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E-WASTE BUSINESS MODEL, POLICIES & REGULATIONS IN INDIA

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Abstract: This research paper focuses on electronic waste - also commonly referred as e-waste, business models created and the policies and regulations enforced in order to manage this category of waste. This research paper aims to provide a thorough understanding on the concept of e-waste that is dealt with in the country India. This study also provides knowledge on the harmful effects of stagnated e-waste and its impact on the environment while also providing statistical data on the e-waste generated city wise. It concerns how E-waste business models play a critical role in the recycling industry and the numerous policies and rules implemented as an attempt, by the Government, to keep e-waste under control. Additionally this study provides an understanding and brief idea on the numerous career opportunities that e-waste recycling brings along in today's world. This topic helps in comprehending the emerging recycling techniques and e-waste regulatory measures with the objective to avoid harming the environment.

Keywords: E-waste Business, Regulations, Policies, E-Waste Management

I. INTRODUCTION

As a result of the increase in urbanization coupled with consumerism and growth in the economy, the demand for electrical appliances has unquestionably augmented. Consequently, India has found itself to be one of the largest contributors to economic waste globally. E-waste, also known as Electronic Waste, pertains to the disposal of electrical contraptions and appliances. These may include a range of electronic devices and their component parts such as monitors, phones and motherboards to name a few. Furthermore, E-waste also comprises those materials that are involved in the manufacturing process of electronic appliances. Generally, this category of waste is subject to recycling and restoration. This concept of E-waste has been a matter in question due to the complexity of the process of discarding electronic objects. The rationale being that electronics quite often contain toxic substances that could instigate adverse effects on the environment and surroundings. A few of the hazardous chemicals that electrical equipment possess are substances such as lead,

cadmium and beryllium. At the juncture of E-waste discarding, these chemicals tend to seep into water, soil and air which is, in turn, consumed by humans and organisms. Consequently, leading to multiple negative health effects. E-waste is ascending, unfortunately, as a grave complication as far as the environment and health sector are concerned. Subsequently, E-waste business models are being developed as high priority in order to resolve this problem. (Das, 2019)

E-Waste

E-waste, also known as Electronic Waste, pertains to the disposal of electrical contraptions and appliances. These may include a range of electronic devices and their component parts such as monitors, phones and motherboards to name a few. Furthermore, E-waste also comprises those materials that are involved in the manufacturing process of electronic appliances. Generally, this category of waste is subject to recycling and restoration. This concept of E-waste has been a matter in question due to the complexity of the process of discarding electronic objects. The rationale being that electronics quite often contain toxic substances that could instigate adverse effects on the environment and surroundings. A few of the hazardous chemicals that electrical equipment possess are substances such as lead, cadmium and beryllium. At the juncture of E-waste discarding, these chemicals tend to seep into water, soil and air which is, in turn, consumed by humans and organisms. Consequently, leading to multiple negative health effects. E-waste is ascending, unfortunately, as a grave complication as far as the environment and health sector are concerned.

Subsequently, E-waste business models are being developed as high priority in order to resolve this problem. (Wikipedia, 2022)

E-Waste in India

According to statistics, India stands third in the ranking for producing the highest magnitude of electronic waste - the record being roughly two million tonnes of e-waste collected on a yearly basis. Additionally, garnering an unannounced and unadvertised magnitude of e-waste from foreign land. As time progresses, the number of mobile connections are increasing. Recycling of E-waste has



become a business in India - this activity serves as an approach to earning money illegally. A majority of this type of waste - nearly 95%, is recycled in India via an illegal and unlawful manner through unofficial waste collectors to conduct the operation. These laborers do not function under any official institution or corporation - thereby making the process of enforcing regulations, an arduous challenge. The individuals that engage in the recycling of E-waste process do not adopt advanced methodologies for conducting this function - therefore leading to the inevitable discharge of virulent pollutants.

(Wikipedia , 2022)

Environmental Impact of E-waste in India

The incautious usage of mediocre techniques to discard electronic waste has catalyzed the deleterious impact on the environment. Correspondingly, water bodies, air and the soil across the country is polluted with the careless discardment of electronic waste. Here is a brief description of the negative impact of e-waste disposal on

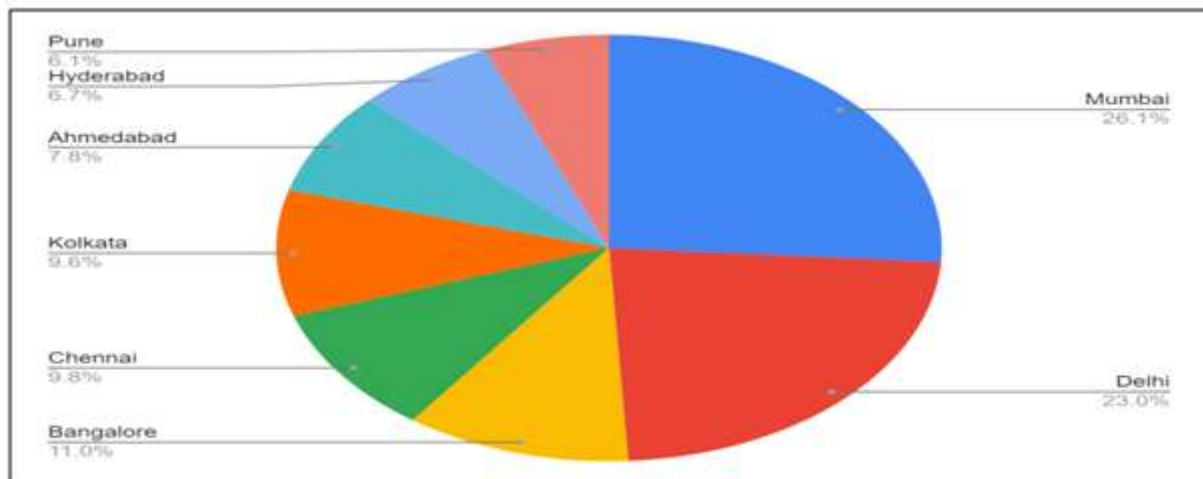
- **Water:** India contains some of the most contaminated river bodies in the world, namely The Ganges river and The Yamuna river. These two water bodies are significant and sacred to the Indian population which is quite contradictory to the fact that a majority of the surface water in the country is contaminated and heavily polluted (roughly five hundred liters of waste is discarded into these rivers that consequently generates high volumes of toxic foam). The main contributors

being industrial and electronic waste, pesticides and sewage. This occurs either due to incorrect recycling techniques (that discharges toxic chemicals that seep to water bodies) or the disposal of electronic waste in landfills that is washed away into nearby rivers or lakes. (Wikipedia , 2022)

- **Air:** Majority of the highest polluted cities in the world are in India. This is in view of the fact that improper e-waste disposal is being utilized that leads to the discharge of chemicals into the atmosphere. Burning or the destruction of e-waste dispenses detrimental particles into the air. Subsequently, these particulates return back to land and water bodies when it rains which thereby leads to soil and water pollution respectively. (Wikipedia , 2022)
- **Soil:** As per research, soil is excessively contaminated with noxious chemicals namely PCBs, PCDDs and PCDFs. Moreover, the concentration of these chemicals (in the soil found in India) is found to be twice as much as the average concentration observed globally. (Wikipedia , 2022)

E-Waste region-wise ranking in India

As can be viewed from the statistics shown in the table and the pie chart, Mumbai ranks as one of the highest generating cities of electronic waste. It is closely followed by other cities such as Delhi, Bangalore, Chennai etc. These cities contribute an approximate figure of nearly 60% of total e-waste generated by the whole country.



E-Waste generated by cities in India on an annual basis (in tons)	
Mumbai	24%
Delhi	21.20%
Bangalore	10.10%



Chennai	9.00%
Kolkata	8.80%
Ahmedabad	7.20%
Hyderabad	6.20%
Pune	5.60%

(Chatterjee, 2011)(Representation: Author)

The Government has provided guidance and support for TSDF - also known as Treatment, Storage & Disposal Facilities. Nearly 28 TSDFs have been set up so far. In addition, these centers also provide financial support as well. In order to monitor the progress, certificates are issued as part of the process.

(Das, 2019)

E-Waste disposal methods used in India

On account of the absence of formal laws for e-waste disposal, informal practices to do so are generally followed. This has resulted in economic gain for certain sections of society. It allows individuals to earn a living from this operation but also poses a grave risk as far as health and safety is concerned. E-waste is managed and handled by both formal and informal sectors:

- **Informal Section:** This sector is responsible for the final function of disposal or recycling of e-waste. A majority of e-waste collected in India is out of date and can no longer be used. An economic market sprouted from these activities as the dismantled components and scrap are recycled.

(Wikipedia , 2022)(Chatterjee, 2011)

- **Formal Section:** This sector recycles e-waste utilizing approved and authorized techniques and skills. An approximate amount of five tonnes is disposed of on a given day. The formal sector is different from that of the informal one by the procedure it follows for segregation and discardment.

(Wikipedia , 2022)(Chatterjee, 2011)

E-Waste Business Model in India

Firstly, a Circular Business Model may be defined as a business plan that aims to utilize resources efficiently by finding methods to extend the life of components and commodities via repair/re-designing. (BusinessLine, 2021) Since India ranks as a major contributor to electronic waste, a need for developing an e-waste business model arises. Development of an e-waste circular business model could result in the establishment of startups. It serves as an opportunity for several entrepreneurs across the nation. However, the country faces strenuous challenges doing so due to the narrow and restricted awareness of e-waste disposal methods. In spite of efforts for providing facilities such as producer liability, e-waste collection centers and

producer responsibility organizations, successful implementation has been proved futile. As a result, a policy for developing an e-waste business model must be created and enforced immediately. The formal sector, that has access to technology and skilled labor must utilize its advanced resources for recycling e-waste in an effective manner. Developing a structured e-waste business model can dwindle the dependence on other countries for garnering raw materials - thus, reducing the cost of production.

(BusinessLine, 2021)(Earth Reminder, 2021) (ITU, 2018)(Lahiry, 2019)] (MeitY)

There exists immense potential in this field (especially for budding entrepreneurs) that is yet to be acknowledged and recognized, completely. As the years progress, individuals are making an effort to create a suitable business model for the high volumes of e-waste that the country inhabits. On the other hand, there also poses a risk of exploitation of these resources in case of poor monitoring by the authorities. In order to prevent malpractices and unethical means of recycling e-waste, e-certificates must be issued to the concerned parties - making them accredited to conduct their operations in a lawful manner.

The e-waste business model in India can be designed in two different ways. Namely:

- **Self-Owned:** This electronic waste business model is based on the idea that management of e-waste can be done via purchasing the waste from numerous sources, by one individual. In this particular operation, the entrepreneur is entitled to support the whole cost of the activity - therefore, bearing any losses that might occur in the trajectory as well. In this case, the entrepreneur may be labeled as the primary investor in the business. In accordance with research, a self-employed or unaffiliated structured business model for e-waste can garner a rough estimate of 6 to 7.5 million INR on a monthly basis - taking into consideration the high operational and capital expenses. (Earth Reminder, 2021)
- **Franchise:** This electronic waste business model is based on the idea that management of e-waste operation is conducted by an enterprise that is established already. This business model is appropriate for those entrepreneurs who may not be willing to take the risk of high investment into e-waste and thereby bearing the losses as well. A franchise based business model is



suitable and beneficial for the parent company. Naturally. Since the functions of the business are carried by the enterprise as a whole unit, the operational and capital expenses will be lower. (Earth Reminder, 2021)

Since we have a basic understanding of the deplorable mismanagement of e-waste conditions, we will do a thorough study regarding the business model or startups developed to address this key issue. (Kretchmer, 2021)

Despite the numerous e-waste rules and regulations implemented earlier this decade, only just about 2% of all the electronics in the country are actually recycled. In order to resolve this drawback, Pranshu Singhal, the founder of Karo Sambhav found a viable solution. He suggested that every operation that takes place in the e-waste management process must join forces and collaborate. Mr. Singhal claimed that the trick to tackle this problem of e-waste is by virtue of technology as well as trust. The plan was to capture photographs of e-waste shipments and host it on a highly recognized social platform - in this case, Azure Cloud, owned by Microsoft. This gave Karo Sambhav its boost as it received the opportunity to collaborate with numerous institutions and parties. Mr. PranshuSinghals' vision facilitated product tracking and better schemes for ameliorating the recycling process. He advises that technology can be the key to resolving this endless challenge of e-waste. However, it is to be noted that in spite of these efforts, only 1/5th of e-waste is discarded in an appropriate manner. (Kretchmer, 2021)

E-waste Management in the Indian market

This sub-section provides information regarding the pioneers of E-waste Management prevalent in the Indian market. Through the years, individuals had big business ideas that concerned the management, recycling and reusability of electronic waste.

- Deshwal Waste Management (By: Raj Kumar): Raj Kumar observed the increased levels of e-waste accumulated and the difficulties this brings along. In order to bring a drastic change to these deplorable conditions, Mr. Kumar invested his own money and established his e-waste management business. Currently, this business is successful boasting a growth rate of nearly 50%, attracting individuals from all sectors.

(Earth Reminder, 2021)

- Deluxe Recycling (By: Jignesh Shah): Jignesh Shah had started an eco-friendly business nearly two decades ago with the aim to recycle and reuse electronic waste.

(Earth Reminder, 2021)

- Packman (By: Gaurav Jalan): The main aim of this company is to protect the environment by eradicating the negative effect of plastic packaging. This

organization is associated with the production of eco-friendly materials. (Earth Reminder, 2021)

Fortunately so far, an approximate number of 23 formal processing and recycling units that are environmentally and economically viable have been registered with the Central Pollution Control Board. As observed through recent years, the electronic waste sector has transformed into a feasible business idea which has been proved by an informal enterprise based in Bangalore that goes by the name Kabariwalas (also well known as the Harit Recycler Union). (Das, 2019) (ITU, 2018)

Likewise, the MAIT - also referred to as the Manufacturers Association for Information Technology - commenced a project of four years, in the year 2010. The purpose of the project was to establish a link between the formal and informal sectors associated with e-waste management. This operation would aid the Association in directing the e-waste processing in a structured manner. 4 cities of India were the target of this project, namely Bangalore, Pune, Kolkata and Delhi. (Das, 2019)

E-waste Regulations in India

E-waste regulations in India are under the control of the MoEFCC - also referred to by the Ministry of Environment, Forests & Climate Change. These regulations are monitored, implemented and executed systematically by two committees namely: CPCB - Central Pollution Control Board and the SPCB - State Pollution Control Board (Chatterjee, 2011) (AprajitaSharma, 2018) (Sharma & Hussain, 2018)

Quite often the Central Pollution Control Board (CPCB) would audit and collect samples randomly of electronic appliances in the market. The rationale being to verify the conformance and abidance to the provisions and regulations enforced - to reduce the negative impact of e-waste. The cost of these auditing and sampling sessions is disciplined by the Government itself. In cases where the product does not comply with the standardized provisions, the producer must bear the auditing and sampling costs.

(Das, 2019) (Sharma & Hussain, 2018)

Therefore, a few of the various responsibilities of the producer include: responsibility of collection centers, responsibility of the dismantling process and responsibility of the recycling process to name a few.

For effectual and constructive implementation of E-waste rules and regulations, the producer must be held accountable for the safety of the products being manufactured in the premises. Additionally, efforts from the industries, e-waste authorities, concerned committees and pollution control boards such as CPCB (Central Pollution Control Board) and SPCB (State Pollution Control Board) are also vital in the contemplation of handling the high amounts of e-waste in the country. (Das, 2019) (ITU, 2018)



Responsibilities of Stakeholders

- **Responsibility of Manufacturers:** To monitor the electrical equipment being manufactured and ensure safe & effective disposal and recycling of the same. Ensuring no harm to the environment that might occur during the transportation or storage process. Manufacturers must also record the level of e-waste generated and handled on a daily basis. (Sharma A. , 2018)
 - **Responsibility of Producers:** This highlights the concept of Extended Producers Responsibility that is based on the idea of directing e-waste to formal recyclers according to a certain set of predefined guidelines. Moreover, the consumers must be provided with adequate information such as instructions, helpline numbers, telephone numbers and addresses to expedite the return of remnants of electrical equipment. Spreading awareness via media and technology on e-waste discardment is another duty of producers. (Sharma A. , 2018)
 - **Responsibility of Dealers:** This occurs in the situation where the dealers are responsible for collecting and managing e-waste instead of the producers. The dealers, in this case, must offer an allotted box or bin to consumers to collect their e-waste. These bins/boxes filled with e-waste will be collected and deposited to the designated recycler. (Sharma A. , 2018)
 - **Responsibility of Bulk Consumers:** Those parties involved in bulk ordering of electronic appliances must also be held accountable for the waste generated by it. The bulk consumers must make sure that the e-waste produced as a result passes to the hands of authorized recyclers, properly segregated (radioactive substances must be kept separate). Furthermore, a record of the magnitude of e-waste generated must be maintained by them. (Sharma A. , 2018)
 - **Responsibility of Recyclers:** The principle duty of recyclers is to ensure the recycling operation adheres and complies to the predescribed set of guidelines and rules. The recyclers are held responsible for the safe recycling of electronic waste. They must prevent any harmful effects on the environment during the operation. (Sharma A. , 2018)
 - **Responsibility of Government:** The Government ensures financial and industrial support. It will be accountable for providing the necessary facilities (eg. space, equipment, tools, etc.) for effective e-waste management. The two committees mentioned earlier in this research paper, CPCB and SPCB, are both under the government and possess their own shares of responsibilities as far as e-waste control is concerned. (Sharma A. , 2018)
- ### **E-waste Policies in India:**
- **Electronic Waste Management & Handling Rule (of 2011):** These rules and regulations came into operation from 2012 with the 1986 Environmental Protection Act running parallelly. This policy suggested that the individuals responsible for importing/manufacturing of electronic goods must also be held accountable for managing its electronic waste. Thereby, the need for establishing E-waste collection centers arose. Furthermore, this rule commanded the sellers and producers of this category of goods to ensure that consumers were aware of the information on disposing and discarding electronic waste in a proper manner. Additionally, this rule forced electronic goods producing companies to make sure their customers and consumers were aware of the noxious and toxic constituents of the commodity. This rule, indubitably, caused a radical change in the production, management and disposal departments of e-waste. This rule that came into effect in 2012, facilitated easy regulation and monitoring of the waste. (Wikipedia , 2022)(Athreya, 2018)(MeitY)
 - **Electronic Waste Management Rule (of 2016):** This rule that was enforced in the year 2016 served as a substitute to the rule that prevailed previously, in 2011. This particular regulation encompassed more firm and rigid rules with respect to electronic waste disposal. The E-waste Management rule of 2016 included the remnants of production and repair operations also. The definition of 'electrical equipment' expanded and also meant any product that relied on electromagnetic fields or electrical current in order to operate and function successfully. This policy accentuated the concept of EPR i.e extended producer responsibility - this concept obligated the producers of electronic waste to assure that their products are being recycled and discarded efficiently by authentic recyclers. It served as a protection scheme that made all producers responsible over the life cycle of their products. Additionally, this policy that was implemented also hinted on the reduction of e-waste production for specific industries. (Wikipedia , 2022) (Sharma & Hussain, 2018)
 - **Amendment (of 2018):** This amendment focused on liberating the strict Electronic Waste Management Rule that was enforced previously, in 2016. This amendment gave the CPCB the liberty to choose electrical equipment arbitrarily for testing for adherence and conformance of the policies. Additionally, this was done in order to help the Government in redirecting the e-waste to the formal sector and approved authorities to polish the e-waste recycling process. (Wikipedia , 2022) (Sharma & Hussain, 2018)
 - **National Telecom Policy (of 2012):** This policy accentuates the idea of disposal of e-waste on a periodic basis. This would allow the Ministry to give importance



to the health and environmental impacts of electronic waste. Furthermore, this policy encourages the utilization of energy-saving and eco-friendly equipment. This will, in turn, help in accomplishing sustainability and efficiency in the long run.

(Sharma A. , 2018)

II. DISCUSSION:

One of the learning points of this study is the highly negative influence that electronic waste has on the environment. Improper recycling techniques are leading to adverse effects on the surroundings and individuals' health - and will continue to do so in case improper methods are utilized. It is of major importance that research centers and eco-friendly startups are encouraged to find a solution. There are many career opportunities that sprouted from e-waste management in recent years. This broadens the scope for entrepreneurs to venture into different fields that would not only generate high amounts of profits but would also help improve the environmental conditions. Cities that rank high in the category for generation of e-waste must have stricter policies when it comes to recycling of e-waste. Furthermore, another learning point is that while India has made an effort and acknowledged this key issue by enforcing rules in 2011 and 2016, only a small percentage of this mission was actually successful. There continues to be high amounts of e-waste that goes unrecycled. This study allows us to understand the importance of having a waste segregation system in place in the country. With many cities in India relying on industries, having a systematic and structured blueprint of waste segregation is of critical importance.

III. CONCLUSION

India still has a long way to go as far Electronic Waste Management is concerned. Currently, E-waste is managed in an informal and disorganized manner. Cities that rank high in the category for generation of e-waste must have stricter policies when it comes to recycling of e-waste. However, it has been observed that this operation, undeniably, requires immense manpower. Companies and Institutions that are willing to put an end to this challenge must be willing to spread awareness. Appropriate education and awareness is highly needed at this juncture if a radical change is expected. The reason being that most individuals residing in the country are unaware or are careless of the harmful and hazardous risks that electronic waste can pose on one's health. Creating awareness on the concept of e-waste can invoke curiosity to numerous individuals who might want to volunteer in the e-waste management task. Additionally, suitable usage of technology can play a critical role in this scenario. Technology can be used in the

future to develop innovative tools and equipment to recycle and refurbish electronic waste. Accordingly, sufficient funds must be arranged by the concerned parties. In general, a comprehensive approach can be beneficial for facing this unique challenge that India faces today. Startups and entrepreneurs in the field of e-waste management must be encouraged. This can help in creating schemes and techniques for e-waste management rapidly. These organizations should also come up with permanent solutions in order to put an end to this incessant problem.

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