iJRASET
International Journal For Research in Applied Science and Engineering Technology

# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

**Volume:** 10 **Issue:** XI **Month of publication:** November 2022

**DOI:** https://doi.org/10.22214/ijraset.2022.47660

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
*ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538*
*Volume 10 Issue XI Nov 2022- Available at www.ijraset.com*

# E-Waste Management and Challenges in India

Dr. Vikas Kumar
*Associate Professor, S.D. College of Engineering and Technology, Muzaffarnagar (U.P)*

## I. INTRODUCTION

E-waste is the end-of-life electronic and electrical gadgets. As a consequence of increase in production, combined with rapid product obsolescence and lower costs, discarded electronic and electrical equipments or 'e-waste' is now the most rapidly growing waste problem in the world. In India, e-waste is primarily recycled by people in the informal sector. Yet, insufficient and poor working conditions in addition to low environmental standards endanger people and the environment alike. In the last few years, since e-waste has been discovered as a resource by the formal world, globally e-waste recycling is emerging as a lucrative business with many large and small players competing for this waste pile. The E-waste (Management & Handling Rules) that came in 2012 in India requires only authorized people to handle e-waste and emphasizes on clean channel for e-waste flow. This has led to the growth of formal recycling. The shift of waste to clean channel is important considering the environmental and health impacts. But the formalization of e-waste recycling may render thousands of workers who earn their livelihood by collecting and processing e-waste, unemployed. However, this may not be a loss just for the informal sector, as the whole recycling chain will stand to lose. The informal sector has great collection skills and strong networks which help it in procuring e-waste, especially from small and peripheral sources. But their primitive methods of recycling are hazardous for their health and environment. The formal recyclers though not very efficient like the informal recyclers in collection are capable of recycling using the Best Available Technologies (BAT) leading to better environment management and enhanced resource recovery practices. A mutual support system that will provide a balance between the cheap labor intensive operations in the informal sector and the sophisticated mechanized operations in the formal recycling units is thus needed. Hence it is important to look at the possibilities of integrating the informal sector in the emerging regulated system for sustainable e-waste management.

## II. AWARENESS ABOUT E-WASTE

Effective communication between waste management organizations and citizens is essential to the efficient operation of waste management services. Citizens need to know what services are available to them, and the schedule and requirements of that service, in order for those services to be efficiently used. Citizens are also more likely to undertake waste sorting and recycling activities if they know what happens to waste that is sent for recycling, and the associated environmental benefits.

An effective way to improve attitudes towards waste reuse and recycling is to integrate waste management education into school curriculum and particularly teaching children about the causes and consequences of waste disposal and highlighting the importance of waste prevention, reuse and recycling. Local authorities and/or waste management organizations can facilitate this by undertaking outreach activities, sending representatives to local schools or inviting schoolchildren to facility tours or open days, etc. Best practice in awareness-raising is to effectively encourage waste prevention, reuse and recycling behavior within the waste collection catchment area. Ultimately, this should translate into improved performance across key waste generation and separation indicators. Particular emphasis is placed on reaching all stakeholders, including non-native speakers via multilingual or pictorial communication ad via school activities. Best practices for awareness-raising campaigns need to:

*1)* ensure continuity, consistency, complementarily and clarity of all communications with well-defined aims and objectives
*2)* create clear messages appropriate to, and directed at, well-defined target audiences
*3)* ensure efficient delivery through the integration of activities and clear lines of responsibility.

## III. E-WASTE GENERATION

This year's Waste Electrical and Electronic Equipment (WEEE) is total about
57.4 million tonnes (MT) and will be greater than the weight of the Great Wall of China, Earth's heaviest artificial object. According to the Central Pollution Control Board (CPCB), India generated more than 10 lakh tonnes of e-waste in 2019-20, an increase from 7 lakh tonnes in 2017-18. Against this, the e-waste dismantling capacity has not been increased from 7.82 lakh tonnes since 2017-18.

## IV. CHALLENGES RELATED TO MANAGEMENT OF E-WASTE IN INDIA

1) *Less Involvement of People:* A key factor in used electronic devices not being given for recycling was because consumers themselves did notdo so. However, in recent years, countries around the world have been attempting to pass effective 'right to repair' laws.
2) *Involvement of Child Labor:* In India, about 4.5 lakh child laborers inthe age group of 10-14 are observed to be engaged in various E-waste activities and that too without adequate protection and safeguards in various yards and recycling workshops.
3) *Ineffective Legislation:* There is absence of any public information onmost State Pollution Control Boards (SPCBs)/PCC websites.
4) *Health hazards:* E-waste contains over 1,000 toxic materials, which contaminate soil and groundwater.
5) *Lack of Incentive Schemes:* No clear guidelines are there for theunorganized sector to handle E-waste. Also, no incentives are mentionedto lure people engaged to adopt a formal path for handling E-waste.
6) *E-waste Imports:* Cross-border flow of waste equipment into India- 80% of E-waste in developed countries meant for recycling is sent to developing countries such as India, China, Ghana and Nigeria.
7) *Security Implications:* End of life computers often contain sensitive personal information and bank account details which, if not deleted leave opportunity for fraud.

## V. POLLUTANTS IN E-WASTE

Pollutants or toxins in e-waste are typically concentrated in circuit boards, batteries, plastics, and LCDs (liquid crystal displays). Given below is a tableshowing the major pollutants occurring in waste electrical and electronic equipments:
Pollutants and Their Occurrence in Waste Electrical and Electronic Equipment

| Pollutant | Occurrence |
|---|---|
| Arsenic | Semiconductors, diodes, microwaves, LEDs (Light-emitting diodes), solar cells |
| Barium | Electron tubes, filler for plastic and rubber, lubricant additives |
| Brominated flame- | Casing, circuit boards (plastic), cables proofing agent and PVCcables |
| Cadmium | Batteries, pigments, solder, alloys, circuit boards, computer batteries, monitor cathode ray tubes (CRTs) |
| Chrome | Dyes/pigments, switches, solar |
| Cobalt | Insulators |
| Copper | Conducted in cables, copper ribbons, coils, circuitry, pigments |
| Lead | Lead rechargeable batteries, solar, transistors, lithium batteries,PVC |
| Lithium | Mobile telephones, photographic equipment, video equipment(batteries) |
| Mercury | Components in copper machines and steam irons; batteries inclocks and pocket calculators, switches, LCDs |
| Nickel | Alloys, batteries, relays, semiconductors, pigments |
| Pollutant | Occurrence |
| Selenium | Photoelectric cells, pigments, photocopiers, fax machines |
| Silver | Capacitors, switches (contacts), batteries, resistors |
| Zinc | Steel, brass, alloys, disposable and rechargeable batteries, luminous substances |

## VI. IMPACT OF HAZARDOUS SUBSTANCES ON HEALTH AND ENVIRONMENT

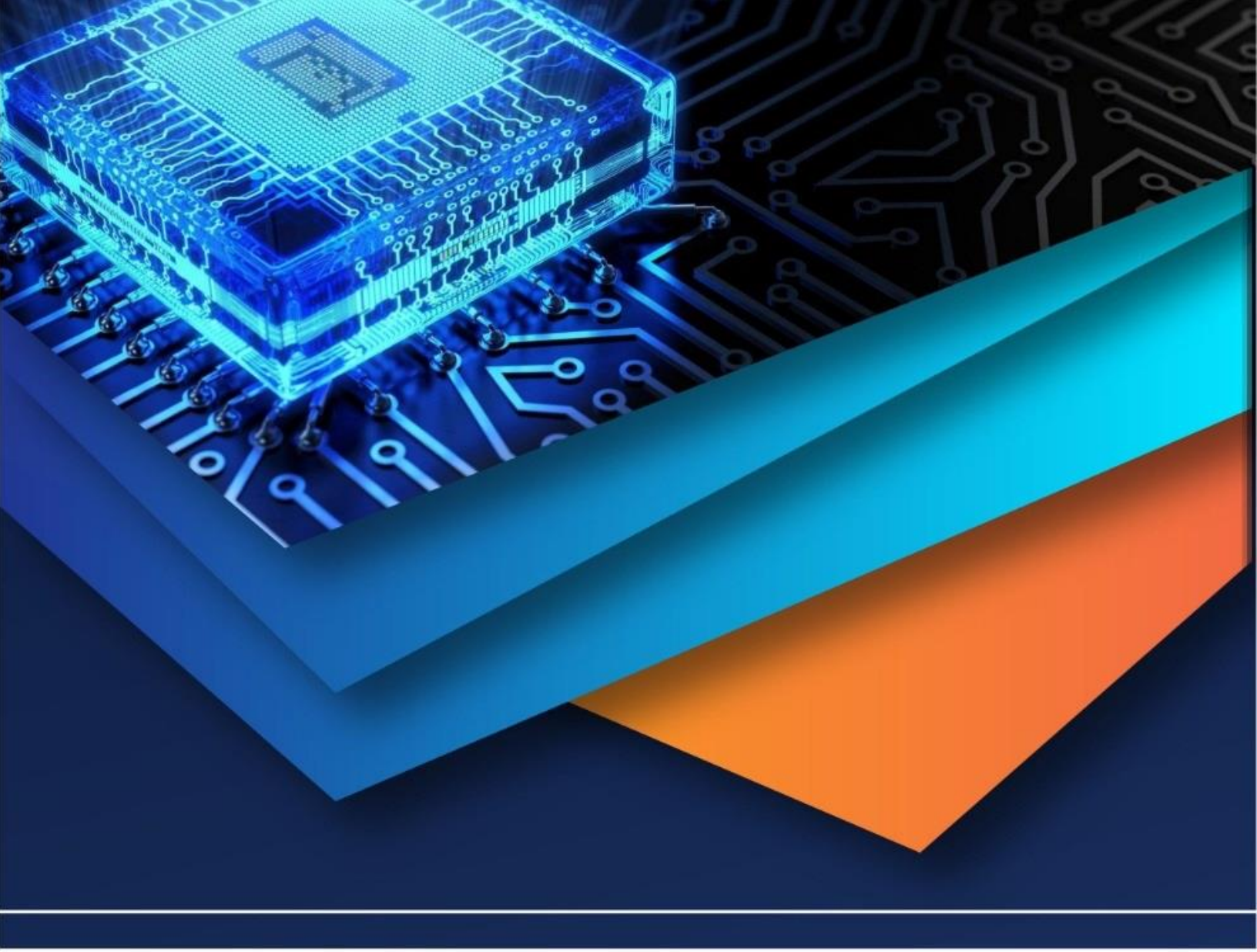
Listed in the table below are the harmful elements in the compositions of electrical and electronic appliances that can be hazardous to health and environment:

| *Metal* | *Danger* |
|---|---|
| Lead | A neurotoxin that affects the kidneys and the reproductive system. High quantities can be fatal. It affects mental development in children. Mechanical breaking of CRTs (cathode ray tubes) and removing solder from microchips release lead as powder and fumes. |
| Plastics | Found in circuit boards, cabinets and cables, they contain carcinogens. BFRs or brominated flame retardants give out carcinogenic brominated dioxins and furans. Dioxins can harm reproductive and immune systems. Burning PVC, a component of plastics, also produces dioxins. BFR can leach into landfills. Even the dust on computer cabinets contains BFR. |
| Chromium | Used to protect metal housings and plates in a computer from corrosion. Inhaling hexavalent chromium or chromium 6 can damage liver andkidneys and cause bronchial maladies including asthmatic bronchitis and lung cancer. |
| Mercury | Affects the central nervous system, kidneys and immune system. It impairs foetus growth and harms infants through mother's milk. It is released while breaking and burning of circuit boards and switches. Mercury in water bodies can form methylated mercury through microbial activity. Methylated mercury is toxic and can enter the human food chain through aquatic. |
| Beryllium | Found in switch boards and printed circuit boards. It is carcinogenic andcauses lung diseases. |
| Cadmium | A carcinogen. Long-term exposure causes Itai-itai disease, which causes severe pain in the joints and spine. It affects the kidneys and softens bones.Cadmium is released into the environment as powder while crushing and milling of plastics, CRTs and circuit boards. Cadmium may be released with dust, entering surface water and groundwater. |
| Acid | Sulphuric and hydrochloric acids are used to separate metals from circuit boards. Fumes contain chlorine and sulphur dioxide, which cause respiratory, eye and skin problems. |

## VII. CONCLUSION

The hazardous nature of e-waste is one of the rapidly growing environmental problems of the world. The ever-increasing amount of e-waste associated with the lack of awareness and appropriate skill is deepening the problem. A large number of workers are involved in crude dismantling of these electronic items for their livelihood and their health is at risk; therefore, there is an urgent need to plan a preventive strategy in relation to health hazards of e-waste handling among these workers in India. Required information should be provided to these workers regarding safe handling of e-waste and personal protection. For e-waste management many technical solutions are available,but to be adopted in the management system, prerequisite conditions such as legislation, collection system, logistics, and manpower should be prepared. This may require operational research and evaluation studies.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY