MANTECH Publications
Journal of Remote Sensing, Environmental Science & Geotechnical Engineering
Volume 1, Issue 1, January-April, 2016

# *Evaluation of E-Waste Generation and Disposal Mechanism in Davanagere City*

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## *Abstract*

*In the 20th Century, the information and communication revolution has brought enormous changes in the way we organize our lives, our economies, industries and institutions. These spectacular developments in modern times have undoubtedly enhanced the quality of our lives. The use of electronic devices for both business and personal use has increased dramatically in recent years. These electronic devices include computers (including printers and monitors), TVs, VCRs, DVD players, and cellular phones. At the same time, the lifespan of these items are reducing due to growing demand for enhanced features and performance. Moreover, uses of these devices have led to many problems, such as the massive amount of hazardous and other waste generated from electric products. These wastes pose a great threat to the human health and environment. The issue of proper management of wastes, therefore, is critical to the protection of our livelihood, health and environment. It constitutes a serious challenge to the modern societies and requires coordinated efforts to address it for achieving sustainable development.*


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***Keywords:*** *Electric Devices, Hazardous Waste, Electric Products, Sustainable Development,*

## INTRODUCTION

All over the world, the quantity of electrical and electronic waste generated each year, especially computers and televisions, has assumed alarming proportions. In 2006, the International Association of Electronics Recyclers (IAER) projected that 3 billion electronic and electrical appliances would become WEEE or E-waste by 2010. That would tantamount to an average E-waste generation rate of 400 million units a year till 2010.

Globally, about 20-50 MT (million tonnes) of E-wastes is disposed off each year, which accounts for 5% of all municipal solid waste. Although no definite official data exist on how much waste is generated in India or how much is disposed of, there are estimations based on independent studies conducted by some NGOs or government agencies. According to the Comptroller and Auditor- General's (CAG) report, over 7.2 MT of industrial hazardous waste, 4 lakh tonnes of electronic waste, 1.5 MT of plastic waste, 1.7 MT of medical waste, 48 MT of municipal waste are generated in the country annually.

In 2005, the Central Pollution Control Board (CPCB) estimated India's E-waste at 1.47 lakh tonnes or 0.573 MT per day. A study released by the Electronics Industry Association of India (ELCINA) at the electronics industry expo – "Componex Nepcon 2009" had estimated the total E-waste generation in India at a whopping 4.34 lakh tonnes by the end of 2009.The CPCB has estimated that it will exceed the 8 lakh tonnes or 0.8 MT mark by 2012. There are 10 States that contribute to 70 per cent of the total E-waste generated in the country, while 65 cities generate more than 60 per cent of the total E-waste in India.

Among the 10 largest E-waste generating states, Maharashtra ranks first followed by Tamil Nadu, Andhra Pradesh, Uttar Pradesh, West Bengal, Delhi, Karnataka, Gujarat, Madhya Pradesh and Punjab. Among the top ten cities generating E-waste, Mumbai ranks first followed by Delhi, Bengaluru, Chennai, Kolkata,


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Ahmedabad, Hyderabad, Pune, Surat and Nagpur. The main sources of electronic waste in India are the government and private industrial sectors, which account for almost 70 per cent of total waste generation. The contribution of individual households is relatively small at about 15 per cent; the rest being contributed by manufacturers. Though individual households are not large contributors to waste generated by computers, they consume large quantities of consumer durables and are, therefore, potential creators of waste. An Indian market Research Bureau (IMRB) survey of 'E-waste generation at Source' in 2009 found that out of the total E-waste volume in India, televisions and desktops, including servers, comprised 68 per cent and 27 per cent respectively. Imports and mobile phones comprised of 2 per cent and 1 per cent respectively.

As a large-scale organized E-waste recycling facility, the Attero Recycling Plant in Roorkee opened in January 2010. Despite 23 units currently registered with the Government of India, under Ministry of Environment and Forests and Central Pollution Control Board, as E-waste recyclers/reprocessors with environmentally sound management facilities, the entire recycling process exists more or less in the unorganized sector. The Cobalt-60 radiation tragedy at Mayapuri in Delhi, in which one person lost his life and six persons were admitted to hospital, served as a wakeup call drawing attention to the mounting quantity of hazardous waste including E-waste in the country while revealing systemic problems on the issue of waste disposal.

**Objectives of the present study:**

- To evaluate E-waste generation for Davanagere City.
- To quantify E-waste generated by survey method.
- To recommend a suitable disposal method.
- To suggest suitable storage methods and disposal mechanism based on conditions and economics.
- Source of generation / quantities and its classification according to future estimations.

## LITERATURE REVIEW

### Electronic Devices Present New Waste Challenges

The use of electronic devices for both business and personal purposes has increased dramatically in recent years.


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These electronic devices include computers (including printers and monitors), TVs, VCRs, DVD players, and cellular phones. At the same time, the lifespans of these items are reducing due to growing demand for enhanced features and performance. The ubiquitous presence of cellular phones and the advent of TVs with liquid crystal displays (LCDs), tablet PCs, and plasma TVs illustrate the rapid rate of change, as these devices were rare or unknown only a few years ago. Furthermore, many new technologies are on the horizon. Environmental concerns with electronics are associated with the dramatic increase in the volume of E-waste. E-waste stream is estimated to be growing approximately three times as fast as the rest of the municipal waste streams.

The national volume of E-waste is estimated at over 2 million tons per year, and approximately 90 percent of this waste may be ultimately disposed at municipal solid waste landfills. This estimate includes approximately 50 million computers becoming obsolete each year; with over 300 million obsolete computers estimated by 2005. The problem with E-waste is not just the volume of waste generated, but also the volume of hazardous chemicals associated with E-waste.

**Major Types Electronic Devices Parts / Components**

**i. Components / Parts of Computer:**

The various components / parts of computers are as follows:

Mother Board, CPU, SMPS (Switch Mode Power Supply), RAM (Random Access Memory), Hard Disk, Processors, Capacitors, IC's (Integrated Circuits), Main Board, Magnetic Touching Sheet, CD Drive, Floppy Drive and Diodes etc.

**ii. Components / Parts of Television:**

The various components / parts of televisions are as follows:

Capacitors, Resistors, Transformers, STR (Supply Transformer Regulator), Integrated Circuits (IC's), LOT(Line output Transformer),Tuners, Condensers, CPT Socket (Colour Picture Tube), Zenor Diode and Normal Diode etc.

**iii. Components / Parts of Mobile Phone:**

The various components / parts of mobile phones are as follows:

Lens, internal antenna, aerial, speakers, earpiece, microphone, microphone connectors, loud speakers, buzzers, ringers, charging blocks, system connectors,


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chassis, slide mechanism, ribbon cables, sim slot covers, readers, backup, battery, battery clip, covers, battery contacts, connectors and kea pad membrane etc.

**iv. E-waste Composition:**

The various parts / materials / composition of E-waste may be divided broadly into six categories: iron and steel, used for casings and frames, non-ferrous metals, especially copper used in cables, and aluminum, glass used for screens, windows, plastic used as casing, in cables and for circuit boards, electronic components, and others (such as rubber, wood, ceramic etc.).

**v. Specific Review for Present**

A detailed literature survey was conducted for collecting information based on methods of E-waste generation, quantification and various disposal methods. Anwesha et al (2013) paper attempted to quantify the amount of E-waste generated in India with the related stakeholder involvement. Electronic waste (E-waste) or waste from electrical and electronic equipments (WEEE), which is a relatively recent addition to the hazardous waste stream, is drawing rapid attention across the globe as the quantity being generated is rising rapidly.

All electrical and electronic equipments (EEE), on completion of their useful life, contribute to the E-waste stream. However, the current estimation of the amount of E-waste generated in India is extremely hazy. In this paper, an attempt has been made to formulate an inventory of E-waste in the country in terms of both internal or domestic generation and illegal import. Different methods of estimation of E-waste have been evaluated. Furthermore, the paper tries to identify the whole range of diverse stakeholders involved in the generation of E-waste in the country.

It has been observed that actual and reliable data on the generation of E-waste, both domestic and import of E-waste, is currently unavailable in India. Few studies have been conducted to identify the involvement of different stakeholders in E-waste generation in the country. Urgent needs arise to document the issues related to E-waste generation and management in the country in order to deal with this growing toxic waste stream.

*Esther et al (2009)* revealed that the rapid pace of technological change, the highly diffused implementation of electronics in everyday life and a decrease in prices has made appliances for home and office equipment affordable and widely usable.


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The high growth rates combined with increasing obsolescence rates result in large quantities of end-of-life electrical and electronic equipment to be disposed of. In many countries, flows of electric and electronic wastes have never been quantified due to the lack of data and missing take-back schemes. Furthermore, studies to collect the data and to assess the E-waste quantity are often expensive and very complex. In this study, a model was developed and applied to derive E-waste flows from existing indicators which are published periodically by international organizations (e.g. International Telecommunication Union, World Bank) and which are easily accessible. The method allows estimating E-waste quantities in a certain region or country, as well as on a global scale. A probabilistic model approach accounts for the fact that for many countries, calibration data is not available. Results are shown for personal computers which show one of the highest growth rates. Further electronic appliances as well as whole E-waste categories are planned to be introduced in the model in the future.

*Priyadharshini. et a (2011)* reported that the IT industry has been one of the major drivers of change in the economy over the last few decades and has contributed significantly to the digital revolution. New electric and electronic equipments have infiltrated all aspects of our daily life, providing us with more comfort , health and security. The same technology that has made our lives better is on the downside, creating more toxic problems for our society. With the growth of IT and related industries, the use and disposal of electrical and electronic equipment is all set to increase, which in turn will increase the quantity of E-waste generated. Therefore, it has become imperative to study the E-waste management practices that are being adopted worldwide. Coimbatore is set to become the next important IT destination after Chennai in Tamil Nadu. With the growth of IT industry and economic growth in general, the use of electric and electronic products are set to increase, and with that the quantity of E-waste generated will also increase.

It is critical to address the problem of E-waste because of increase in its volume in recent years and the fact that this trend is expected to continue. It is relatively new form of waste that has to be dealt with differently when compared to municipal or biomedical wastes. The technique for its safe disposal is still being evolved, and as the quantity of waste is enormous and the


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components present in E-waste is not uniform. The types of wastes that come under this category are varied. There are plenty of useful materials that can be recovered and reused. Most importantly, the health and environmental effects due to the toxic substances, that are a result of improper handling and disposal of E-waste, is a cause for major concern.

*Dr. S Chatterjee (2010)* Scientist Electronic waste (E-waste) is one of the fastest growing waste streams in the country. Growth of Information and Communication Technology sector has enhanced the use of electronic equipment exponentially. Faster obsolescence and subsequent upgradation of electronics products are forcing consumers to discard old products, which in turn accumulate huge E-waste to the solid waste stream. E-waste is growing in India at the rate of 10%. Major recycling of E-waste is carried out in the non-formal sector using primitive and hazardous methods. Adequate legislative measures with cost-effective and environmental friendly technological solution would be needed to address the issue. This article provides the basic information on electronic waste management in India

*Kurian Joseph* The current practices of E-waste management in India suffer from a number of drawbacks, like the difficulty in inventorisation, unhealthy conditions of informal recycling, inadequate legislation, poor awareness and reluctance on the part of the corporate sector to address the critical issues. The consequences are that (i) toxic materials enter the waste stream with no special precautions to avoid the known adverse effects on the environment and human health, and (ii) resources are wasted when economically valuable materials are dumped or unhealthy conditions are developed during unorganized recycling. The paper highlights the important issues and strategies to address this emerging problem in the light of initiatives taken in India. The paper presents a waste management system with shared responsibility for collection and recycling of electronic wastes amongst the manufacturers / assemblers, importers, recyclers, regulatory bodies and the consumers.

*Shubhi Tomar et al (2014)* Electronic waste or E-waste is an emerging problem due rapidly increasing IT sector and modern lifestyle. E-waste consists of many things, some of which are highly hazardous and can cause human health and the environment problems. India also lacks in proper infrastructure and


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procedures to handle it. This review article gives an overview of current E-waste scenario of environmental and health problems related to it and disposal as well as recycling operations. It also tries to explains existing legal framework and organizations working on this issue.

## MATERIALS AND METHODOLOGY:

### Study Area – Davangere City

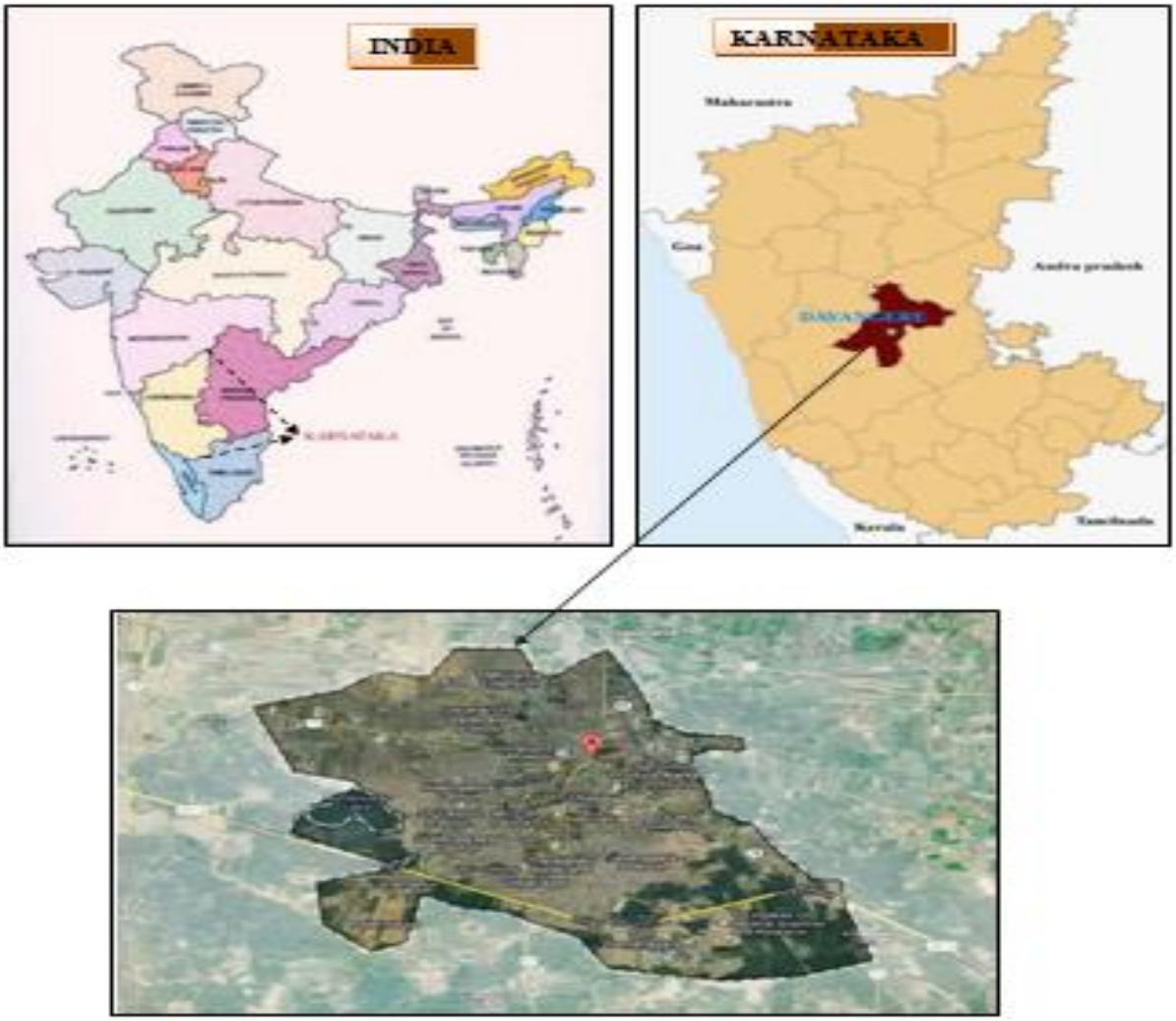



*Fig1. Davangere City Map (Source: GPS)*

The solid waste is an inseparable constituent of modern livelihood and has been diverse based on the source. The solid waste can be classified as municipal waste, industrial waste, biomedical waste and hazardous waste, electronic waste, etc. The aggregation of human settlements in the urban areas is prone to production of


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heavy solid waste at various gradients. The density of waste varies with the industry and municipal wastes. In the industrial regions, the waste density would be 3 times that of municipal areas. The accumulation of wastes, leaving it untreated for long, delay in its collection, and ignoring the waste can cause a serious damage to the environment. The total quantity of solid waste generated is 150 tons per day and quantity of solid waste collected per day is 120-135 tons. Solid waste collected from the Municipal authorities was from 42,000 houses. All Municipal solid waste was collected and transported out of city to a nearby village called Avaragolla. 22.19 acres of the village was used for scientific land filling.

Solid Waste includes different quantities of plastic wastes, electronic goods waste, etc. Plastic wastes are recycled and reused but electronic waste is not easily recyclable and reusable, as it involves preparation for scientific method. Though the severe problems due to electronic waste pollution are not visible till now, the growth in use of electronic products indicate we will soon start facing such problems. This has a gradual negative effect on the human health. If some of the electronic goods are not carefully handled and disposed in an unscientific manner, it can cause serious health effects . In Davangere, there were no recycle units of electronic waste. These can be collected and stored in a scientific manner sent to KSPCB authorized and registered E-waste dismantler and Recycle (total 30 units in Karnataka and all are near Bangalore. Some of Recycler and Dismantling units include M/s. Ash Recyclers, E - Parisara Pvt Ltd, Sriram Eco Raksha Computer Services Pvt Ltd,).

**Recycling, Reuse and Recovery Options**

The composition of E-waste consists of diverse items like ferrous and non ferrous metals, glass, plastic, electronic components and other items, and it also consists some hazardous elements. Therefore, the major approach to treat E-waste is to reduce the concentration of these hazardous chemicals and elements through recycle and recovery. In the process of recycling or recovery, certain E-waste fractions act as secondary raw material for recovery of valuable items. The recycle and recovery includes the following unit operations:

**i. Dismantling:**

Removal of parts containing dangerous substances (CFCs, Hg switches, PCB);

Removal of easily accessible parts containing valuable substances (cable


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containing copper, steel, iron, precious metal containing parts, e.g. contacts).

ii. **Segregation of ferrous metal, non-ferrous metal and plastic**

This separation is normally done in a shredder process.

**iii. Refurbishment and reuse:**

Refurbishment and reuse of E-waste has potential for those used electrical and electronic equipments which can be easily refurbished to put to its original use.

**iv. Recycling/recovery of valuable materials**

Ferrous metals in electrical furnaces, non-ferrous metals in smelting plants, and precious metals in separating works.

**v. Treatment/disposal of dangerous materials and waste**

Shredder light fraction is disposed of in landfill sites or sometimes incinerated (expensive). CFCs are treated thermally. PCB is incinerated or disposed of in underground storages, and Hg is often recycled or disposed of in underground landfill sites.

**Treatment & Disposal Options**

The presence of hazardous elements in E-waste offers the potential of increasing the intensity of their discharge in environment due to land filling and incineration. The potential treatment disposal options based on the composition are given below:

**i. Landfilling**

The literature review reveals that degradation processes in landfills are very complicated and run over a wide timespan. At present, it is not possible to quantify environmental impacts from E-waste in landfills for the following reasons:

- Landfills contain mixtures of various waste streams;
- Emission of pollutants from landfills can be delayed for many years;

According to climatic conditions and technologies applied in landfills (e.g. leach ate collection and treatment, impermeable bottom layers, gas collection), data on the concentration of substances in leachate and landfill gas from municipal waste landfill sites differs with a factor 2-3.

**ii. Incineration**

Advantage of incineration of E-waste is reduction of waste volume and utilization of the energy content of combustible


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materials. Some plants remove iron from the slag for recycling. By incineration, some environmentally hazardous organic substances are converted into less hazardous compounds. Disadvantages of incineration include emission of substances escaping from flue gas cleaning in to the air and the large amount of residues from gas cleaning and combustion.

There is no available research study or comparable data that indicates the impact of E-waste emissions into the overall performance of municipal waste incineration plants. Waste incineration plants contribute significantly to the annual emissions of cadmium and mercury. In addition, heavy metals not emitted into the atmosphere are transferred to slag and exhaust gas residues and can reenter the environment on disposal. Therefore, E-waste incineration will increase these emissions, if no reduction measures like removal of heavy metals from are taken.

**E-waste Recycling/Treatment technologies in India**

In this context, it is pertinent to assess the E-waste recycling scenario in India, where recycling of E-waste to recover items of economic value is carried out. The assessment of E-waste recycling sector in India indicates that E-waste trade starts from formal dismantling sector and moves to informal recycling sector. E-waste movement from formal to informal sector is driven by trade and can be tracked by trade value chain.

This chain was identified considering a bottom-up approach with three levels of E-waste generation hierarchy. The three levels of E-waste generation hierarchy give rise to three types of stakeholders involved in E-waste trade as described below:

i. **1st Level** – Preliminary E-waste generators.
ii. **2nd Level** – Secondary E-waste generators.
iii. **3rd Level** – Tertiary E-waste generators.

The input to "Preliminary E-waste Generator" comes from formal organized market like manufacturers, importers, offices and organized markets, where E-waste from domestic consumers comes either in exchange schemes or as a discarded item. Therefore, the major stakeholders are scrap dealers/ dismantlers who purchase E-waste from the first level in bulk quantities. These stakeholders have limited capacity of dismantling and


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are involved in trading of E-waste with" Secondary E-waste Generators".

The market between first and second level is semi formal i.e. part formal, while the market between second and third level is completely informal. Stakeholders falling under" Secondary E-waste Generators" has limited financial capacity and is involved in item/ component wise dismantling process and segregation ex. dismantling of CRT, PCB, plastic and glass from E-waste. 'Tertiary Level Stakeholders" are the major stakeholders between second and third level and are metal extractors, plastic extractors and electronic item extractors. They use extraction process, which are hazardous in nature. The entire E-waste treatment is being carried out in an unregulated environment, where there is no control on emissions. There are two E-waste dismantling facilities in formal sector in India. These facilities are M/s. Trishiraya Recycling facilities, Chennai and M/s E-Parisara, Bangalore.

**E- Waste Survey in Davangere**

i. **E- Waste Generation Due to Households Using Computers, Televisions, Printers, Mobile Phones and Small Electrical Appliances**

A total of 40 houses were surveyed to know the trend of use of computers, televisions, refrigerators, printers, electric bulbs, small appliances and E-waste generation. A total of 46 televisions, 35 computers and 5 printers, 36 refrigerators, 75 mobiles and a number of electric bulbs are used by 40 households. The disposal method of these equipments after they are not usable, their breakage etc. is that most of the households store the waste from the electrical and electronics equipment in their premises. Wires and metal parts have been traditionally sold to vendors. Large electronics equipments/parts, which do not find any buyer, are either stored or simply disposed with other municipal waste. Exact ground data for different types of electrical equipments of households are not known. In most of the houses, the computers, televisions, refrigerators, and printers are in good condition, however if any trouble arises, they get it repaired either from service centers or a person from service centers visits and fixes the items. In some cases, the computers which need repairs are either repaired and stored in homes or donated to other family members.

**RESULTS AND DISCUSSIONS**

The survey was conducted among 40 households ( 10 houses at MCC A Block,


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15 houses at Vinayaka Nagara, 15 houses at MCCB) and average income of these households was below Rs.40,000/-) E-waste -312.23 kgs.

***Table 1 Shows the e-waste generated from households at Davangere city***

| Sl No | Name of Equipment | No of Samples | Units | Mode of Disposal | | | Repair /refurbishing of equipment and accessories | Total e-waste generated from equipment and their components |
|---|---|---|---|---|---|---|---|---|
| | | | | Discarded Components MSW/open area/store | Breakage/ Junk Storage | Sold back to agency or second hand | | |
| 1 | TV | 40 | 46 | Stabilizers, motherboard, sound box, etc. | 4 | 3 | 3 | 150.8 |
| 2 | Computer | 40 | 35 | Hard disk, CPU parts, pen drive CD, DVD, mouse, key board etc | 3 | 3 | 20 | 127.6 |
| 3 | Refrigerator | 40 | 36 | - | | -- | 2 | 10kg |
| 4 | Mobiles | 40 | 82 | Chargers, head phones | 10 | 3 | 15 | 2.24 kg |
| 5 | Music Systems | 40 | 36 | Sound box - | 2 | - | 2 | 1kg |
| 6 | Telephones | 40 | 15 | - | 3 | | 1 | 0.16kg |
| 7 | Web Cameras/Cameras | 40 | 10 | Lens, cells, memory cards - | 1 | | 1 | 0.05 kg |


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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8 | Printers | 40 | 6 | Tonars<br>- | 2 | | 1 | 10kg |
| 9 | Batteries/<br>Cells | 40 | 60 | 20 | 30 | | -- | 7kg |
| 10 | Different kinds of Lights | 40 | man y | Many (20) | 10 | | | 3kg |
| 11 | Smaill Eletrical Appliences | 40 | 50 | 50 | 10 | | | 0.38 kg |
| | | | | | | | **Total=312.23kg** | |

A total of 40 houses were surveyed to know the trend of use of computers, printers and E-waste generation. The discarded computer parts are 20 which include one printer per year. In most of the houses, the televisions, computers and printers are in good condition, however if any trouble arises, they get it repaired either from service centers or a person from service centers visits and fixes the items. In some cases, the computers which need repair are either repaired and stored in houses or donated to other family members.

Based on the conducted survey, the following observations were made:

- Most of the household consumers use TV, computers, mobiles phones and refrigerators.
- In many houses, it was observed that the waste battery cells and waste CD DVD disks were disposed in municipal solid wastes.
- Some of the houses stored old equipment like 15 year old TV.
- Number of households in which old TVs and computers are repaired reused are shown in table 4.1.
- Every household commonly generated battery cells and bulbs that were disposed off in Municipal solid wastes.
- Some households had disposed their E-waste in the open by burning it in a nearby field.


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## CONCLUSIONS

Many types of wastes are imported but a lot of it is also generated in India. These include hazardous industrial waste, municipal solid waste and E-waste. The quantum of wastes generated over the past several years have posed an ever increasing threat to environment and public health. Over 88 critically polluted industrial zones have been identified by the CPCB. Pollutants from such zones contaminate water bodies and rivers and even pollute the ground water in many places. Studies have also shown that crops are contaminated through industrial effluents but the scale of such an impact is yet to be identified. As far as E-waste is concerned, it has emerged today as one of the fastest growing waste streams worldwide. The sheer amount of electronic equipments reaching end-of-life poses a huge challenge.

Increase in standard of living leading to an increase in use of electronic goods has resulted in an increased production of E-waste. Most of the households in Tamil Nadu store the waste from any electrical and electronic equipment in their own premises. Wires and metal parts have been traditionally sold to vendors. Large electronic equipments/parts which do not find any buyer are stored with the tag that it is valuable or simply disposed together with other municipal waste. Moreover,

1. E-waste produces much higher volumes of waste in comparison to other consumer goods.

2. E-waste produces much more hazardous waste in comparison to other consumer goods.

From the survey, we conclude that there is lack of proper E-waste collection points/bins or centres arranged by the Municipalities or Private Sectors, hence most of the households disposed their E-wastes in an improper manner into the Municipal solid waste. Some houses dispose their waste in an improper manner, some of the houses stored old and waste electronic instruments as junk. Junk stored in homes pose a threat to small children who can easily come into contact with E-waste with health hazards. So, due care must be taken. Computers and electronic equipments are designed without giving sufficient attention to the aspects such as downstream impact, and the ease of recycling. Thus, their dismantling is also extremely labor-intensive. As long as electronic products continue to contain an


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assortment of toxic chemicals and are designed without giving due consideration to ease in recycling, they would pose a threat to the environment and public health.

When developing countries like India start tightening and enforcing stricter legislation on movements of E-waste, they may find it harder to avoid the issue of recycling and disposal through export. Considering the future scenario, it is imperative that the safe management of waste is done in an organized manner with sufficient resources and sustainable recycling technologies on the one hand, and effective legislations and monitoring mechanisms on the other. The public must be educated to take legal recourse for damages caused to their health, environment and property.

A scientific, safe and environmentally sound management system, including policies and technologies, need to be developed and implemented. It is, therefore, pertinent for the Government to keep an inventory of all E-waste and also the stock of hazardous metals like mercury so that their trade and use can be regulated. Mercury base processes in chloralkali industry has been phased out in 2012.

As of today, there are no explicit regulations for E-waste management, its handling and disposal. Though there are rules like the Recycled Plastic Manufacture and Usage Rules, the Hazardous Waste (Management & Handling Rules) and Batteries (Management & Handling Rules), none of them cover the hazardous elements and compounds that are used in electronic goods. As there are no regulations, the Cathode ray tubes, plastics coated with poly-brominated flame retardants and many toxic chemicals are getting contaminated with the municipal solid waste or interact with sewage in sewers contaminating water and soil. However, of late various reports on unscientific disposal of E-waste have brought about awareness amongst the general public and some agencies.

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