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An Analysis on the E Waste Management System in the World in Particular Reference to India

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Abstract: Digitalization influenced by rapid technological development causes the increase of the utilization of electronic gadgets globally. This virtual world is growing rapidly due to the reinforcement of online platform under the current scenario of COVID 19 pandemic that restricts the physical interaction of people. The increase of the use of electronic equipment and the inclination of consumers towards the latest and upgraded model of gadgets are the main reasons for expanding the volume of e waste which becomes a major concern for the environmental scientists and policy makers. These large volumes of e wastes are handled unscientifically by the informal sectors in most parts of the world due to the lack of enforcement of the e waste management policy leading to the exposure towards toxic pollutants and poisonous metals that ultimately results in serious physical as well as behavioral disorders. The open combustion of plastic materials and landfilling of e waste also cause the air pollution, soil pollution and contamination of ground water.
Keywords: E Waste, Electronic gadgets, toxic pollutants, poisonous metal, informal sectors

I. INTRODUCTION

We inhabit in a digital era now where people to people communication depends upon just the click of one single button and the technology is upgrading day by day due to the invention of new ideas. Now, electronic equipment has become an integral part of our daily life. The current pandemic situation emerged due to the outbreak of COVID 19 virus makes us more dependent on the electronic gadgets. The classroom teaching, office meeting, job interview, shopping, transaction of money and other essential services are continually shifting towards online mode from offline mode. Apart from that, due to restrictions related to social distancing, new movies and other entertainment shows are also releasing in digital platforms. A smart phone is able to provide a lot of service to a person such as banking, information gathering, reading books, watching shows, listening music, watch, calendar, calculator, playing games, map, photography, videography etc. replacing a lot of other traditional electronic equipment like watch, camera, video camera, gramophone, TV, CD player etc. Therefore, the dependency of people on smart phone, laptop and other electrical and electronic equipment has been increasing day by day which also increasing the possibility of disposing old gadgets causing the increasing numbers of e-waste. Electronic wastes are the wastes generated from the electrical and electronic devices which used to throw by us after consumption. The increasing uses of electronic gadgets due to increase of digital activities under current pandemic scenario give more pressure on the electronic garbage across the world. According to a survey, Americans produce $55 billion worth e-waste every year which is accelerating day by day. Other developed nations like European states are also one of the largest contributors of e-waste. The developing nations of Asia and Africa also generate significant numbers of e-waste due to their movement towards digitalization. It is obvious that e-waste is going to be the main concern for human civilization in near future as the dumping of e-waste leads to the formation of serious environmental concerns. Now, due to the absence of strict law regarding the management of e-waste, this increasing huge electronic garbage is unscientifically handling by informal sectors largely leading to their exposure towards chronic health diseases. The toxic metals present in the e-wastes cause serious health issues and also behavioral disorders to the economically weaker section of the society attached to the handling of e-wastes.

The reports of United Nations also confirm the involvement of child labors and women in this sector leading to the emergence of serious diseases like cancer, genetic disorders and other problems related to kidney and nervous system. On the other hand, continuous up gradation of technology and software makes the old gadgets outdated even before its major damage and influence the

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consumers to purchase new gadgets which ultimately increase the number of e-waste rapidly. For instance introduction of 4G technology in the market makes the 3G services inefficacious which directed the large section of world population to purchase new 4G mobile phones as the existing 3G gadgets became outdated simultaneously. Therefore, in this paper we will try to find a sustainable method for the superintendence of e-waste.

II. LITERATURE REVIEW

Electronic scraps comprise of all types of discarded and outdated electrical and electronic materials like TV, refrigerator, washing machine, fridge, cooler, heater, air conditioner, switch boards, lights, fans, computers, laptops, mobile phones, ipad, tabs etc. It contains over 1000 types of harmful substances such as toxic metals like mercury, lead, cadmium, chromium etc., expensive metals like gold, silver, copper and polymers like PVC, polycyclic aromatic hydrocarbons, brominated flame retardants etc. which affect the kidney along with central and peripheral nervous system of human body leading to the outbreak of serious health issues like cancer, behavioral disorders and genetic diseases apart from the minor health problems like breathing trouble, asthma etc. The unscientific way of the handling of e-wastes like burning of circuit boards for extraction of copper, dismantle of mother board to extract gold and silver in bare hands etc without adequate protection towards exposure of toxic pollutants and carcinogenic substances leads to serious health issues to the kabadiwalas (the informer collectors of e-waste) and the workers attached with this profession.

Apart from that, unscientific and open combustion of plastic bodies and contamination of toxic heavy metals with soil and water lead to the degradation of environment. According to several reports of World Health Organization, more than 18 million children and adolescents including the children below the age of 5 are engaged in this sector which affects child health and also causes malnutrition, behavioral disorder, psychological issues, genetic problem leading to the improper growth of a significant section of the society belongs to the economically weaker section. Flustering levels of dioxin compounds amalgamated to cancer, developmental defects and other health issues have been prevalent in the snippet of breast milk, umbilical cord and hair which are linked to unscrupulous marshalling of electronic appliances.

The lack of policy and legal provisions and their improper implements are the main reasons for the large scale engagement of unorganized sectors in this field. The infrastructure of e-waste recycling is not yet developed according to the supply of e-wastes in the economy. According to Global E-Waste Monitor, 2020, annually 53.6 million tonnes electronic scraps used to have been generated in 2019, whereas only 17.4% of them have been recycled.

Apart from that, the expeditious growth of software engineering and data science leads to the update of digital services at regular manner which accelerates the tendency of bulk as well as small consumers to dispose old outdated gadgets and purchase new updated gadgets with more features that results in the addition of more quantity of wastes in the electronic garbage of the society. However, some developed European countries like Sweden introduced strict environmental policy related to the management of all types of waste and their recycling in a scientific manner. They also developed the scientific technology of extracting gold from e-waste.

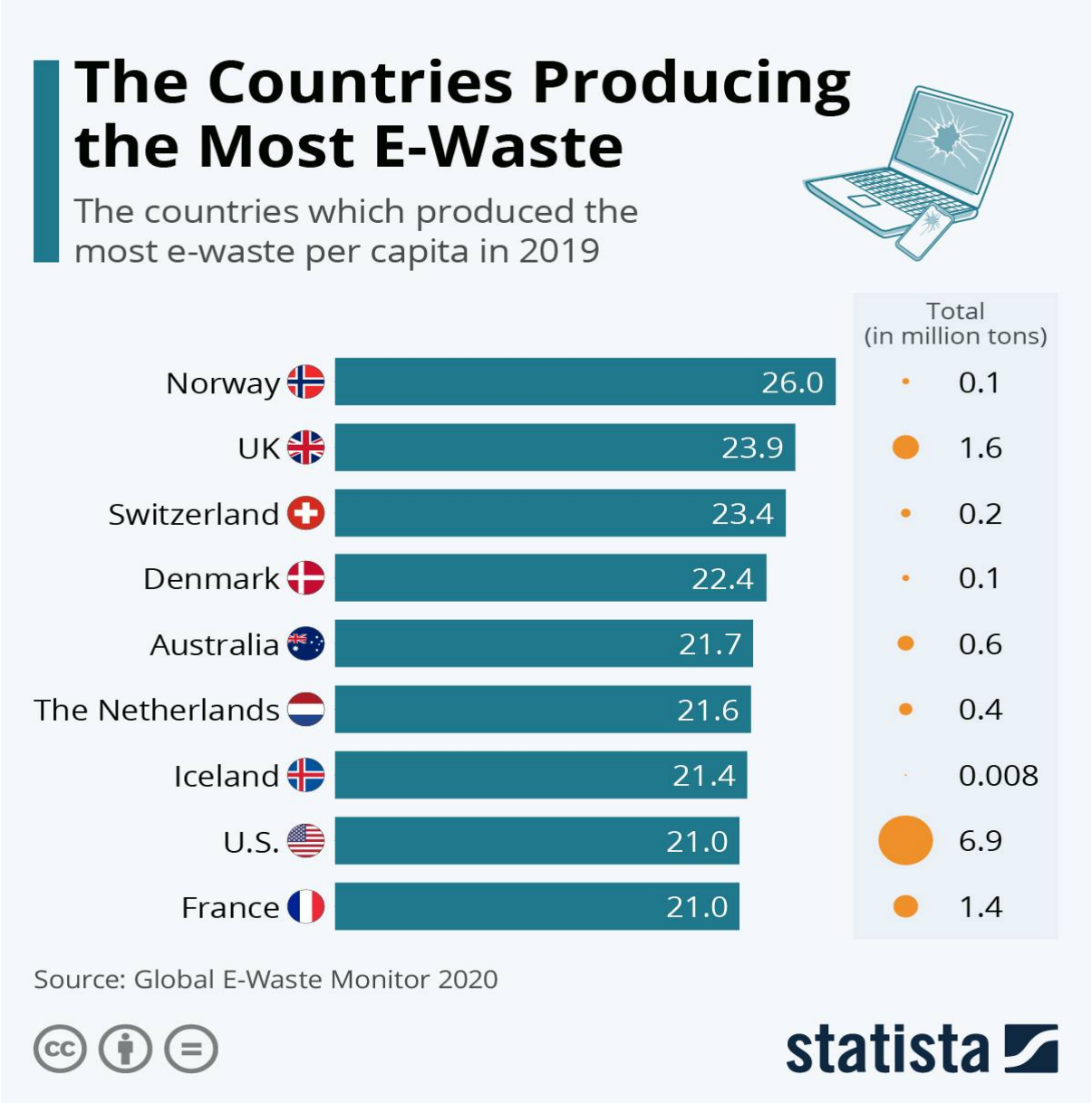
E-wastes are often burnt in an open area, dismantled, shredded and melted to extract valuable metals like gold, silver, copper etc. leading to the release of dust particles, toxic gases in the air. Treatment of acids and other chemicals also is a prevalent method of extraction of gold and silver resulted in the release of toxic dense fumes causing air pollution. For eg. the informal e-waste recycling hub at Guiyu, China established for the purpose of extraction of valuable metals causes the extreme high level of lead particles in the surrounding air.

The landfill of e-waste leads to the contamination of heavy toxic metals like mercury, lithium, lead, barium etc. with the groundwater and also the disposal of same in the open water bodies causes contamination of ponds, rivers etc. It results in the pollution at drinking water as well as affects the marine life.

USA started to extract valuable metals like Cobalt, Gold, Indium etc. from e-waste which is largely known as Urban Mining. It replaces the traditional way of mining causing the reduction of environmental hazards and risk of human life in mining field. The production of scarce expensive metals also decreases the dependency of USA on the exported metals.

III. FINDINGS

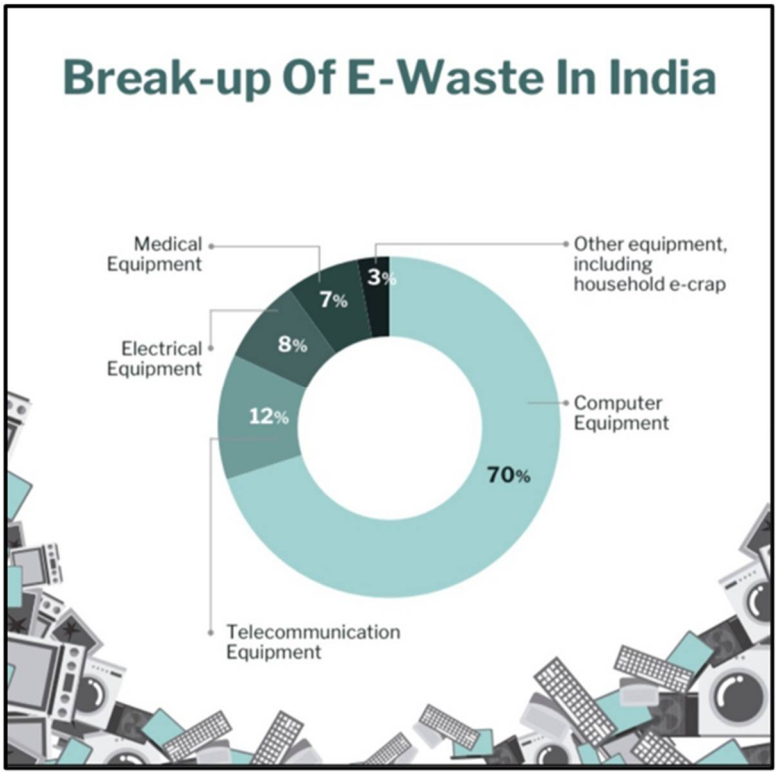
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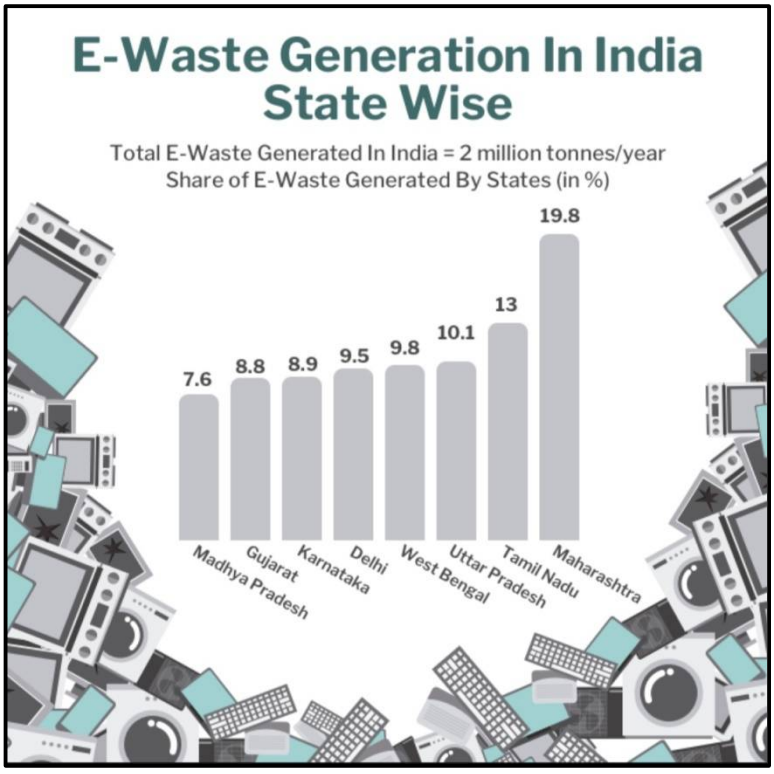
India generates about 3 million tonnes e-waste annually and is holding 3rd rank globally just after China and United States and it has been risen by nearly 43% between 2017-18 Financial year to 2019-20 Financial year and also supposed to be increasing more in an exponential manner as the usage of smart phones and laptops are increasing due to the lockdown and other restrictions in physical meeting of people for the outbreak of COVID 19 in 2020. A joint report of ASSOCHAM and European Union suggested that India will fabricate approximately 5 million tonnes of e-waste by 2021 which is likely to be 100 million tonnes by 2050. As per the report of Central Pollution Control Board, Ministry of Environment, Forest and Climate Change, Government of India, just 10% of the e-waste produced in India in 2019 was collected for recycling. Another major concern for India is that, 95% of the e-wastes originated in India are handled by unorganized sector in an unscientific manner. Only 0.036 Million tonnes of squander was processed in India for the year 2016-17. Moreover the extraction pattern of cobalt is 30% of the e waste which is an important element in the production of electric car batteries, laptops , smart phone . It is estimated that reprocess metals are energy – effective .

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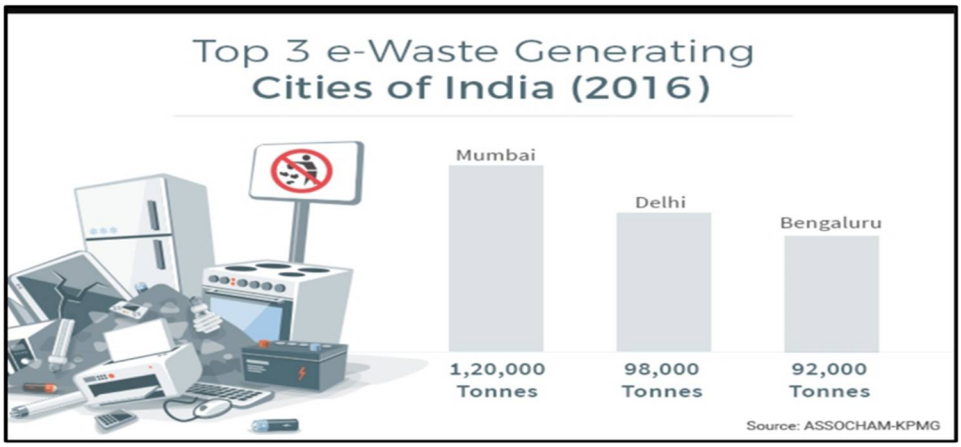


A joint study of ASSOCHAM and KPMG also indicates that laptop and computers are the highest contributor of e-waste which is 70% in India followed by telephones and mobile phones that is 12%and other electronic equipment is 15%. Maharashtra, Tamil Nadu and Uttar Pradesh are the three states of India produce highest number of e-wastes whereas Mumbai, Delhi and Bengaluru are the top three states generating e-wastes.



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Ministry of Electronics and Information Technology, Government of India introduced E-Waste Management Rules in 2011 gleaned on the principle of Extended Producer Responsibility (EPR) which had been passed by the Parliament of India. Under EPR, the producers of electronic goods are legally authorized to collect the old electronic gadgets after consumption from the normal customers and bulk consumers in order to dismantle it scientifically and also sell in second hand markets. However, this provision has been extended in 2016 by the amending the rule where the damaged spare parts of the original goods are also to be accepted for collection and 21 more products were included in the list of electronic products eligible for collection. It further introduced the concept of Producer Responsibility Organizations (PRO) which are individually or collectively financed by the manufacturers as well as recyclers in order to guarantee the accumulation and proper channelization of e-waste after consumption. It also ensures the reduction of hazardous substances like mercury, lead, cadmium, chromium etc. in the newly manufactured electrical and electronic products. Government of India also initiated a national level E-Waste awareness campaign in 2015 under Digital India initiative in order to increase public awareness about the hazardous effects of e-waste in the society and also promote the scientific management and recycling of e-waste. greene.gov.in is a website launched by Ministry of Electronics and Information Technology, Government of India for propagating the ideas of the sustainable management of e-waste. Initially different stakeholders such as educational institutions, welfare organizations, private organizations etc. from 10 states of India like Madhya Pradesh, Uttar Pradesh, Jharkhand, Odisha, Goa, Bihar, Puducherry, West Bengal, Assam and Manipur participated in this programme and 20 more states like Andhra Pradesh, Andaman & Nicobar Island, Gujarat, Chhattisgarh, Daman & Diu, Delhi, Haryana, Himachal Pradesh, Kerala, Karnataka, Lakshadweep, Maharashtra, Meghalaya, Punjab, Rajasthan, Sikkim, Tamil Nadu, Telengana, Tripura and Uttarakhand joined later in the second phase. In 2017, country's first e-waste bin was installed at Bengaluru jointly by two NGOs namely Saahas, Environmental Synergies in Development (Ensyde) and BM Kaval Residents' Welfare Association. The Chief Executive Officer of Ensyde announced that they had assembled 4.4 tonnes of e-waste in 10 months and also recuperated 306 Kg metals by recycling the collected e-waste.



In consonance with Central Pollution Control Board of India, there are total 312 authorized E-Waste recyclers across 18 states in India with a capacity of recycling total 7, 82, 080.62 Metric tonnes of e-waste as on 27.06.2019.

IV. PROPOSAL

During the year 2019 53.6 million metric tons of e -waste was produced globally , companies like Iphone and Samsung have started producing electronics which can be recycled . In order to limit and reduce the manufacture of electronic products or its wastage we can adopt circular economy approach in the electronic industries by producing products which are long lasting and can be updated to the newer version for many years , along with the manufacture of spare parts , batteries so that people can repair their electronic , E -waste can also be used to generate electricity in a natural way , for instance Mobile phone if attach to the trees and if they receive direct sunlight it can produce electricity , followed by that e -waste can be used for the water waste treatment. Many countries are using e waste product like gold for making of jewellery .E waste like TV can also be used for decorative purpose, like a recycled old TV can be used as an Aquarium . The construction of passive houses and moving towards nature based solution can eliminate the crisis of e waste to a certain level. Journalism Technology and Technology is ruling the 21st century . With Digital India rising, the use of electronic products like mobile and tablet is rising , we need to adopt sustainable products , in India 95% of the e- waste is thrown into the landfills , the presences of plastic in e waste can be used for 3D Printing .

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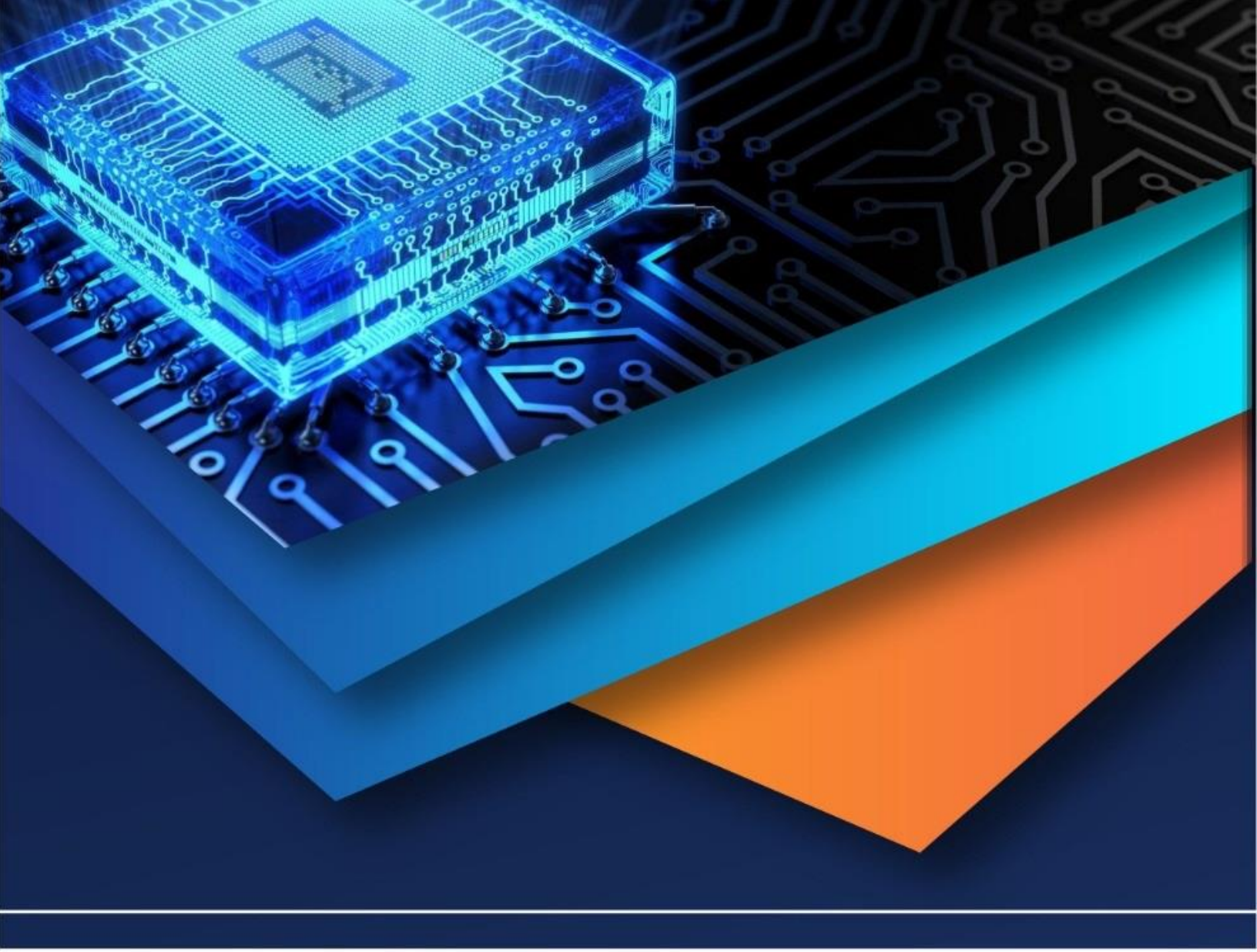
V. CONCLUSION

Despite of the availability of useful products in the e-waste, the rate of collection as well as recycling of the same is not satisfactory. According to a report of Global E-Waste Monitor, 2017, only 22% of the e-waste originated in India is processed further and around 95% of them are still recycled by informal sector in an unscientific manner causing the exposure of a significant section of society towards toxic pollutants. Seelampur of Delhi has one of the biggest unorganized sectors of the processing of e-waste in India. However, many e-waste collection centres as well as recyclers are establishing in India and the information regarding this can be obtained at common service centers established by Government of India under Digital India Mission.

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