

E-Waste: Unseen Plank of Digitalization

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Abstract— Digitalization is of crucial importance for better ease and accessibility, data processing, storage & transmission. India has witnessed a number of successful E-Projects. For the successful execution of this, there is a need of the lots of electronic equipment's in coming days, thus so many industries are launching varieties of gadgets and devices, which are easy to access the internet and helpful for the digitalization. This trend regards industrial sectors affecting the consumption habits and, especially, electronic industry where the short life cycles and the rapidly developing technology have led to increased e-waste volumes. The hazardous content of these materials pose a threat to human health and environment. E-waste is now the fastest growing an unsustainable, and most toxic, component of municipal garbage.

Key words: E-Waste, Digitalization, Effect, Computer

I. INTRODUCTION

The digitization of our world has been a forward march for years now. it "allows information of all kinds in all formats to be carried with the same efficiency and also intermingled . Unlike analog data, which typically suffers some loss of quality each time it is copied or transmitted, digital data can, in theory, be propagated indefinitely with absolutely no degradation. This is why it is a favored way of preserving information for many organisations around the world. The journey of e-Governance initiatives in India took a broader dimension in mid 90s for wider sectoral applications with emphasis on citizen-centric services. Later on, many States/UTs started various e-Governance projects. Though these e-Governance projects were citizen-centric, they could make lesser than the desired impact. The Digital India programme is a flagship programme of the Govt of India with a vision to transform India into a digitally empowered society and knowledge economy in the World. It has been felt that a lot more thrust is required to ensure e-Governance in the country promote inclusive growth that covers electronic services, products, devices. The manufacturing of electrical and electronic equipment (EEE) is one of the emerging global activities. About 40 million tonnes of e-waste are created globally each year.

II. DIGITALIZATION

A. Digital India Programme

The Digital India Programme (DIP) is Centered on three Key Areas:

Vision Area 1: Infrastructure as a Utility to Every Citizen:

- High speed internet as a core utility
- Cradle to grave digital identity -unique, lifelong, online, authenticable
- Mobile phone & Bank account enabling participation in digital & financial space
- Easy access to a Common Service Centre

- Shareable private space on a public cloud
- Safe and secure Cyber-space

Vision Area 2: Governance & Services On Demand:

- Seamlessly integrated across departments or jurisdictions
- Services available in real time from online & mobile platform
- All citizen entitlements to be available on the cloud
- Services digitally transformed for improving Ease of Doing Business
- Making financial transactions electronic & cashless
- Leveraging GIS for decision support systems & development.

Vision Area 3: Digital Empowerment of Citizens:

- Universal Digital Literacy
- Universally accessible digital resources
- All documents/ certificates to be available on cloud
- Availability of digital resources / services in Indian languages
- Collaborative digital platforms for participative governance
- Portability of all entitlements through cloud

B. Digitalized Our World Through

- Books to e-Books
- DVDs to Streamed Movies and Television
- CDs to MP3s
- Road Maps to GPS
- Photos to Flickr
- Snail Mail to e-Mail
- Magazines, Newspapers & Journals to Online Article Databases

III. SOURCES OF E-WASTE

- 1) Data processing product: computers, computer devices like monitor, speakers, keyboards, printers etc.
- 2) Entertainment device: TV, DVDs, and CD players.
- 3) Communication device: phones, landline phones, fax etc.
- 4) Household equipments: vacuum cleaner, microwave ovens, washing machines, air conditioners etc.
- 5) Audio visual components: VCRs, Stereo equipment etc.

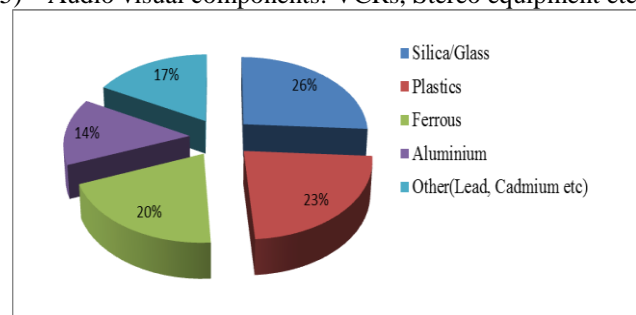


Fig. 1: Material composition of personal computer

Constituents	Sources	Health effect
Lead (Pb)	Solder in printed circuit boards(PCBs) and gaskets in computer monitors	Damage to central & peripheral nervous system ,Blood systems & kidney Brain developments of children
Cadmium (Cd)	Chip resistors & semiconductors	Toxic irreversible effects on human health Accumulates in kidney & liver Causes neural damage Teratogenic
Mercury (Hg)	Relays & switches, printed circuit boards`	Chronic damage to the brain Respiratory & skin disorders due to bioaccumulation in fishes
Chromium	Corrosion protection of untreated and galvanized steel plates, decorator or hardner for steel housings	Asthmatic bronchitis DNA damage
Beryllium (Be)	Mother board	Carcinogenic(lung cancer) Inhalation of fumes & dust Skin diseases such as warts
Lithium (Li)	Lithium-ion battery	It can pass into breast milk and may harm a nursing baby
Nickel(Ni)	nickel-cadmium rechargeable batteries.	allergy to the skin results dermatitis while allergy to the lung results in asthma.
Copper(Cu)	copper wires, printed Circuit board Tracks.	stomach cramps nausea, liver damage
Plastic and PVC	Cabling and computer body.	While burning produces dioxin that causes reproductive and developmental problems.

Table 1: Health Hazards of Constituents in E-Waste

A. E-waste in India

Increased usage of gadgets, telecom, information and technology and appliances is collectively creating nearly 13 lakh tonnes of e-Waste annually in India according to an August 2014 report by the industrial body ASSOCHAM. E-waste is exported to India because of major reasons as:

- a) Cheap labour : rates are approximately
- b) US - \$ 30/ computer
- c) India - \$ 2/ computer
- d) Saving - \$ 28/ computer

Weak environmental laws

Excess dumping of CRT tubes due to the ramp walk of flat screen monitors Driven by the potential for corporate profits.

Greenpeace estimates that India will triple its E-Waste generation over the next five years with the total E-Waste generation of 1,46,180 tonnes per year. According to the estimates carried out by Toxics Link, India annually generates about \$1.5 billion worth of E- Waste. Another survey conducted by the Delhi based International Resources Group (IRG), reveals that India churns out 146,180 tonnes of E- Waste annually with the Indian IT industry contributing 30 per cent of it .). According to the MAIT-GTZ E- Waste assessment study, the annual generation of E-Waste in India works out to 400,000 tonnes annually and 19,000 tonnes are being recycled based on the data by hardware manufacturers (Business Standard, 2012). Extracting Gold from useless smartphones is indeed lucrative. For instance, 41 smartphones contain a gram of gold — worth about Rs3,000. For every one million smartphones recycled, 16,000 kg, 350 kg of silver, 34 kg of gold, and 14 kg of palladium can be recovered. In India, only 19,000 metric tonnes of the total E- Waste generated is recycled due to high refurbishing and reuse of electronic products and poor recycling infrastructure. According to a study by ASSOCHAM, a Delhi based industry body, last year, 76% of India's e-waste workers are prone to cancer and suffer from weakened immune systems. For each metal they extract, workers such as Abid run the risk of damaging their health in several ways as the Research Journal of Chemical and Environmental Sciences points out. For instance, lead can damage central nervous system, kidney, and even affect brain development of children exposed to it. Another January 2015 report from Markets and Research has forecast that the Indian e-Waste market will grow at 26.22% CAGR during 2014-2019. According to the Comptroller and Auditor- General's (CAG) report 4 lakh tonnes of electronic waste are generated in India 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.

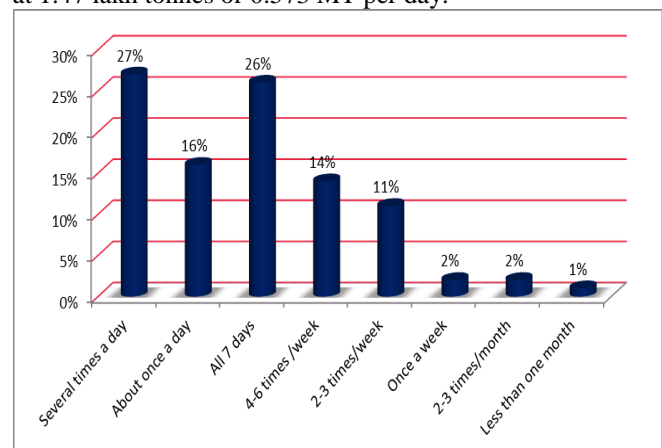


Fig. 2: Internet Access in Urban India (year 2015)

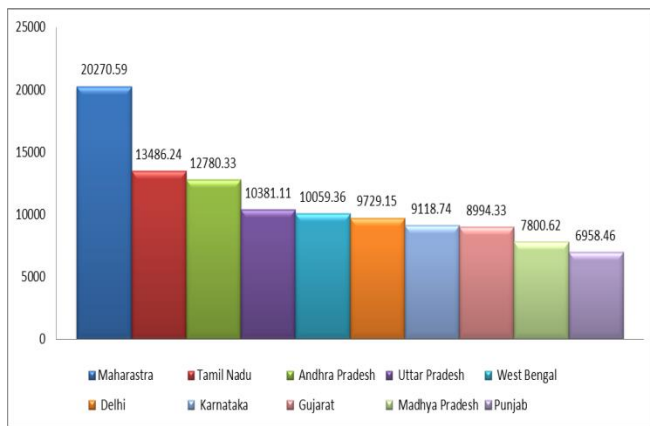


Fig. 2: WEE (Tonnes) Generating Top Ten States [Consumer Voice, 2009]

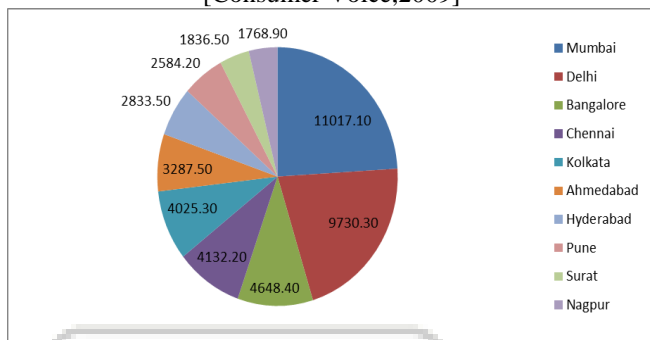


Fig. 3: WEE (Tonnes) Generating Top Ten Cities [Consumer Voice, 2009]

Policy level initiatives in India regarding E-waste:

- 1) The Hazardous Wastes (Management and Handling) Amendment Rules, 2003
- 2) Guidelines for Environmentally Sound Management of E-waste, 2008
- 3) The e-waste (Management and Handling) Rules, 2011

IV. CONCLUSION

E-waste contains many valuable, recoverable materials such as aluminum, copper, gold, silver, plastics, and ferrous metals. In order to conserve natural resources and the energy needed to produce new electronic equipment from virgin resources, electronic equipment can be refurbished, reused, and recycled instead of being landfilled. Ban on total imports of e-waste, Need to address safe disposal of domestic waste, attract investment in this sector. Give an operable computer to a local family, friend, school, or nonprofit such as Goodwill or Technology Training Foundation. Also some more points that can be considered while buying electronic products are made with fewer toxic constituents, use recycled content, energy efficient, are designed for easy upgrading or disassembly, utilize minimal packaging, offer leasing or take back options. "Extended Producer Responsibility" or "Product Take Back" forms the basis of policy. Policies/ laws/ regulations related to WEEE/E-waste management provide an institutional framework for their implementation. Institutional mechanism for WEEE/E-waste management system has been described in terms of three elements like collection systems, national registry and logistics. Each of these three elements has been further described in terms of different stakeholders and their respective roles/ responsibilities. The Key Players in e-waste are 1) Consumers as in (a) Office

and (b) Domestic, 2) Scrap Dealers and 3) Recycler. There are two generic categories of collection systems at national level i.e. "collective system (monopoly)" and competition based "clearing house system" for managing WEEE/E-waste.

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