

New Environment Panic “E-Waste”

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Abstract - E-waste has emerged as a new environmental issue in today's world. E-waste is the only type of electrical and electronics products that are left unused or in motion after being used in offices, courts, businesses, hospitals and homes. Sometimes it is recyclable but most of the time it becomes permanent waste. These are known as Waste Electrical and Electronic Equipment (WEEE) and in general it is known as e-waste.

Key Words: E-Waste, Waste Electrical and Electronic Equipment

1. Introduction

Experts believe that the unprecedented advancement of technology, the invention of new updated versions every day, the versatility of new products, the increase in capacity, attractive designs, the increase in human income and the innate attraction of people towards fashionable and comfortable life are the causes of e-waste. Older devices may not be as durable as long-term use, repair costs may not be profitable, and in some cases the aggressive marketing strategies of multinational companies may be a factor in the creation of e-waste.

Disposal of discarded devices and unregulated collection and recycling techniques are becoming more and more a threat to public health and the environment. For these reasons, e-waste has become one of the major environmental problems in the world today.

2. Source of e-waste generation

E-waste is directed to different countries. In the United States it refers to consumer electronics (TVs, computers, etc.) and in Europe it refers to all electrical products with batteries or power cords. There are two types of e-waste based on material and structural features.

- Ferrous substance
- Non-ferrous substance (plastic, copper, glass, fiber, carbon, etc.)

However, the European Union has divided e-waste into ten categories. Note that this segmentation based on the source of e-waste is the most acceptable in the world.

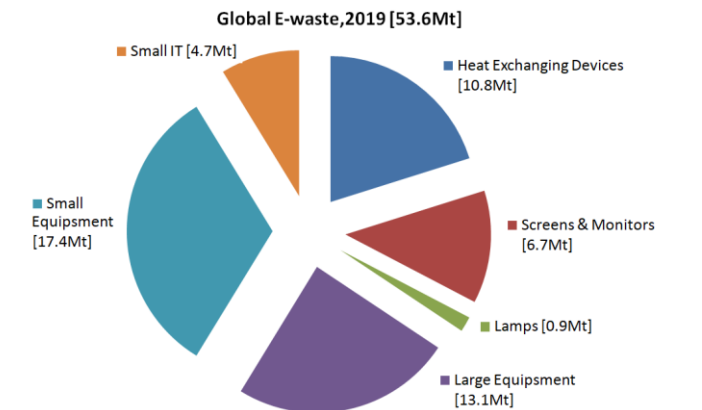
1. *Large Household Appliances:* Refrigerator, freezer, washing machine, cloth dryer, dish washer, cooking electric oven, hot plate, microwave, electric fan, air conditioner.

2. *Small Household Appliances:* Vacuum cleaner, toaster, grinder, coffee maker, electric shaver, trimmer, hair dryer, rice cooker, water heater, curry cooker.

3. *Information Technology and Telecommunication:* Mainframe computers and mini computers, desktops, laptops, pump tops, tabs, notebooks, printers, toners, photocopiers, telephones and cell phones, pen drives, scanners, integrated circuits, broadband and WiFi devices.

4. *Consumer Equipment:* Various listening devices including radios, televisions, video cameras, video recorders, DVD players, stereo recorders, digital cameras, DSLRs, amplifiers and headphones.

5. *Lighting Equipment:* Fluorescent bulbs, energy saving bulbs, high quality discharge lamps.



6. *Electric and Electronic Tools:* Drilling machines, wood sawing machines, soldering irons, excavators, turning, milling, grinding, folding and bending machines for the preparation of wood and other metal products.

7. *Toys, Entertainment and Sporting Goods:* Electric train and racing car sets, video games, sports and exercise equipment.

8. *Medical and Health Supplies:* Radiotherapy machine, X-ray, CT scan, mammography machine, dialysis, ventilator, nuclear medicine machine etc.

9. *Monitoring and Regulating Devices:* Smoke detectors, hearing regulators, thermostats, closed circuit cameras, etc.

10. *Automatic Dispenser*: Hot drinking machines (tea, coffee), hot or cold water dispensers, water purifiers, money counting machines, all kinds of automatic dispensers etc.

3. Risk of e-waste

In this age of technological revolution, new products are being invented to make our life easier and more comfortable. After a few days of use, they lose their performance, get damaged, or we throw away the old devices to attract new exclusive and fashionable devices. After scattering, they are rented from the e-waste breaking shop at one time, and at another time they are placed in the refinery for recycling. Throughout this process, waste is exposed to the sun, water, and underground as it spreads under the open sky, increasing the health risks to the people involved in the collection process.

For all these reasons, electrical and electronic waste is rapidly becoming a cause for concern. E-waste has been identified as a "New and Emerging Environmental Threat to Human Health" at a conference in Africa organized by the World Health Organization (WHO) and the United Nations Environment Program (UNEP).

Modern electronic products have about 70 different types of components. Some of these components are valuable, some are risky, and some components are valuable and risky at the same time. E-waste materials include Lead, Cadmium, Beryllium, Chromium, Copper, Aluminum, Gold, Silver, Palladium, Platinum, Nickel, Tin, Zinc, Iron, Sulfur, Phosphorus, Arsenic, Polyvinyl chloride (PVC), Polychlorinated by phenyl (PCB) etc.

4. How e-waste harms

According to experts, e-waste contains more than a thousand different types of toxins and everyday electrical and electronic devices cause more damage. Harmful substances used in lead, mercury, copper and motherboards on televisions and computer monitors, cell phones, refrigerators and ACs can play a role in causing a variety of physical problems, including cancer and kidney damage, and thyroid hormone disorders.

They also complicate the availability of potable water through contamination of surface and groundwater sources (Sinha et al.2007 cited in Ahmed 2011). The influence of these elements hinders the growth and propagation of plants. The food chain of the ecosystem is damaged and they play a role in changing the environment as a whole.

A cell phone can contain up to forty components. Of these, 23 per cent are metals and the remaining 77 per cent are plastics and ceramics. A handset contains 250 mg of silver, 24 mg of gold, 9 mg of palladium and 9 g of copper.

In addition, the lithium ion battery of each mobile phone contains an average of 3.5 grams of cobalt (UNEP & UNU

2009). In addition to these there are harmful elements like lead, zinc and arsenic. So throwing the phone set with the battery in the open ground can be very harmful. Cadmium used in cell phones can contaminate up to 6,000 liters of water.

Lead (Pb): It is most harmful to the animal kingdom and the environment. When it enters the human body in any way, it damages the brain and kidneys.

Cadmium (Cd): Causes lung cancer, kidney and liver problems, stomach problems, ulcers and allergies. Excessive intake can lead to death. It also has a detrimental effect on bones.

Nickel (Ni): Many devices have a nickel coating. This can lead to cancer of the lungs, nose, prostate and other organs. Nickel is also responsible for the irregular heartbeat.

Cobalt (Co): Problems with the lungs, heart, eyes and thyroid. It is responsible for asthma also.

Antimony (Sb): Damages eyes, skin, heart and lungs.

Bismuth (Bi): Responsible for shortness of breath, skin damage, insomnia, depression and bone pain.

Molybdenum (Mo): Causes pain in hands, feet, knees and elbows.

Tin (Sn): Itching of skin and eyes can cause headaches, indigestion, and shortness of breath and bladder disease.

E-waste also contains some valuable ingredients along with such harmful ingredients. With proper management, the loss can be minimized and valuable material can be collected. As of 2008, the value of metals used exclusively for electrical and electronic products is estimated at 45.4 billion. According to the United Nations Environment Program (UNEP) and the United Nations University, four million tons of precious metals can be recovered from e-waste every year if proper recycling or recycling can be done.

But countries in Asia, Africa and Latin America are increasingly recycling e-waste. This risk is created in two steps:

- Pollution spreads in the environment during collection of precious metals from wastes.
- Pollution spreads in the environment when waste is melted down and converted to another form.

Pollution from the recycling process is divided into three levels by the United Nations Environment Program (UNEP & UNU 2009).

• *Phase I-early discharge*: E-waste is initially discharged from harmful substances such as lead, mercury, arsenic, PCBs, fluorinated liquids used for cooling etc.

• *Phase II-emissions:* Emissions in this phase are due to the interaction of different components during recycling. Such as: Dioxin and furan produced by burning or melting halogen-rich plastics.

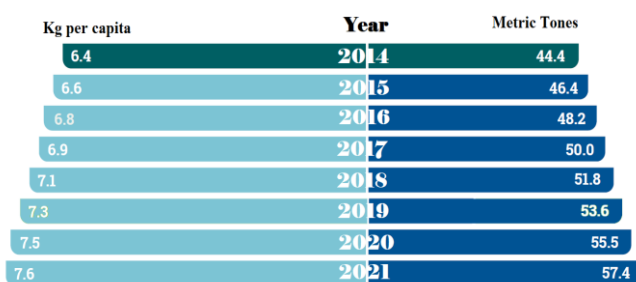
• *Phase III-emissions:* If the recycling method is not appropriate, the toxic substances used in the recycling process such as cyanide, mercury etc. are released into the environment and started the third phase emissions.

Recycling villages are located in Guiyu under Guangdong Province in China, to reflect the level of pollution from e-waste. A 2006 survey found that Guiyu has one of the highest rates of dioxin pollution in the world. A 2002 survey conducted by the Basel Action Network found that the lead levels in the Li Jiang River were 2,400 times higher than those set by the World Health Organization (WHO) and 212 times higher than in the riverbed mud.

A 2009 survey found that the amount of copper, nickel, lead and zinc in Guiyu's road dust was 330, 106, 371, and 155 times higher than in villages 8 to 30 kilometers away, respectively. Eighty percent of the child laborers working here are exposed to harmful lead contaminants. It is a matter of concern that millions of children and adolescents in Asia, Africa and Latin America are involved in these recycling processes in the informal sector. They are doing it without any defense equipment.

5. Global image of e-waste

A report titled "The Global E Waste Monitor 2014: Qualities, Flows and Resources" published by the United Nations University in Japan in 2014 states that more than 40 million tons of e-waste is generated in the world every year. The USA and China produce one-third of the world's e-waste.



A report of the United Nations University published on January 15, 2016 shows that in the five years of 2010-2015, the amount of e-waste in Asia has increased by about 63 percent. At the end of 2015, Cambodia, China, Hong Kong, Indonesia, Japan, Malaysia, Philippines, Singapore, South Korea, Taiwan, Thailand, and Vietnam had 12 million tons of waste. In China alone, it has more than doubled in five years to 761000 tons.

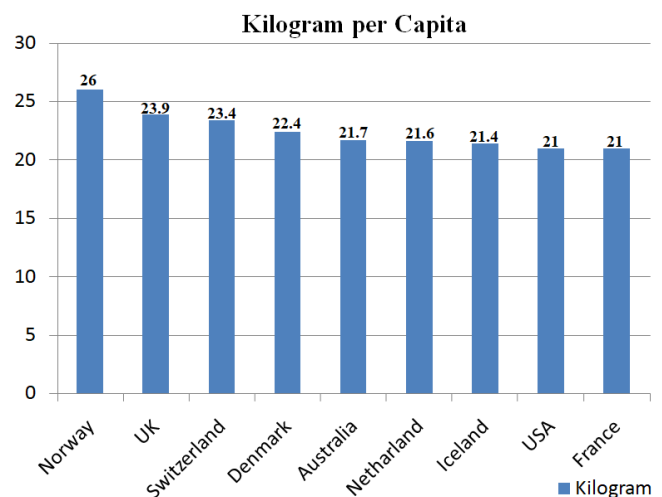
The Global E-Waste Statistics Partnership published a report on "Global E-Waste problem" on June 4, 2019, citing the United Nations University (UNU). The report states that the

world generates 50 million tons of e-waste every year, which is more than the weight of all commercial aircraft produced in the world so far. In 2016, 44.7 million metric tons of e-waste was generated in the world. Of which only 20 percent have been recycled and 6 percent still cover mankind. Solving the E-Waste Problem (StEP) in a report says that an average of 6 kg of e-waste is generated annually by every 600 billion people in the world.

6. Top e-waste producing countries in the world

The Global E-Waste Monitor-2020 report published an interactive map; where the per capita e-waste production and collection of the country concerned is shown. So that countries can easily decide what to do.

In many European countries the per capita e-waste generation is as high as; similarly, the amount of waste collection per capita is more. Although Norway is the world's leading e-waste (per capita) producer, it is also the world's largest e-waste (63%). Sweden has collected 14.5 kg of e-waste with a per capita production of 21.5 kg in 2016. That means the amount of collection is 69%.



In Asia, on the other hand, e-waste collection is negligible in most countries except South Korea, Taiwan and Japan. The same picture exists in Africa and Latin America. In 2016, Japan produced 2139 kilotons of e-waste, of which only 26% was collected. The Japanese produce an average of 16.9 kg of e-waste per capita, compared to the average per capita e-waste generation of 4.2 kg in Asia. But hopefully the least e-waste producing country is also located in Asia

7. Country that produces the least e-waste

S/N	Country	E-waste Production [Kg per capita]
01.	Cambodia	1.10
02.	Vietnam	1.34
03.	Philippine	1.35

8. E-waste flow

Recycling toxic and dangerous e-waste is quite complex and expensive. So to avoid this problem and avoid environmental risks, developed countries send these wastes to developing countries in the developing world which are relatively less aware of the environment and lag behind in law making and enforcement. Sometimes this is done as a grant; sometimes it is done in the name of technology transfer.

European e-waste is mainly trafficked to Senegal, Ivory Coast, Ghana, Benin, Nigeria, Egypt in West Africa, India and Pakistan in South Asia, and Eastern Europe in East Africa (Lewis 2010).

The United States exports 60% of its e-waste. Most of which enter China through Hong Kong ports (Lewis 2010). The United States exports 14 million tons of used electronics products every year in mobile phone forms.

Their destinations are Hong Kong, Latin America and the Caribbean. And heavy items such as TVs and computer monitors go to Mexico, Venezuela and China. The world's largest e-waste recycling village has been set up in Guiyu, Guangdong Province, China. About 60,000 (2005) workers are involved in this work in an area of 52 sq km. E-waste is hauled here from more than 100 trucks every day. This is why Guiyu is called the "Electronic Graveyard" of the world.

7% of e-waste smuggled from England and Wales first goes to Ghana and Nigeria (BBC 2011). In this way, one of the largest e-waste bins in the world has developed in the ' Agbogbloshie' area near Accra, the capital of Ghana.

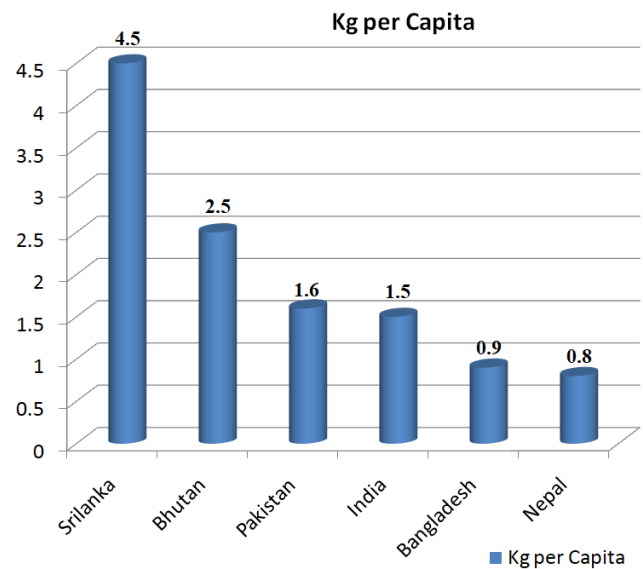
9. E-waste situation in Bangladesh

Due to rapid urbanization and continuous economic growth, e-waste is growing irresistibly in developing countries including Bangladesh. In 2018, Bangladesh generated about 0.4 million metric tons of e-waste with an annual growth rate of about 20%.

The research report of Environment and Social Development Organization (ESDO), a non-governmental organization, says that waste management from electrical and electronics products-2018 is producing 3 million metric tons of waste annually in Bangladesh. According to the data of Bangladesh Mobile Phone Importers Association (BMPIA), in 2016, 142000 tons of e-waste was generated in the country. Of this, one thousand metric tons of waste is generated by mobile phone operators. According to the Chief Waste Management Officer of Dhaka North City Corporation, 1179.98 tons of mobile e-waste will be generated in the country by 2021.

On the other hand, according to the Bangladesh Electrical Merchandise Manufacturers Association (BEMMA), about 3.2 million tons of electronic goods are used in Bangladesh every

year. Of this, (20-30)% is recycled and the rest is thrown away. That is, it turns into e-waste.



The idea is that e-waste is generated in Bangladesh in three ways:

- Firstly, internal customers use these and throw out at expiration.
- Secondly, a large quantity of electrical and electronics products brought into the country through expatriate workers.
- Thirdly, used and old devices smuggled from developed countries.

According to the report published by Bangladesh Bureau of Statistics in June 2019, the current population of the country is 164700000. The report of BTRC published in December 2019 says that at present the number of mobile phone users in the country is 165572000. In other words, almost every person in the country uses a mobile phone. According to experts, 20-25 percent of mobile phone usage expires every year. As such, a huge amount of e-waste is being generated in the country only from mobile phone users.

These wastes are recycled at Nimtali, Islampur, Chowk Bazar, Babubazar, Elephant Road and Dholaikhal in Dhaka, CDA Market, Ice Factory Road, Bhatiari and Kadamtali in Chittagong, Cox's Bazar and even in residential areas of different parts of the country. There is no shortage of laws and defense equipment in these recycling centers set up in the informal sector. About 50,000 children and adolescents work in these centers in a risky environment.

About 63% of the children and adolescents involved in this work suffer from various complex diseases including kidney and lung damage, high blood pressure, mental depression, nervous system weakness, hearing loss and paralysis. But

despite this, there is no awareness among the people of Bangladesh about the harmful aspects of e-waste.

10. Ways to remedy the risk of e-waste

- ❖ According Initiatives should be taken to create awareness and public opinion about the harmful aspects of e-waste.
- ❖ Emphasis should be placed on prolonged use of the same instrument by mastering the correct method of using the instrument.
- ❖ The use of multifunctional electronic devices such that the same device will perform multiple tasks should be increased. The use of a charger that can charge all models of mobiles of all companies can be made mandatory.
- ❖ Manufacturing companies may be encouraged to develop recycling or recycling arrangements and provide loan assistance if required.
- ❖ Emphasis should be placed on establishing eco-friendly e-waste recycling system in the informal sector.
- ❖ E-waste management should strive to acquire advanced technology from industrialized countries.
- ❖ Bangladesh is a signatory to the Basel Convention on the Control of Transboundary Movements of Hazardous Waste and their Disposal. However, there is no effective policy on e-waste management so far. Therefore, it is necessary to take immediate steps to formulate policies and laws related to the production, import, marketing, use and management of e-waste in the field of electrical electronics.
- ❖ Proper training of people involved in waste management, use of uniforms and regular physical tests need to be arranged.

11. Conclusion

On the one hand the attraction of collecting precious metals from e-waste; On the other hand, employment of a large number of floating people, mainly due to these two e-waste collection and recycling business is growing everywhere. Lack of policies on e-waste, indifference on the part of the administration, and above all, lack of awareness about the harmful aspects of e-waste are further exacerbating the situation. Therefore, effective measures must be taken in this regard before e-waste pollution seriously degrades the environment and public health.

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