Project Report on

Electronic Waste Management using Cloud Computing

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Introduction:

Electronic Wastes or, E wastes are the used items which are discarded or after used electrical and electronic materials or devices.

Used or discarded electronic materials like CPU contain very dangerous substances such as Lead, Beryllium, Brominated flame ashes any many other harmful materials which are very dangerous for the human health.

Electronic waste has now become one of the emerging global environmental and health issues.

Disposal of Electronic waste is now become a major problem all over the world. Scientists and Researchers are very much eager to find out the best solution for E-Waste Management. Cloud Computing could be a best solution for it. Cloud Computing provides the computer system resources on the demand of the user. Its one of the most famous service is infinite data storage.

Lifecycle of an Electronic Equipment:

1) **Stage I – Production of the Electronic and Electrical Equipment**
   In the first stage, the production of the Electrical and Electronic Equipment take place and EEE gets ready for the use of the consumer.

2) **Stage II – Generation of the Used Electronic and Electrical Equipment**
   In the second stage the generation of the Used Electronic and Electrical Equipment takes place. This stage mainly occurs due to the change in the trend of technology or when new technology gets introduced in the market.

3) **Stage III – Decision of the Destiny**
   Third stage is the most important phase of the lifecycle of the Electrical and Electronic Equipment because in this stage we get to know and differentiate whether the given Electrical / Electronic Equipment will be repaired for the secondary market or will be considered as Waste Electrical and Electronic Equipment or, simply Electronic Waste (E-waste).

4) Stage IV – Electronic Waste (E-Waste) Processing

Forth stage of the lifecycle of the Electronic Equipment is split into Three parts:

a) Pre Processing:

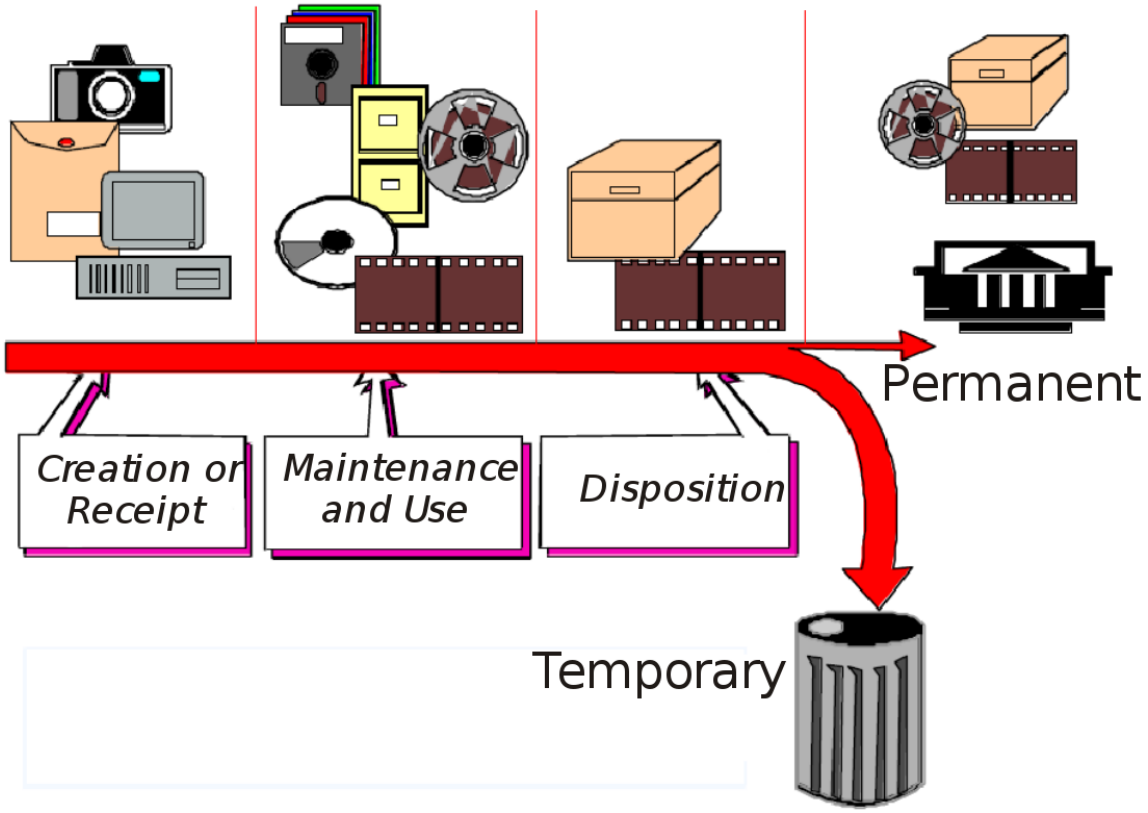
This includes the collection, categorize and disassembling of the Electronic Waste.

b) Proper Treatment:

This include the treatment of the Electronic Waste. After treatment we recovered some metals and some waste also created from Electronic Waste processing (sometimes also known as Zero Value Waste).

c) Post Processing:

This includes the processing and disposal of the Zero Value Waste.



Factors which contribute to Electronic Waste Generation:

a) **Rise in Global Information Sharing**

A very huge rise in network, application and service requirement amplified in major sectors of a country such as Education, Health, Commercial, Entertainment and Government.

b) **Rapid Industrialization and Urbanization in under developed or developing nations**

Over the time, the emerging economies (such as India) with a low purchasing power witnessed the fastest annual growth in electronic and electrical equipment consumption.

c) **Digital services and products are getting cheaper**

A very huge competition in telecommunication market, technological advancement in mobiles and fall in the prices of the digital services such as the internet are increasing or fueling the widespread usage of the electronic products.

d) **Multiple Device Ownership building a Digital Ecosystem**

People nowadays want to be connected 24X7 so they own multiple devices such as smartphones, laptops, tablets, gaming devices, smart televisions etc.

e) **Digital Revolution from Analogue to Digital Systems**

Over last some years, many electrical and electronic systems are converted from analogue to digital which generated a lot of electrical and electronic waste.

Electronic Waste Data of 2019

In 2019, a very huge amount of Electronic Waste (53.6 Mt, with a 7.3 kg per capita average) was produced all over the world.
Asia contributes 24.9 Mt amount of Electronic waste.
America contributes 13.1 Mt amount of Electronic waste.
Europe contributes 12 Mt amount of Electronic waste.
Africa contributes 2.9 Mt amount of Electronic waste.

On per capita scale, Europe leads with 16.2 kg.
Least electronic waste is generated in Africa with 2.5 kg.

In compilation and recycling of electronic waste,
Europe comes 1st with 42.5%
Asia comes 2nd with 11.7%
America comes 3rd with 9.4%

Out of 53.6 Metric Tons produced Electronic Waste worldwide,
Recorded compilation and recycling was only 9.3%.
Destiny of 44.3% remains undetermined.

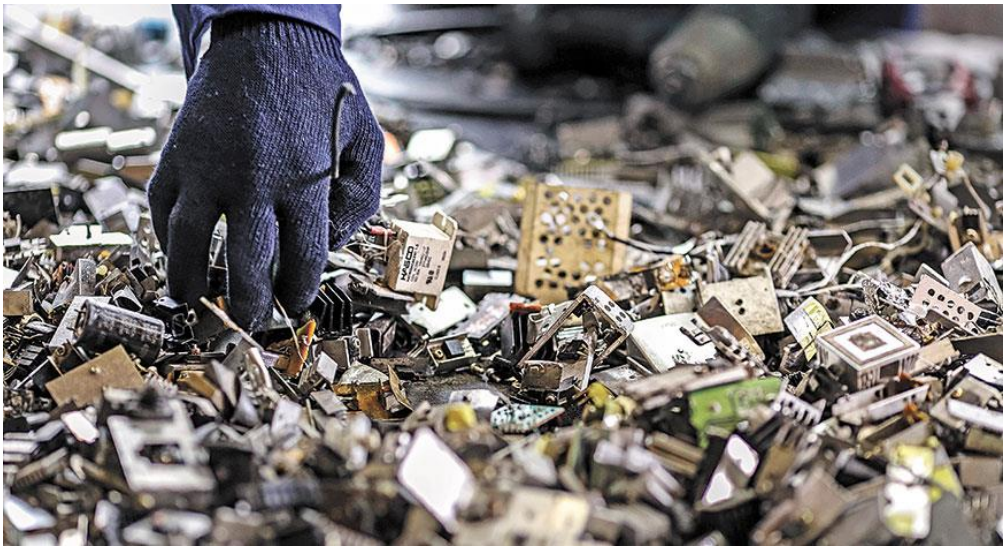
Health & Environmental Consequences:

Generally it is believed that about 4000 tons per hour of electrical and electronic waste are being generated around the globe.

Electronic components contain value-able metals such as copper, silver, gold, platinum, etc.

In addition to small quantities of value-able components these electronic waste also contain some toxic chemicals such as PVC, PCB, mercury, zinc, lead, cadmium, arsenic, chromium, selenium, etc.

Burning or dismantling of these electronic components produces very dangerous fumes that are very much hazardous to human health.



Methods of Electronic Waste Management:

- Storing the Electronic Waste in the landfills is one of the most common way but it creates a lot of land pollution. So it is not recommended.
- Incineration (destruction of Electronic Waste through burning or damaging) releases heavy metals into the atmosphere which creates air pollution. So it is also not recommended.
- Reusing the Electronic waste as second hand item. It is very much preferred as it will decrease the amount of Electronic Waste and its very much cost efficient manner.
- Recycling appears to be the safest and best method but is not because it involves various processes such as dismantling, shredding, burning, etc. So it is also not recommended.

Problems in managing the Electronic Waste in India:

- Low Electronic Waste disposal awareness among manufacturers and consumers.
- Specific Rules and Regulations on Electronic Waste are not available in India.
- No method is there to collect the accurate data of Electronic Waste is present.
- Electronic Waste recycling or management processes are inefficient causing consider-able loss of value-able materials.
- Inadequate or Improper funding.

Initiative taken by Govt. of India:

In year 2011, Government of India passed the 1st law on Electronic Waste Management,

It states that producer is solely responsible for the management of final stages of the life cycle of its product in an environmental or eco-friendly manner.

Electronic Waste collection target was not achieved in the earlier version, so a new set of Electronic Waste Management Rules, 2016, comes into existence after October 2017.

The present Rule states that

- The producer is solely responsible to revoke every electronic gadget at the end of its life.
- Any electronic or electrical equipment or spares must not contain pollutants beyond a maximum concentration value.
- Central Pollution Control Board (CPCB) to conduct random sampling of electronic or electrical equipment placed in market.

Some other initiatives taken by the Govt. of India:

- ‘The Ministry of Electronics and Information Technology (MeitY)’ has initiated an ‘Electronic Waste Awareness Program’ under ‘Digital India Initiative’ to spread awareness among common people regarding problems of Electronic Waste recycling by disordered sector.
- People of the country are motivated to take part in ‘Swachh Digital Bharat’ by providing their Electronic Waste to permitted recyclers only.
- A website, Twitter handle, Facebook page and Instagram handle is also created to spread awareness through social media.
- ‘The Ministry of Electronics and Information Technology (MeitY)’ has developed inexpensive technologies for recycling value-able materials in an eco-friendly manner.

Cloud Computing :

Cloud Computing is the on-demand accessibility of computer system resources, particularly data storage (cloud storage) and computing power, without direct active management by the user.

The accessibility of high capacity networks, low cost computers and storage devices as well as the widespread adaptation of hardware visualization, service oriented architecture and autonomic and utility computing has led to growth in cloud computing.

Benefits of Cloud Computing include:

1. Cloud Computing reduces IT cost.
2. Scalability increases.
3. Collaboration efficiency increases.
4. Flexibility of work practises.
5. Increases access to automatic updates.

Today, many large companies provide different cloud computing platforms:

a) **Amazon Web Services (AWS):**

AWS is an ancillary of Amazon. AWS provides on demand cloud computing platforms like storage, data analysis etc.

b) **Google Cloud Platform (GCP):**

Google provides its cloud computing services under the name of GCP. GCP offers computing, networking, storage, machine learning (ML) and the internet of things (IoT).

c) **Microsoft Azure:**

Microsoft provides cloud computing service named Microsoft Azure. It supports development, deployment and management of applications & services. It also provides assistance for PHP, ASP.net & Node.js for web development.

d) **IBM Bluemix:**

It is also a cloud computing solutions from IBM. It comes with the platform (PaaS) as well as infrastructure as service (IaaS) offerings. Using Bluemix IaaS, user can install and access virtualized compute power, storage and networking using the internet.

Use of Cloud Computing to reduce E Waste:

Cloud Computing could be helpful for companies to reduce their electronic waste. Some of the ways are as follows:

1. Companies/personal don't require to buy, repair or replace the hardware for an Info. Tech. configuration. They don't require to discard of all of the damaged servers, storage devices, networking hardware, and cords over a period of time.

2. Companies that provide cloud services are utilizing their hardwares effectively. These can control or provide diversified applications & infrastructure. So, these companies purchases comparatively very few amount of hardwares as they are entirely utilizing their servers, storage devices & networking hardware before discarding them.

3. Companies adopting cloud based solutions don't require to regularly repair or replace their hardware like desktop, keyboard, mouse, laptop, monitor etc. Companies take care of overall processing & storage. Older devices works with the same efficiency as the new devices. Companies do not even require to buy latest hardwares as workers can use cloud application and infrastructure from any of their personal devices.

While other technology advancement require new gadgets, Cloud don't require any advancement in old gadgets. One can work with their old device with as much efficiency as one have with the new devices.

Conclusions:

E Waste Management:

1. Well education is must for proper E waste management.
2. Donate in place of discarding.
3. Replacement and Recycling.
4. Reuse or Repurpose.
5. Proper maintenance of the electronic gadgets.
6. Disposal of E waste by taking recommendations from an expert.
7. Renting is better than buying new gadgets if want to use for a short span of time.
8. Use Cloud Services and Cloud Computing

Use of Cloud Services and Cloud Computing:

We spent a lot of money on storage devices such as hard disk, USB drive, memory cards, etc. in order to store our data.

These devices are responsible for huge electronic waste creation that no one is predicting.

Cloud services and cloud storage can reduce the amount of E waste.

It helps to access our data from anywhere around the world.

There is no need to carry your own storage devices all the time.

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THANK YOU !!!!!