-direction/>

materials from Swachh Bharat's focus on end-of-life resource management, ensuring reliable raw material availability and innovative mechanisms for a self-sustained circular economy.

The Centre for Materials for Electronics Technology (C-MET) and the Central Institute of Plastics Engineering & Technology (CIPET) have developed indigenous technologies for recovering precious metals and plastics from e-waste. These technologies, now scaled to industry-level use, can benefit informal actors willing to formalize, leading to increased incomes, safer workplaces, and reduced environmental pollution.

CHAPTER 5

FINDINGS AND CONCLUSION

From the definition of e-waste, to the evolution of transboundary movement of e-waste, it is apparent that the transboundary movement of e-waste and its legislative scope needs a bigger playing field. It is also evident that the e-waste management framework in the developing countries is not yet fully equipped to face the contemporary demands of the environmentally sound management of e-waste. Owing to the economic benefit that accompanies the trade in UEEE, a clearer distinction that facilitates the efficient separation of UEEE from WEEE has become the need of the hour. India as a developing country shows immense potential in the sector of e-waste economically. However, several roadblocks are apparent there as well. Thus, reforms in the e-waste sector at national and international levels is desirable to accommodate the evolving landscape of the heavily digitalised world order.

5.1 KEY FINDINGS

The main issue dealt is the transboundary movement of e-waste. It is found that the transboundary movement of e-waste follows a pattern, i.e., the waste generators are usually not the waste bearers. To be precise a few of the industrialised and digitalised nations generate the lions sum of the e-waste and due to the presence of strict environmental and health related standards in such countries the waste is being shipped off to the places where such regulations are not so rigorous. Though there are several international policies that directly deals with the e-waste sector the efficiency in discerning the functional UEEEs from WEEEs are not yet achieved. In the Basel convention which acts as an umbrella convention for the transboundary movement of hazardous waste including e-waste, shortcomings are apparent. The Basel BAN which took several years to effect is a testament to the same. Additionally, it is found that the convention does not put any effective obligations upon its signatories nor it aids the affected in any efficient manner. The conventions mandate of letting the signatories to partake in bilateral multilateral and regional agreements which possess the potential to derogate from the convention and its vague mandate of adherence to environmentally sound management of e-waste is also proof to the same. Other international policies that came under the auspices of the Basel convention are MPPI, PACE and Nairobi declaration. However, it is found that these are not equipped enough to address the whole e-waste sector.

In the latter part the importance in discerning the functional UEEE and WEEE is addressed. Recognising the economical and ethical aspects of refurbishing the UEEE, the scope of non-trade-restrictive measures are looked into. However, it is found that the alternatives were landfilling, incineration and recycling. The key finding in this matter is the need of the state-of-the-art facilities for the environmentally sound management of e-waste. It is further found that the developing countries does not possess such facilities nor it is capable of bringing one currently. This observation diverted the thoughts towards the next obvious measure, i.e. trade-restrictive measure. A proposed certification and labelling mechanism were thoroughly analysed with respect to the WTO provisions and its TBT agreement. It is found that such a certification mark and labelling mechanism in exporting country coupled with an effective monitoring system in the importing country can result in the effective separation of UEEE from WEEE while enabling the trade in UEEE. Further it is found that import ban by the receiving country and an export ban by the exporting can aid in the curbing of unauthorised trade in e-waste. The compatibility of the same under the WTO was looked into, specifically under the general exceptions and the introductory chapeau and found that it can be an effective measure to further cement the obligations under the Basel Convention. Further, an export ban and its effectiveness were looked into and found that some inconsistencies may arise when the territorial nexus is considered. However, it is found that an export ban imposed by a developed country is a testament to its commitment to environmental and health standards and international obligations. Moreover, it may also result in the installation of state-of-the-art facilities that can make recycling, landfilling and incineration an effective alternative. However, it was found that, the export measure in question may lead to discrimination, as exports are treated differently depending on their destination, but examining it with important WTO provisions found that the proposed export ban could be justifiable under the introductory chapeau.

Later, the e-waste management system in India was analysed, along with its evolution. It was found that only since 2008 India began addressing the e-waste management directly. In 2008, the provisions were incorporated into the hazardous waste (Management, Handling and Transboundary Movement) rules of 2008 with limited scope. It evolved further ever since with the incorporation of direct explicit provisions into the electronic waste management rules 2011 and it was found that the electronic waste management in India evolved a lot since 2011. The subsequent amendments are were analysed and upon studying the new rules of 2011 and 2016 it was found that it possesses several shortcomings. The subsequent electronic waste

Management rules, 2022 was analysed and found that it possesses several shortcomings. It was found that the informal sector who hold a significant role in the e-waste management sector was more or less not represented in the rule. Further, it was found that the provisions regarding the transboundary movement was completely missed out from the rules, mandating it to be dealt under a rule erstwhile the whole e-waste management was part of, further emphasising the need of a new legislation that accommodates the informal sector and the transboundary movement. Additionally, the EPR mandate which is utmost importance in the proper management of e-waste were found to be significantly inadequate under the current rules. Another key finding is the need for circular economy, right to repair and sustainable e-waste management. Though the government has begun to incorporate these emerging concepts into national e-waste policies, the incorporation of the same into the e-waste rules in the future is found to be more desirable and effective.

5.2 CONCLUSION

The truth is that the world will only keep making, using, and disposing electronic devices and create electronic waste. Thus, it is evident that a highly sought after and efficient mechanism to manage the several intricacies of the e-waste sector is imperative. The current global system has established a pattern and it is conclusively proving that it doesn't favour developing nations. It can also be concluded that the Basel convention must be strengthened further with respect to the changing time. More e-waste specific global frameworks are needed. The responsibility of the e-waste generating nations shall be established along with strengthening their waste management infrastructure.

It is no secret that the international trade in used electronic devices offers economic growth. However, it can be concluded that the current system is not well equipped efficiently to differentiate the same from waste electrical and electronics. This hinders the opportunity of the developing nations to make use of the possibilities offered by the transboundary movement of e-waste. Though the trade in WEEE is banned as per the Basel Convention, the same in UEEE is not. The international policies shall be further revisited to realise the wasted potential offered by the transboundary movement of e-waste. It can be further concluded that even the developing nations lack techniques to facilitate the environmentally sound disposal of the e-waste. Thus, the installation of state-of-the-art facilities that make landfilling, incineration and recycling a viable option shall be made a reality. Detailed analysis of the main WTO provisions

prove that a proposed certification mark and label is not in derogative to the mandates of WTO and thus, those aspects need to be further looked into.

Coming into the e-waste sector in India, legislatively speaking India is a forerunner. However, the parallel informal sector plays the major role and somewhat stands in between the proper implementation of the rules. Apart from that, the rules also need to be revised with addition of several missed-out features. Examples are formalising informal sector, transboundary movement etc. As established early in this dissertation, the informal sector e-waste sector in India is a huge industry that has the potential to bring economic growth. Thus, the gap in the legislative framework needs to be addressed quickly to tap the full potential of the sector. Another area where India needs to put attention is awareness generation. It is pretty obvious that the common people who contribute towards the e-waste generation are completely oblivious about the channels where discarded e-waste shall be put into. For a population where globalisation has made every other product an electronic product with high levels of obsolescence, awareness shall be the first step. If informal units are not included in a coordinated and integrated effort, and if there is insufficient emphasis on raising awareness, the implementation of the legal and regulatory framework may yield sub-optimal results. Thus, a new legal framework emphasising all these shortcomings shall be the next priority.

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and interact in a society. Many people own and use multiple electronic
devices. Further, enhanced connectivity across both urban and distant
regions is leading to an increased number of devices and items connected
to the internet. This range not only encompasses the typical computers
and smartphones but also extends to a wide array of objects such as
home appliances, electric bikes, and scooters, health tracking devices,
environmental monitoring sensors, electronics integrated into furniture
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INTERNATIONAL TRADE IN REGULATING TRANSBOUNDARY
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International trade in electronic waste is an economically lucrative business. The trade measures regulating the movement of electronic waste have historically been focused on bans. Due to the lack of economic incentives and the inability of the importing countries to enforce them, such bans have never been effective. Thus, there arose a need to explore trade measures that find a middle ground between social, environmental, and economic factors. Trade measures that soften the externalities while creating economic growth are relevant in this chapter. Thus, the chapter explores non-trade-restrictive and trade-restrictive measures available in regulating the transboundary movement of electronic waste. The discussion on facilitating trade shall only be limited to UEEE as the trade in obsolete e-waste is banned under international law as it is considered hazardous waste.

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ELECTRONIC WASTE GENERATION IN INDIA AND THE EFFECTIVENS
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India, as per the Global E-waste Monitor, is the world's third largest generator of electronic waste only behind the United States and China. India is also a forerunner in the region when it comes to e-waste legislation and infrastructure for collection and recycling

Cornelis P. Baldé, Ruediger Kuehr, Tales Yamamoto, Rosie McDonald, Elena D'Angelo, Shahana Althaf, Garam Bel, Otmar Deubzer, Elena Fernandez-Cubillo, Vanessa Forti, Vanessa Gray, Sunil Herat, Shunichi Honda, Giulia Iattoni, Deepali S. Khetriwal, Vittoria Luda di Cortemiglia, Yuliya Lobuntsova, Innocent Nnorom, Noémie Pralat, Michelle Wagner (2024). International Telecommunication Union (ITU) and United Nations Institute for Training and Research (UNITAR). 2024. Global E-waste Monitor 2024. Geneva/Bonn.

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Moreover, it may also result in the installation of state-of-the-art facilities that can make recycling, landfilling and incineration an effective alternative. However, it was found that, the export measure in question may lead to discrimination, as exports are treated differently depending on their destination, but examining it with important WTO provisions found that the proposed export ban could be justifiable under the introductory chapeau.

Later, the e-waste management system in India was analysed, along with its evolution. It was found that only since 2008 India began

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