

How Does the World Deal with E-waste? Its Management and Analysis

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Abstract

There are numerous electrical devices used daily. Whether we do it knowingly or unknowingly, we always appreciate how much easier life is as a result. But as we all know that everything nice eventually comes to an end, these gadgets inevitably stop working and are wasted. One of them claims that electronic garbage, or “E-waste”, is a global issue that is only becoming worse. A significant buildup of e-waste is caused by the advent of newer technology and the exponential growth of electronic consumption. For effective e-waste management, there is a need for a tool that both individuals and companies can use. Thus, the term “e-waste” is considered. In this study, we will see a brief study of how the world deals with this electronic waste problem. And how does the world analyze this waste? And help our earth become a better place in various ways.

Keywords: E-waste, garbage, World Health Organization, analyst, machines

INTRODUCTION

We must first comprehend what constitutes e-waste to comprehend its management and analysis. What do you notice if you glance around or simply up at the ceiling? Our trusty fan is the solution to this dilemma. One might now question how this amiable fan is an electronic waste. It is not yet a waste, but it will be until you switch it out with a fan that uses less energy and is more attractive and efficient. If it is not properly recycled, this old fan will end up in the trash where it will rust forever and harm the environment. This Fan is just an example of how we use hundreds of electronics till the time we are on the earth and all of those electronics eventually become useless and create e-waste. And this increase in the use of electronics makes it hard to analyze and makes its disposal even harder.

Nevertheless, many nations are developing unique plans to handle this e-waste and attempt to produce less e-waste.

With the advancement of technology and the introduction of cutting-edge engineering that resulted in the development of several electronic items, rendering all previous models obsolete, e-waste disposal generally began in the middle of the 1970s. To control the production, collection, storage, transportation, processing, and disposal of e-waste, the e-waste (Management) Rules, 2016 were adopted in India on October 1, 2017.

E-waste, often known as electronic garbage, is an increasing issue in modern civilization. Electronics are rapidly becoming obsolete due to the rapid

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evolution of technology. As a result, there is now more electronic garbage being produced; and inappropriately disposed of e-waste contains hazardous materials such as lead, mercury, and cadmium that can pose a threat to human health and the environment. Inadequate e-waste disposal can result in air pollution, land, and water contamination, and even health issues for individuals who encounter it. E-waste must be recycled if its harmful effects on the environment and public health are to be minimized. To ensure that electronic devices are disposed of in an environmentally appropriate way, proper e-waste management calls on cooperation from people, organizations, and governments. This abstract tries to emphasize the value of managing e-waste and the necessity of raising awareness and taking action to address this expanding problem [1].

E-WASTE

Examples of E-waste

Electronic waste (e-waste) products have exhausted their utility value through either redundancy, replacement, or breakage and include both “white goods” such as refrigerators, washing machines, and microwaves, and “brown goods” such as televisions, radios, computers, and cell phones. Other examples of electronic waste include air conditioners, freezers, screens, monitors (TVs, laptops), lamps (LED lamps), and other large equipment.

Managing E-waste

E-waste management is a comprehensive approach to removing electronic trash from the environment to stop its poisonous deterioration of the planet [2]. It reuses and recycles obsolete electronic waste. Managing e-waste can be done in the following ways:

- Reuse the equipment which is still functioning to reduce e-waste.
- Many damaged pieces of equipment, such as mobile phones, calculators, laptops, etc., are recyclable; repairing them helps preserve resources and lowers the amount of electronic trash produced.

WHAT MAKES E-WASTE A THREAT TO HUMANS?

E-waste is hazardous because it can leach toxic substances like lead and mercury into the soil, water, and air when it is not disposed of correctly. These chemicals may have negative effects on human health, animals, and plant growth, as well as the environment. Another source of e-waste is outdated technology that is not repaired or reused [3]. E-waste can intoxicate important bodily organs, damage DNA, cause thyroid difficulties, lead to lung disorders, and worsen conditions like cancer and heart disease. Exposure to the dangerous compounds included in e-waste can cause serious health problems that are occasionally deadly. Through consumption, skin absorption, or inhalation, these poisons get into our system. Humans then run the danger of suffering damage to their skeletal, liver, renal, heart, and brain systems. A worker's risk of exposure to over 1,000 hazardous compounds, including lead, mercury, nickel, brominated flame retardants, and polycyclic aromatic hydrocarbons (PAHs), increases when they work to extract valuable commodities like copper and gold. Children and expectant mothers are particularly vulnerable at crucial exposure times that adversely influence a variety of biological systems and organs.

Due to the inclusion of harmful substances like mercury, lead, and brominated flame retardants, which are classified as hazardous waste under the Basel Convention, it is listed as hazardous waste [4]. It is important to dispose of e-waste properly to prevent these harmful substances from contaminating ecosystems and food chains.

Elements that Cause E-waste

The main causes of electronic waste are:

1. Advancement in technology that makes electronic products obsolete or less desirable.
2. Changes in style, fashion, and status that influence consumer preferences and behavior.
3. End of the useful life of electronic products due to wear and tear, damage, or malfunction.
4. Lack of precautions or awareness while handling, disposing, or recycling electronic products [5].

When released into the environment, dangerous materials included in electronic waste, such as mercury, beryllium, lead, and cadmium, can have a negative impact on the health of living things. A combination of metals including copper (Cu), aluminium (Al), and iron (Fe) makes up the majority of e-waste. They could be joined to, covered in, or even combined with different ceramic and plastic materials.

How Does E-waste Affect Nature?

E-waste is damaging to humans and the environment alike. The environment and human health may suffer because of poor e-waste disposal. Heating e-waste results in the release of harmful substances including lead, cadmium, and beryllium into the air, which is one of the primary detrimental consequences on the environment. Following that, there is a possibility that the toxic materials will seep into the groundwater, where they may affect both aquatic and terrestrial organisms. E-waste that has been incorrectly shredded, melted, or burned can potentially pollute the air. These procedures pollute the air by releasing dust particles or pollutants like dioxins into the environment [6].

Ways to Dispose of E-waste

Here are some eco-friendly waste disposal techniques that you can use to dispose of electronic waste locally:

1. Give it back to your electronic companies and drop off points.
2. Visit civic institutions.
3. Donate your outdated technology.
4. Sell off your outdated technology.
5. To give it to an authentic recycler of e-waste.

These are some important ways to dispose of e-waste.

Analysis of E-waste

The Global E-waste Monitor 2020 report states that 53.6 million metric tons of e-waste were produced globally in 2019. This translates to 7 kg of electronic garbage per person. According to the context of the current web page, India is the “Third largest producer of electronic waste in the world,” and about 2 million tons of e-waste are produced each year [7]. India is the world's third-largest producer of electronic garbage after China and the United States, and these three nations collectively contributed 38% of the total 53.6 million tons (Mt) of e-waste produced globally in 2019. E-waste is a serious problem for the environment and human health that needs to be addressed right away. Technology's quick development has increased the amount of electronic trash produced, which contains potentially dangerous elements that could endanger both human health and the environment. Inadequate e-waste disposal can result in air pollution, soil and water contamination, and health issues for everyone who comes into touch with it.

To lessen e-waste's detrimental effects on the environment and human health, recycling is essential. To ensure that electronic devices are disposed of in an environmentally appropriate way, proper e-waste management calls on cooperation from people, organizations, and governments [8]. This entails putting into place rules and procedures for e-waste disposal, raising awareness and educating people about the significance of proper e-waste management, and encouraging the use of environmentally friendly electronic gadgets.

In general, tackling the e-waste problem is crucial for preserving both the environment and human health. We can lessen the quantity of electronic waste produced and make sure that it is disposed of safely and responsibly by cooperating. In June 2021, the World Health Organization (WHO) released its first-ever report describing the extent of how e-waste affects children's health. The report, titled “Children and Digital Dumpsites: E-waste Exposure and Child Health”, demands that governments, exporters, and importers take legally binding action to ensure worker and family safety, proper e-waste disposal, and the production of more enduring electrical and electronic equipment [9].

After China and the US, India generates 3.2 Mt of e-waste annually, making it the third-largest contributor in the world. India is starting to experience major healthcare and environmental problems. Policymaking and better legislative enforcement must play catalysts for India to transition from a linear to a circular economy vis-à-vis electronics (Figure 1).

How Will Things be With E-waste Within the Future?

Since they contain a variety of organic materials, including heavy metals like cadmium, chromium, lead, and mercury plastic, which are extremely dangerous to individuals and the environment, managing e-waste has become a pressing problem for many nations. Millions of people are employed now in the unorganized e-waste disposal industry, which deals with valuable elements like gold, silver, and copper (Figure 2).

E-waste management's future is still up in the air. However, there are numerous efforts being made to lessen and recycle e-waste. For instance, the European Commission recently abandoned a series of ambitious legislative commitments on waste and recycling, including the vow to phase out the disposal of recyclable garbage in landfills and to reduce food waste by 30% by 2025. The globe generates up to 50 Mt of electronic and electrical garbage (e-waste) annually, according to a UN assessment. Of this, only 20% is officially recycled. Over \$ 62.5 billion worth of e-waste is produced each year, which is more than the GDP of many nations [10]. By 2050, if current trends continue, the production of e-waste might more than double to 120 Mt.

Schemes of the Government of India

The E-waste Management Rules were introduced by the Indian government in 2016. Businesses that produce electronic trash are subject to the rules. According to the regulations, businesses must create plans for the secure disposal of electronic waste. The Ministry of Environment, Forest, and Climate Change is responsible for enforcing the regulations. The E-waste Management Rules also include the Extended Producer Responsibility Plan. Companies will be expected to recycle a minimal portion of the manufactured electronic products under the scheme. To address the problem of e-waste, governments from all over the world have put in place a number of programs. These are a few of the schemes:

1. *Extended producer responsibility (EPR)*: This policy approach holds producers responsible for the end-of-life disposal of their products. Governments require manufacturers to take back and recycle their products at the end of their useful life.

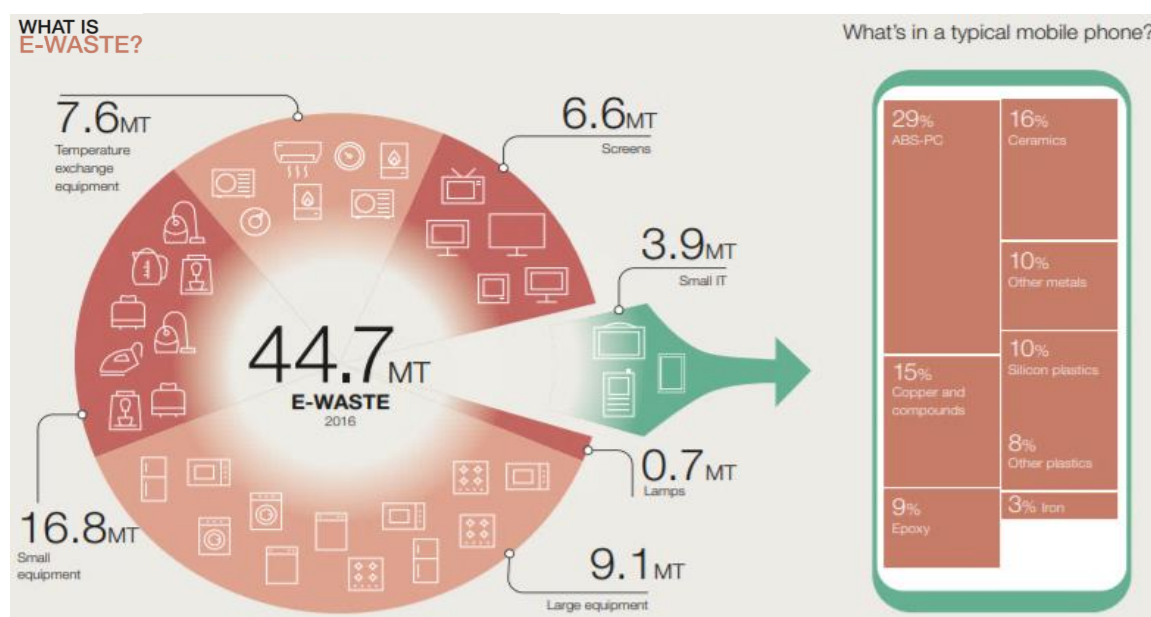


Figure 1. Composition of e-waste.

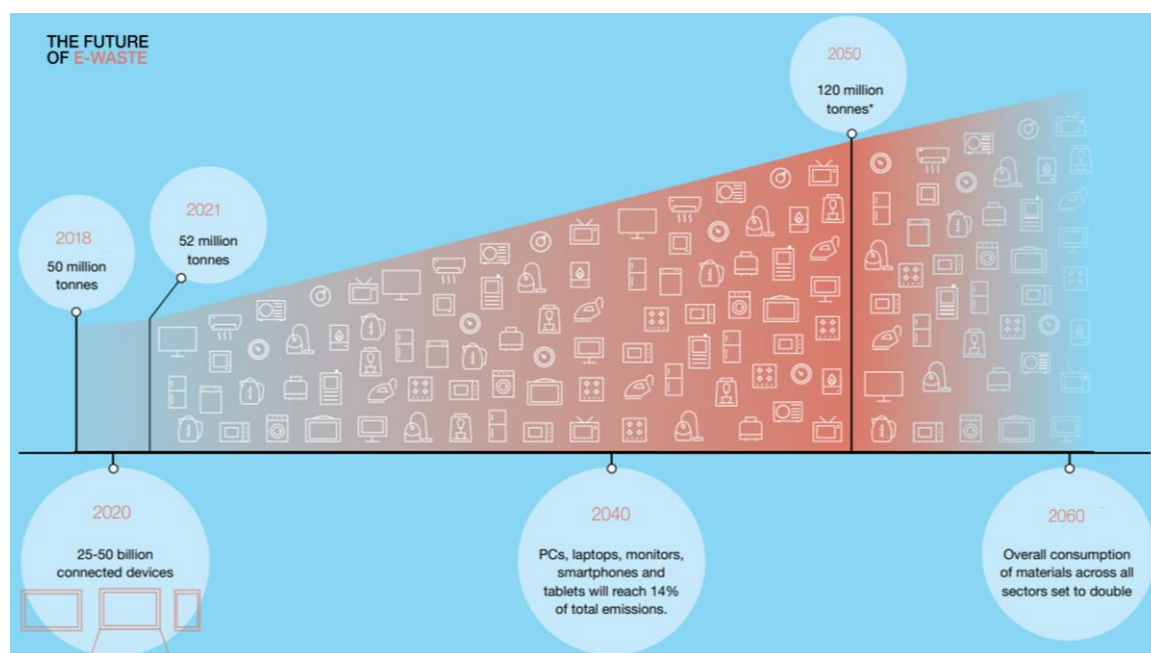


Figure 2. E-waste future.

2. *Deposit-refund system:* In this system, consumers pay a deposit when purchasing electronic devices, which is refunded when the device is returned for recycling.
3. *E-waste collection drives:* Governments organize e-waste collection drives to encourage individuals and businesses to dispose of their electronic devices responsibly. These drives are often held in partnership with recycling companies.
4. *E-waste recycling incentives:* Governments offer incentives to recycling companies to encourage them to invest in e-waste recycling facilities.
5. Governments have put in place measures to limit the export of electronic waste to developing nations and to make sure that it is disposed of in an environmentally friendly way.

The overall goal of these programs is to encourage appropriate e-waste disposal and lessen the harm that electronic waste does to the environment and public health.

Schemes Different Countries Have

Different countries have different e-waste management policies. E-waste management is the top concern in developed nations, but in developing nations, it is made worse by completely adopting or replicating the e-waste management of developed nations, as well as by a number of other issues, such as a lack of funding, technological, financial, and technically skilled human resources, another lack of buildings, a lack of information on the e-waste situation, and the recovering of valuable stuff in small-scale manufacturing facilities using crude disposal methods.

Extended producer responsibility (EPR) and producer responsibility organization (PRO) initiatives have been clearly articulated as the keys to success in managing e-waste. The European Union offers the best e-waste management. For instance, Switzerland and the Netherlands have the best e-waste management systems.

CONCLUSION

This study provides a quick overview of the e-waste problem and offers some management ideas. As e-waste is expected to grow in importance over the future years. So, while there is still time, it is best to start taking preparations. The globe produced 53.6 Mt of electronic garbage in 2019, which is around 7.3 kg/person and the weight of 350 cruise ships, according to research by The Conversation. Waste

electronic and electrical equipment (WEEE) is expected to reach a global mountain this year, with a total estimated weight of 57.4 Mt. According to studies, the total amount of electronic trash produced worldwide is expected to exceed 67 Mt (74 million metric tons) by 2030 based on current trends. Or this could harm our presence on the planet in several ways. Because of this, managing and analyzing waste is crucial. E-waste is a problem that is getting worse and needs immediate response.

It is impossible to ignore the harm that incorrect electronic device disposal does to the environment and to people's health. Through recycling, instruction, and laws, people, companies, and governments must collaborate to promote appropriate e-waste management. We can save our planet and guarantee a sustainable future for future generations by acting today.

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