

A
Field Project
On
“Study of E-waste Collection in Arvi Town”



The Department of Computer Science
Arts, Commerce and Science College, Arvi
Dist Wardha
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On
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Chapter 1

INTRODUCTION

Rapid growth of technology, upgradation of technical innovations, and a high rate of obsolescence in the electronics industry have led to one of the fastest growing waste streams in the world which consist of end of life electrical and electronic equipment product E-waste or electronic waste is created when an electronic product is discarded after the end of its useful life. The rapid expansion of technology means that a very large amount of e-waste is created every minute. Electronic waste or e-waste may be defined as discarded computers, office electronic equipment, entertainment device electronics, mobile phones, television sets, and refrigerators. This includes used electronics which are destined for reuse, resale, salvage, recycling, or disposal as well as re-usables (working and repairable electronics) and secondary scraps (copper, steel, plastic, etc.).

The term "waste" is reserved for residue or material which is dumped by the buyer rather than recycled, including residue from reuse and recycling operations, because loads of surplus electronics are frequently commingled (good, recyclable, and non-recyclable). Several public policy advocates apply the term "e-waste" broadly to all surplus electronics. Cathode ray tubess (CRTs) are considered one of the hardest types to recycle. CRTs have relatively high concentration of lead and phosphorss (not to be confused with phosphorus), both of which are necessary for the display.

The United States Environmental Protection Agency (EPA) includes discarded CRT monitors in its category of "hazardous household waste" but considers CRTs that have been set aside for testing to be commodities if they are not discarded, speculatively accumulated, or left unprotected from weather and

other damage, The EU and its member states operate a system via the European Waste Catalogue (EWC) - a European Council Directive, which is interpreted into “member state law”.

Arvi is developing town from Wardha district with more than fifty thousand populations with Municipal Corporation i.e. Nagar Parishad who are controlling the administration of Arvi town. More of the population in the town uses electronic equipments, like television set, LED, refrigerators, mobile etc. After failure of equipment, they are going towards refurbisher (repairer) or keep it as a waste. In a town more than thousand electronic shops and refurbisher (repairer) are doing their work of repairing but problem is that which equipment did not repaired, they keep it as waste which is called as e waste.

In this work, we are going to study the management of e waste collection in Arvi town which is helpful for town like Arvi or ruler areas . Before starting a study of e waste firstly we must know that what is e-waste. So we first discuss about e waste, and e waste management in world wide.

Rapid changes in technology, changes in media (tapes, software, MP3), falling prices, and planned obsolescence have resulted in a fast growing surplus of electronic waste around the globe. Technical solutions are available, but in most cases, a legal framework, a collection, logistics, and other services need to be implemented before a technical solution can be applied.

Display units (CRT, LCD, LED monitors), processors (CPU, GPU, or APU chips), memory (DRAM or SRAM), and audio components have different useful lives. Processors are most frequently out-dated (by software no longer being optimized) and are more likely to become “e-waste” while display units are most often replaced while working without repair attempts, due to changes in wealthy nation appetites for new display technology. This problem could potentially be solved with smartphones or Phonebloks. These types of phones are more durable

and have the technology to change certain parts of the phone making them more environmentally friendly.

Being able to simply replace the part of the phone that is broken will reduce e-waste. An estimated 50 million tons of E-waste are produced each year. The USA discards 30 million computers each year and 100 million phones are disposed of in Europe each year. The Environmental Protection Agency estimates that only 15–20% of e-waste is recycled, the rest of these electronics go directly into landfills and incinerators. In 2006, the United Nations estimated the amount of worldwide electronic waste discarded each year to be 50 million metric tons. According to a report by UNEP titled, "Recycling – from E-Waste to Resources," the amount of e-waste being produced – including mobile phones and computers – could rise by as much as 500 percent over the next decade in some countries, such as India. The United States is the world leader in producing electronic waste, tossing away about 3 million tons each year. China already produces about 2.3 million tons (2010 estimate) domestically, second only to the United States. And, despite having banned e-waste imports, China remains a major e-waste dumping ground for developed countries.

Society today revolves around technology and by the constant need for the newest and most high-tech products we are contributing to mass amount of e-waste. Since the invention of the iPhone, cell phones have become the top source of e-waste products because they are not made to last more than two years. Electrical waste contains hazardous but also valuable and scarce materials. Up to 60 elements can be found in complex electronics. As of 2013, Apple has sold over 796 million iDevices (iPod, iPhone, iPad). Cell phone companies make cell phones that are not made to last so that the consumer will purchase new phones. Companies give these products such short life spans because they know that the consumer will want a new product and will buy it if they make it. In the United

States, an estimated 70% of heavy metals in landfills comes from discarded electronics.

While there is agreement that the number of discarded electronic devices is increasing, there is considerable disagreement about the relative risk (compared to automobile scrap, for example), and strong disagreement whether curtailing trade in used electronics will improve conditions, or make them worse. According to an article in *Motherboard*, attempts to restrict the trade have driven reputable companies out of the supply chain, with unintended consequences.

TYPES OF E-WASTE

1. Large household appliances (refrigerators/freezers, washing machines, dishwashers)
2. Small household appliances (toasters, coffee makers, irons, hairdryers)
3. Information technology (IT) and telecommunications equipment (personal computers, telephones, mobile phones, laptops, printers, scanners, photocopiers)
4. Consumer equipment (televisions, stereo equipment, electric toothbrushes)
5. Lighting equipment (fluorescent lamps)
6. Electrical and electronic tools (handheld drills, saws, screwdrivers)
7. Toys, leisure and sports equipment
8. Medical equipment systems (with the exception of all implanted and infected products)
9. Monitoring and control instruments
10. Automatic dispensers.



Chapter 2

LITERATURE REVIEW

In a study by Jalal Uddin (2012), Through innovative changes in product style below EXTENDED PRODUCER RESPONSIBILITY (ERP), use of environmentally friendly substitutes for dangerous substances, these impacts can be mitigated. A legal framework must be there for imposing EPR, RoHS for attaining this goal. Adoption of environmentally sound technologies for usage and employ of e-waste at the side of EPR and RoHS offers workable answer for environmentally sound management of e-waste. Manufacturers & suppliers need to set goals for reducing electronic waste. Encourage them to buy back old electronic products from consumers, disposing bulk e-waste only through authorized recyclers and send non tradable e-waste to authorized private developers for final disposal.

According to Vijay N. Bhoi et al. (2014), most of the waste is inherently dangerous. It will degrade to provide leachate, which can contaminate water, and make lowland gas, that is explosive. Additionally, owing to the risks related to lowland sites, there are currently terribly strict needs on the development, operation and medical care of such sites. Most designing authorities desire a figured out quarry to be used for landscaping instead of a lowland web site that nobody desires in their “back yard”. Product style should be used to assist to reduce not solely the character and quantity of waste, however conjointly to maximise end-of-life utilization. Makers, retailers, users, and disposers ought to share responsibility for reducing Prestige e-Journal of Management and Research Volume 4, Issue 1 (April, 2017) ISSN 2350-1316 58 the environmental impacts of merchandise. A product-centred approach ought to be adopted to preserve and shield setting.

Kuehr and Williams (2003) stated that an increasing market for reused PCs in developing countries is allowing people to own PCs and access technology at more affordable prices. Moreover, charitable organizations, such as Computer Mentor, Computer Aid, World Computer Exchange, Computers for Schools and others are expanding their boundaries and providing used and refurbished computers to organizations (e.g., schools) around the world. Furthermore, reuse also reduces the environmental impacts of technological artifacts by increasing their life spans and thereby reducing the demand for new equipment. Ramzy

Kahhat, et al., (2008) stated in his article that some states are adopting e-waste regulations, but so far the U.S. does not have a federal regulation that addresses the complete e-waste situation, including residential and non-residential sectors.

Federal level policies and regulations present the best way to address the e-waste situation (U.S. GAO, 2005) as they will overcome the lack of regulations in most states and will standardize regulations and policies in the country. This will create a more efficient national e-waste management system. In this scenario, the e-Market for returned deposit system will be the mechanism for residential customers to dispose of their devices in a way that motivates collection, recycle and reuse of e-waste. In a 2011 report, "Ghana E-Waste Country Assessment", found that of 215,000 tons of electronics imported to Ghana, 30% were brand new and 70% were used. Of the used product, the study concluded that 15% was not reused and was scrapped or discarded.

Sivakumaran Sivaramanan (2013) confirmed that the public awareness and cooperation of manufactures are essential for the advancement of e-waste management system. And also it is the responsibility of government to allocate sufficient grants and protecting the internationally agreed environmental legislations within their borders. Licensing of certification like estewardship may ensure the security to prevent illegal smugglers and handlers of e-waste. As e-wastes are the known major source of heavy metals, hazardous chemicals and carcinogens, certainly diseases related to skin, respiratory, intestinal, immune, and endocrine and nervous systems including cancers can be prevented by proper management and disposal of e-waste.

Prestige e-Journal of Management and Research Volume 4, Issue 1 (April, 2017) ISSN 2350-1316 59 According to Peeranart Kiddee et al. (2013) e-waste can be managed by developing eco design devices, properly collecting e-waste, recover and recycle material by safe methods, dispose of e-waste by suitable techniques, forbid the transfer of used electronic devices to developing countries, and raise awareness of the impact of e-waste. No single tool is adequate but together they can complement each other to solve this issue. A national scheme such as EPR is a good policy in solving the growing e-waste problems. Yamini Gupt & Samraj Sahay (2015) suggested that financial responsibility of the producers and separate collecting and recycling agencies contribute significantly to the success of the extended producer responsibility-based environmental policies. Regulatory provisions, take back responsibility and financial flow come out to be the three

most important aspects of the extended producer responsibility. Presence of informal sector had a negative impact on the regulatory provisions.

In Sukeshini Jadhav (2013) observed that proper e waste management will help efficient sourcing and collection right upto extraction and disposal of material, ensuring that e-waste will turn into lucrative products and business opportunity. The manufacturers have to take responsibility for adopting the guideline for manufacturing sound environment product and sustainability management should be started from the product manufacturing stage i.e raw material selection, product and process design can be the important factors for the designed for environment practices, which can facilitate the recycling and reuse. Manufacturer should also try and initiate a take back program to handle the waste so that proper management and disposal of e-waste can be done. This way as 60% e-waste is coming from industry, can contribute to a very large part of Electronic waste management collection and establishing clean e-waste channels.

UNEP (2010) report predicts that by 2020, E-waste from old computers in India will increase to 500%; from discarded mobile phones will be about 18 times high; from televisions will be 1.5 to 2 times higher; from discarded refrigerators will double or triple; than its respective 2007 levels. Considering the growth rate, studies show that the volume of E-waste will reach nearly 2 million MT by 2025. Samarkoon M.B. (2014) in his study states that improper handling of e-waste can cause harm to the environment and human health because of its toxic components. Although the current Prestige e-Journal of Management and Research Volume 4, Issue 1 (April, 2017) ISSN 2350-1316 60 emphasis is on end-of-life management of e-waste activities, such as reuse, servicing, remanufacturing, recycling and disposal, upstream reduction of e-waste generation through green design and cleaner production must be introduced to enhance a sustainable e-waste management system for Sri Lanka. Xinwen Chi et al. (2010) in their study gathered information on informal e-waste management, in China and identifies some of the main difficulties of the current Chinese approach. Informal e-waste recycling is not only associated with serious environmental and health impacts, but also the supply deficiency of formal recyclers and the safety problems of remanufactured electronic products. Experiences already show that simply prohibiting or competing with the informal collectors and informal recyclers is not an effective solution. New formal e-waste recycling systems should take existing informal sectors into account, and more policies need to be made to improve recycling rates, working conditions and the efficiency of involved informal

players. A key issue for China's e-waste management is how to set up incentives for informal recyclers so as to reduce improper recycling activities and to divert more e-waste flow into the formal recycling sector.

Shubham Gupta et al. (2014) studied that in developing countries like India, China, Indonesia, Brazil, commercial organizations tend to focus more on economic aspects rather than environmental regulations of e-waste recycling. So, for the profitable recovery of reusable materials and sustainable environment, the efficient recycling of this waste has been rendered indispensable, and is considered as a challenge for today's society. Sikdar & Vaniya (2014) in their research stated that government should introduce some topics related to disposal of e-waste materials and its recycling and adverse effects of e-waste on health of human body in Environmental Education as a compulsory subject from lower to higher grades. The researcher realized recently that the education system alone is a powerful medium to ensure environmental protection. It should reach most parts of the population at a young age, and more e-waste friendly behavior should be practiced on daily basis.

Binegde et al.. (2015) studied that the repair shops of electronic goods of the study area contributed an important role in extending the life span of electronic goods and thus reduce the number of thrown away e-goods. The study indicated that the high repair cost of the electronic goods and availability of comparatively cheaper new electronic goods with more Prestige e-Journal of Management and Research Volume 4, Issue 1 (April, 2017) ISSN 2350-1316 61 features attracts the consumers towards the throw away culture, leading to accumulation of obsolete electronic items. Strengthening of formal recycling of e-waste is very essential for attaining sustainable development. According to Norazli Othman (2015) the quantity of electronic wastes can be controlled if there is a sustainable integrated technique in managing the electronic waste. Sustainable integrated technique should consider electronic wastes management from the production until its disposal point. Implementation of new Legislation and Act should also be considered by the authority as to develop human capital in managing electronic waste. The combination of human capital with a sustainable technique for managing electronic waste will lead to efficiency in managing electronic wastes in the future.

Hassan Taghipour et al. (2012) suggested that a policy should be framed extending producer responsibility (EPR) programme in combination with a training

programme at different levels of society. An approach consisting of a mandated product take back is proposed for implementing EPR in Iran. Meanwhile, the Health Ministry and the Environmental Protection Agency should strictly supervise E-waste collection, storage, and recycling and/or disposal, and the Trade and Industry Ministries must have more control over the import and production of electronic goods.

Chapter 3

E-WASTE MANAGEMENT RULES

This chapter deals about the rules and management of the various department involved in the treatment of the E-waste prescribed by Government of India, Ministry of Environment, Forest and Climate change in 23rd March, 2016

RULES AND DEFINITIONS :

In these rules, unless the context otherwise requires, -

1. **'Act'** means the Environment (Protection) Act, 1986 (29 of 1986);
2. **'Authorisation'** means permission for generation, handling, collection, reception, storage, transportation, refurbishing, dismantling, recycling, treatment and disposal of e-waste, granted to manufacturer, dismantler, refurbisher and recycler;
3. **'Bulk consumer'** means bulk users of electrical and electronic equipment such as Central Government or State Government Departments, public sector undertakings, banks, educational institutions, multinational organisations, international agencies, partnership and public or private companies that are registered under the Factories Act, 1948 (63 of 1948) and the Companies Act, 2013 (18 of 2013) and health care facilities which have turnover of more than one crore or have more than twenty employees;
4. **'Central Pollution Control Board'** means the Central Pollution Control Board constituted under sub-section (1) of section 3 of the Water (Prevention and Control of Pollution) Act, 1974 (6 of 1974);
5. **'Collection centre'** means a centre or a collection point or both established by producer individually or as association jointly to collect e-waste for channelising the e-waste to recycler and play such role as indicated in the authorisation for Extended Producer Responsibility granted to the producer

and having facilities as per the guidelines of Central Pollution Control Board, including the collection centre established by the dismantler or refurbisher or recycler which should be a part of their authorisation issued by the State Pollution Control Board where the facility exists;

6. **'Component'** means one of the parts of a sub-assembly or assembly of which a manufactured product is made up and into which it may be resolved and includes an accessory or attachment to another component;
7. **'Consumables'** means an item, which participates in or is required for a manufacturing process or for functioning of the electrical and electronic equipment and may or may not form part of end-product. Items, which are substantially or totally consumed during a manufacturing process, shall be deemed to be consumables;
8. **'Consumer'** means any person using electrical and electronic equipment excluding the bulk consumers;
9. **'Channelisation'** means to direct the path for movement of e-wastes from collection onwards to authorised dismantler or recycler. In case of fluorescent and other mercury containing lamps, where recyclers are not available, this means path for movement from collection centre to Treatment, Storage and Disposal Facility;
10. **'Dealer'** means any individual or firm that buys or receives electrical and electronic equipment as listed in Schedule I of these rules and their components or consumables or parts or spares from producers for sale;
11. **'Deposit refund scheme'** means a scheme whereby the producer charges an additional amount as a deposit at the time of sale of the electrical and electronic equipment and returns it to the consumer along with interest when the end-of-life electrical and electronic equipment is returned;

12. **'Dismantler'** means any person or organisation engaged in dismantling of used electrical and electronic equipment into their components and having facilities as per the guidelines of Central Pollution Control Board and having authorisation from concerned State Pollution Control Board;
13. **'Disposal'** means any operation which does not lead to recycling, recovery or reuse and includes physico-chemical or biological treatment, incineration and deposition in secured landfill;
14. **'End-of-life'** of the product means the time when the product is intended to be discarded by the user;
15. **'Environmentally sound management of e-waste'** means taking all steps required to ensure that e-waste is managed in a manner which shall protect health and environment against any adverse effects, which may result from such e-waste;
16. **'Electrical and electronic equipment'** means equipment which are dependent on electric current or electro-magnetic field in order to become functional;
17. **'e-retailer'** means an individual or company or business entity that uses an electronic network such as internet, telephone, to sell its goods;
18. **'e-waste'** means electrical and electronic equipment, whole or in part discarded as waste by the consumer or bulk consumer as well as rejects from manufacturing, refurbishment and repair processes;
19. **'e-waste exchange'** means an independent market instrument offering assistance or independent electronic systems offering services for sale and purchase of e-waste generated from end-of-life electrical and electronic equipment between agencies or organisations authorised under these rules;
20. **'Extended Producer Responsibility'** means responsibility of any producer of electrical or electronic equipment, for channelisation of e-waste to ensure

environmentally sound management of such waste. Extended Producer Responsibility may comprise of implementing take back system or setting up of collection centres or both and having agreed arrangements with authorized dismantler or recycler either individually or collectively through a Producer Responsibility Organisation recognised by producer or producers in their Extended Producer Responsibility - Authorisation;

21. **‘Extended Producer Responsibility - Authorisation’** means a permission given by Central Pollution Control Board to a producer, for managing Extended Producer Responsibility with implementation plans and targets outlined in such authorisation including detail of Producer Responsibility Organisation and e-waste exchange, if applicable;
22. **‘Extended Producer Responsibility Plan’** means a plan submitted by a producer to Central Pollution Control Board, at the time of applying for Extended Producer Responsibility - Authorisation in which a producer shall provide details of e-waste channelization system for targeted collection including detail of Producer Responsibility Organisation and e-waste exchange, if applicable;
23. **‘Facility’** means any location wherein the process incidental to the collection, reception, storage, segregation, refurbishing, dismantling, recycling, treatment and disposal of e-waste are carried out;
24. **‘Form’** means a form appended to these rules;
25. **‘Historical e-waste’** means e-waste generated from electrical and electronic equipment as specified in Schedule I, which was available on the date from which these rules come into force;
26. **‘Manufacturer’** means a person or an entity or a company as defined in the Companies Act, 2013 (18 of 2013) or a factory as defined in the Factories Act, 1948 (63 of 1948) or Small and Medium Enterprises as defined in

Micro, Small and Medium Enterprises Development Act, 2006 (27 of 2006), which has facilities for manufacture of electrical and electronic equipment;

27. **‘Orphaned products’** means non-branded or assembled electrical and electronic equipment as specified in Schedule I or those produced by a company, which has closed its operations;
28. **‘Part’** means an element of a sub-assembly or assembly not normally useful by itself, and not amenable to further disassembly for maintenance purposes. A part may be a component, spare or an accessory;
29. **‘Producer’** means any person who, irrespective of the selling technique used such as dealer, retailer, e-retailer, etc. ;
 - (i) Manufactures and offers to sell electrical and electronic equipment and their components or consumables or parts or spares under its own brand; or
 - (ii) Offers to sell under its own brand, assembled electrical and electronic equipment and their components or consumables or parts or spares produced by other manufacturers or suppliers; or
 - (iii) Offers to sell imported electrical and electronic equipment and their components or consumables or parts or spares;
30. **‘Producer Responsibility Organisation’** means a professional organization authorised or financed collectively or individually by producers, which can take the responsibility for collection and channelisation of e-waste generated from the ‘end-of-life’ of their products to ensure environmentally sound management of such e-waste;
31. **‘Recycler’** - means any person who is engaged in recycling and reprocessing of waste electrical and electronic equipment or assemblies or their components and having facilities as elaborated in the guidelines of Central Pollution Control Board;

32. **'Refurbishment'** means repairing of used electrical and electronic equipment as listed in Schedule I for extending its working life for its originally intended use and selling the same in the market or returning to owner;
33. **'Refurbisher'** for the purpose of these rules, means any company or undertaking registered under the Factories Act, 1948 or the Companies Act, 1956 or both or district industries centre engaged in refurbishment of used electrical and electronic equipment;
34. **'Schedule'** means the Schedule appended to these rules;
35. **"spares"** means a part or a sub-assembly or assembly for substitution which is ready to replace an identical or similar part or sub-assembly or assembly including a component or an accessory;
36. **'State Government in relation to an Union territory'** means, the Administrator thereof appointed under article 239 of the Constitution;
37. **'State Pollution Control Board'** means the concerned State Pollution Control Board or the Pollution Control Committee of the Union Territories constituted under sub-section (1) of section 4 of the Water (Prevention and Control of Pollution) Act, 1974 (6 of 1974);
38. **'Target'** means the quantity of e-waste to be collected by the producer in fulfilment of Extended Producer Responsibility;
39. **'Transporter'** means a person or company or entity engaged in the off-site transportation of e-waste by air, rail, road or water carrying a manifest system issued by the person or company or entity who has handed over the e-waste to the transporter, giving the origin, destination and quantity of the e-waste being transported.

Chapter 4

RESPONSIBILITIES AND DUTIES

To clean the environment it is duties of everyone in the universe including persons, management, and organization. In this chapter we are going to study responsibilities of every person who are related with term e-waste.

4.1 RESPONSIBILITIES OF THE MANUFACTURER:

- (1) Collect e-waste generated during the manufacture of any electrical and electronic equipment and channelise it for recycling or disposal
- (2) Apply for an authorisation in Form 1 (a) in accordance with the procedure
 - (a) prescribed under sub-rule (2) of rule 13 from the concerned State Pollution Control Board, which shall give the authorisation in accordance with Form 1 (bb);
- (3) Ensure that no damage is caused to the environment during storage and transportation of e-waste;
- (4) Maintain records of the e-waste generated, handled and disposed in Form-2 and make such records available for scrutiny by the concerned State Pollution Control Board;
- (5) File annual returns in Form-3, to the concerned State Pollution Control Board on or before the 30th day of June following the financial year to which that return relates.

4.2. RESPONSIBILITIES OF THE PRODUCER:

The producer of electrical and electronic equipment listed in Schedule I shall be responsible for ,

(1) Implementing the Extended Producers Responsibility with the following frameworks, namely:-

(a) Collection and channelisation of e-waste generated from the ‘end-of life’ of their products or ‘end-of-life’ products with same electrical and electronic equipment code and historical waste available on the date from which these rules come into force as per Schedule I in line with the targets prescribed in Schedule III in Extended Producer Responsibility - Authorisation;

(b) The mechanism used for channelisation of e-waste from ‘end-of-life’ products including those from their service centres to authorised dismantler or recycler shall be in accordance with the Extended Producer Responsibility - Authorisation. In cases of fluorescent and other mercury containing lamps, where recyclers are not available, channelisation may be from collection centre to Treatment, Storage and Disposal Facility;

(c) For disposal in Treatment, Storage and Disposal Facility, a pre-treatment is necessary to immobilise the mercury and reduce the volume of waste to be disposed off;

(d) Extended Producer Responsibility - Authorisation should comprise of general scheme for collection of waste Electrical and Electronic Equipment from the Electrical and Electronic Equipment placed on the market earlier, such as through dealer, collection centres, Producer Responsibility Organization, through buy-back arrangement, exchange scheme, Deposit Refund System, etc. whether directly or through any authorised agency and channelizing the items so collected to authorised recyclers;

(e) Providing contact details such as address, e-mail address, toll-free telephone numbers or helpline numbers to consumer(s) or bulk consumer(s) through their website and product user documentation so as to facilitate return of end-of-life electrical and electronic equipment;

(f) Creating awareness through media, publications, advertisements, posters, or by any other means of communication and product user documentation accompanying the equipment.

(i) Information on address, e-mail address, toll-free telephone numbers or helpline numbers and web site;

(ii) Information on hazardous constituents as specified in sub-rule 1 of rule 16 in electrical and electronic equipment;

(iii) Information on hazards of improper handling, disposal, accidental breakage, damage or improper recycling of e-waste;

(iv) Instructions for handling and disposal of the equipment after its use, along with the Do's and Don'ts;

(v) Affixing a visible, legible and indelible symbol given below on the products or product user documentation to prevent e-waste from being dropped in garbage bins containing waste destined for disposal;

(vi) Means and mechanism available for their consumers to return e-waste for recycling including the details of Deposit Refund Scheme, if applicable;

(g) The producer shall opt to implement Extended Producer Responsibility individually or collectively. In individual producer responsibility, producer may set up his own collection centre or implement take back system or both to meet Extended Producer Responsibility. In collective system, producers may tie-up as a member with a Producer Responsibility Organisation or with e-waste exchange or both. It shall be mandatory upon on the individual producer in every case to seek Extended Producer Responsibility -

Authorisation from Central Pollution Control Board in accordance with the Form-1 and the procedure laid down in sub-rule (1) of rule 13;

(1) To provide information on the implementation of Deposit Refund Scheme to ensure collection of end-of-life products and their channelisation to authorised dismantlers or recyclers, if such scheme is included in the Extended Producer Responsibility Plan. Provided that the producer shall refund the deposit amount that has been taken from the consumer or bulk consumer at the time of sale, along with interest at the prevalent rate for the period of the deposit at the time of take back of the end-of life product;

(2) The import of electrical and electronic equipment shall be allowed only to producers having Extended Producer Responsibility authorisation;

(3) Maintaining records in Form-2 of the e-waste handled and make such records available for scrutiny by the Central Pollution Control Board or the concerned State Pollution Control Board;

(4) Filing annual returns in Form-3, to the Central Pollution Control Board on or before the 30th day of June following the financial year to which that return relates. In case of the Producer with multiple offices in a State, one annual return combining information from all the offices shall be filed;

(5) The Producer shall apply to the Central Pollution Control Board for authorisation in Form 1, which shall thereafter grant the Extended Producer Responsibility -Authorisation in Form 1(aa).

(6) Operation without Extended Producer Responsibility-Authorisation by any producer, as defined in this rule, shall be considered as causing damage to the environment.

4.3 RESPONSIBILITIES OF COLLECTION CENTRES.

- (1) Collect e-waste on behalf of producer or dismantler or recycler or refurbisher including those arising from orphaned products; Provided the collection centres established by producer can also collect e-waste on behalf of dismantler, refurbisher and recycler including those arising from orphaned products
- (2) Ensure that the facilities are in accordance with the standards or guidelines issued by Central Pollution Control Board from time to time;
- (3) Ensure that the e-waste collected by them is stored in a secured manner till it is sent to authorised dismantler or recycler as the case may be;
- (4) Ensure that no damage is caused to the environment during storage and transportation of e-waste; maintain records in Form-2 of the e-waste handled as per the guidelines of Central Pollution Control Board and make such records available for scrutiny by the Central Pollution Control Board or the concerned State Pollution Control Board as and when asked for.

4.4 RESPONSIBILITIES OF DEALERS.

- (1) In the case the dealer has been given the responsibility of collection on behalf of the producer, the dealer shall collect the e-waste by providing the consumer a box, bin or a demarcated area to deposit e-waste, or through take back system and send the e-waste so collected to collection centre or dismantler or recycler as designated by producer;
- (2) The dealer or retailer or e-retailer shall refund the amount as per take back system or Deposit Refund Scheme of the producer to the depositor of e-waste;
- (3) Every dealer shall ensure that the e-waste thus generated is safely transported to authorised dismantlers or recyclers;
- (4) Ensure that no damage is caused to the environment during storage and transportation of e-waste.

4.5 RESPONSIBILITIES OF THE REFURBISHER

- (1) Collect e-waste generated during the process of refurbishing and channelise the waste to authorised dismantler or recycler through its collection centre;
- (2) Make an application in Form 1(a) in accordance with the procedure laid down in sub-rule (4) of rule 13 to the concerned State Pollution Control Board for grant of one time authorization, the concerned State Pollution Control Board shall authorise the Refurbisher on one time basis as per Form 1 (bb) and authorisation would be deemed as considered if not objected to within a period of thirty days; the authorized. Refurbisher shall be required to submit details of e-waste generated to the concerned State Pollution Control Board on yearly basis;
- (3) Ensure that no damage is caused to the environment during storage and transportation of e-waste;
- (4) Ensure that the refurbishing process do not have any adverse effect on the health and the environment;
- (5) Ensure that the e-waste thus generated is safely transported to authorized collection centres or dismantlers or recyclers;
- (6) File annual returns in Form-3 to the concerned State Pollution Control Board, on or before the 30th day of June following the financial year to which that return relates;
- (7) Maintain records of the e-waste handled in Form-2 and such records should be available for scrutiny by the appropriate authority.

4.6 RESPONSIBILITIES OF CONSUMER OR BULK CONSUMER

- (1) Consumers or bulk consumers of electrical and electronic equipment listed in Schedule I shall ensure that e-waste generated by them is channelised through collection centre or dealer of authorised producer or dismantler or recycler or

through the designated take back service provider of the producer to authorised dismantler or recycler;

(2) Bulk consumers of electrical and electronic equipment listed in Schedule I shall maintain records of e-waste generated by them in Form-2 and make such records available for scrutiny by the concerned State Pollution Control Board;

(3) Consumers or bulk consumers of electrical and electronic equipment listed in Schedule I shall ensure that such end-of-life electrical and electronic equipment are not admixed with e-waste containing radioactive material as covered under the provisions of the Atomic Energy Act, 1962 (33 of 1962) and rules made there under;

(4) Bulk consumers of electrical and electronic equipment listed in Schedule I shall file annual returns in Form-3, to the concerned State Pollution Control Board on or before the 30th day of June following the financial year to which that return relates. In case of the bulk consumer with multiple offices in a State, one annual return combining information from all the offices shall be filed to the concerned State Pollution Control Board on or before the 30th day of June following the financial year to which that return relates

4.7 RESPONSIBILITIES OF THE DISMANTLER

(1) Ensure that the facility and dismantling processes are in accordance with the standards or guidelines prescribed by Central Pollution Control Board from time to time;

(2) Obtain authorisation from the concerned State Pollution Control Board in accordance with the procedure under sub-rule (3) of rule 13;

(3) Ensure that no damage is caused to the environment during storage and transportation of e-waste;

- (4) Ensure that the dismantling processes do not have any adverse effect on the health and the environment;
- (5) Ensure that dismantled e-waste are segregated and sent to the authorised recycling facilities for recovery of materials;
- (6) Ensure that non-recyclable or non-recoverable components are sent to authorised treatment storage and disposal facilities;
- (7) Maintain record of e-waste collected, dismantled and sent to authorised recycler in Form-2 and make such record available for scrutiny by the Central Pollution Control Board or the concerned State Pollution Control Board;
- (8) File a return in Form-3, to the concerned State Pollution Control Board as the case may be, on or before 30th day of June following the financial year to which that return relates; not process any e-waste for recovery or refining of materials, unless he is authorised with concerned State Pollution Control Board as a recycler for refining and recovery of materials;
- (9) Operation without Authorisation by any dismantler, as defined in this rule, shall be considered as causing damage to the environment.

4.8 RESPONSIBILITIES OF THE RECYCLER

- (1) Shall ensure that the facility and recycling processes are in accordance with the standards or guidelines prescribed by the Central Pollution Control Board from time to time;
- (2) Obtain authorisation from concerned State Pollution Control Board in accordance with the procedure under the sub-rule (3) of rule 13;
- (3) Ensure that no damage is caused to the environment during storage and transportation of e-waste;
- (4) Ensure that the recycling processes do not have any adverse effect on the health and the environment;

- (5) Make available all records to the Central Pollution Control Board or the concerned State Pollution Control Board for inspection;
- (6) Ensure that the fractions or material not recycled in its facility is sent to the respective authorised recyclers;
- (7) Ensure that residue generated during recycling process is disposed of in an authorised treatment storage disposal facility;
- (8) Maintain record of e-waste collected, dismantled, recycled and sent to authorized recycler in Form-2 and make such record available for scrutiny by the Central Pollution Control Board or the concerned State Pollution Control Board;
- (9) File annual returns in Form-3, to the concerned State Pollution Control Board as the case may be, on or before 30th day of June following the financial year to which that return relates;
- (10) May accept waste electrical and electronic equipment or components not listed in Schedule I for recycling provided that they do not contain any radioactive material and same shall be indicated while taking the authorisation from concerned State Pollution Control Board;
- (11) Operation without Authorisation by any recycler, as defined in this rule, shall be considered as causing damage to the environment.

4.9 RESPONSIBILITIES OF STATE GOVERNMENT FOR ENVIRONMENTALLY SOUND MANAGEMENT OF E-WASTE.

- (1) Department of Industry in State or any other government agency authorised in this regard by the State Government, to ensure earmarking or allocation of industrial space or shed for e-waste dismantling and recycling in the existing and upcoming industrial park, estate and industrial clusters;
- (2) Department of Labour in the State or any other government agency authorised in this regard by the State Government shall:

a. ensure recognition and registration of workers involved in dismantling and recycling;

b. assist formation of groups of such workers to facilitate setting up dismantling facilities;

c. undertake industrial skill development activities for the workers involved in dismantling and recycling;

d. undertake annual monitoring and to ensure safety & health of workers involved in dismantling and recycling;

(3) State Government to prepare integrated plan for effective implementation of these provisions, and to submit annual report to Ministry of Environment, Forest and Climate Change.

Chapter 5

DATA COLLECTION AND DISCUSSION

In this chapter we are collecting a data from various sources like a dealers of electronics shops, consumers, recycler and e-waste collector etc. from Arvi town. For that our students are going to the various places and collecting a data. In this work more than thirty students are work together and they do their work properly.

For data collection we make 5 teams of students namely Team A, Team B, Team C, Team D and Team E . Allotted them task for collecting a data from various recourses in the form of survey or questionnaires related to e-waste. Team A was collecting the data from Dealer of electronics equipments. Team B was collecting the data from garbage collector, Team C was collecting the data from Repairer, Team D was collecting the data from Consumers and Team E was collecting the data from Municipal Corporation.

After collecting a data from various resources, we make analysis with collecting a data and find out the behaviour, opinion and procedure of collection and management of e waste.

Team A :

1. Ku. Kanchan Lalwani B.Sc. IIIrd Year
2. Ku. Sakshi Raut B.Sc. IIIrd Year
3. Ku. Pingala Chandurkar B.Sc. IIIrd Year
4. Ku. Sanjivini Lad B.Sc. IIIrd Year
5. Ku. Pooja Bagwale B.Sc. IIIrd Year
6. Ku. Shreya Bhende B.Sc. IIIrd Year

Team B :

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2. Ku. Anuja Jagtap B.Sc. IIIrd Year
3. Ku. Ruchita Wadhai B.Sc. IIIrd Year
4. Ku. Pallavi Dhok B.Sc. IIIrd Year
5. Ku. Sakshi Nehare B.Sc. IIIrd Year

6. Ku. Nusart Shekh B.Sc. IIIrd Year

Team C :

1. Mr. Ganesh Sasane B.Sc. IIIrd Year
2. Mr. Tejas Mahatme B.Sc. IIIrd Year
3. Mr. Mayur Tiwade B.Sc. IIIrd Year
4. Mr. Rahul Nasare B.Sc. IIIrd Year
5. Mr. Akshay Vidhate B.Sc. IIIrd Year
6. Ku. Rakshanda Gahalot B.Sc. IInd Year

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2. Ku. Pallavi Kahndekar B.Sc. IInd Year
3. Ku. Tanaya Fate B.Sc. IInd Year
4. Ku. Shravani Jade B.Sc. IInd Year
5. Ku. Neha Kamdi B.Sc. IInd Year
6. Ku. Payal Mude B.Sc. IInd Year

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1. Ku. Kiran Masram B.Sc. IInd Year
2. Ku. Achal Kale B.Sc. IInd Year
3. Mr. Amit Chopade B.Sc. IInd Year
4. Mr. Ankit Tipale B.Sc. IInd Year
5. Mr. Rohit Dhole B.Sc. IInd Year
6. Mr. Rushikesh Patthe B.Sc. IInd Year



Do's

- Follow the instructions for proper handling of the end of life equipment in product user manual.
- Make sure that your electronic products are recycled only by authorized recyclers/dismantlers.
- Consult your nearest Havel's Collection Point for disposing of products that have reached the end of life.
- Drop off used electronic products, defective spares or any accessories at the nearest Havel's Collection Point.
- Separate the packaging materials from the electronic products as per safe waste disposal options.
- Protect the glass surface of any electronic product to avoid breakage.

Don'ts

- Never dismantle your electronic products yourself.
- Never dispose of electronic products in bins having 'Do Not Dispose of' sign.
- Never sell or give E-Waste to informal and unorganized sectors like local scrap dealer/ rag pickers.
- Never throw your electronic waste along with municipal waste as they end up reaching landfills.

Conclusion

Any electronic product or accessory which has reached the end of its useful life is called E-waste. For example, discarded or obsolete Air Conditioners, TV, Washing Machine, Refrigerator, Fluorescent and other Mercury-containing lamps, etc. These discarded products affect the environment negatively. Apart from affecting the environment, it can also affect the health of the people; hence managing this E-waste effectively is important. The challenges of managing E-waste in India are very different from those in other countries, both the developed and developing. No doubt, there can be several shared lessons; the complexity of the E-waste issue in India, given its vast geographical and cultural diversity and economic disparities, makes WEEE management challenges quite unique. A few of these are: Rapidly increasing E-waste volumes, both domestically generated as well as through imports. Imports are often disguised as second-hand computer donations towards bridging the digital divide or simply as metal scrap.

No accurate estimates of the quantity of E-waste generated and recycled. Low level of awareness amongst manufacturers and consumers of the hazards of incorrect E-waste disposal. Widespread E-waste recycling in the informal sector using rudimentary techniques such as acid. E-waste workers have little or no knowledge of toxins in E-waste, and are exposed to serious health hazards. Inefficient recycling processes result in substantial losses of material value. The major problem we face in India there is no such technology or clear policy/guidelines to check the disposal of e-waste. E-waste is mostly recycled by backyard practitioners.

Recycling of e-waste: Recycling WEEE (waste from electronic and electrical equipments) is an important subject not only from the view point of waste

treatment but also in terms of recovery of valuable waste materials. Mechanical/physical processing provides an alternative means of recovering valuable materials but several difficulties exist. The main difficulty, industries have to afford is the separation of the different material in WEEE. This problem leads to several approaches to optimize the process. One of the most successful is the definition of separation systems based on the physical – chemical properties of materials to make recycling of material constituting WEEE economically profitable.

The recycling of this e-waste generally involves low level processing such as granulation or pelletization followed by melt or partial melt and extrusion to form the end product. E-plastic waste rather difficult to recycle: Because of diversity of polymeric materials used. E. g thermoplastics as well as thermosets and relatively high levels of flame retardants (halogen containing compounds) added during production. When we try to recover the plastic material from discarded electronic devices, we have to take into account the usual high halogen contents resulting from the addition of flame retardants. Thermoset polymer cannot be re-molded or reprocessed by re-melting. Thermoset composite contain high amount of inorganic glass reinforcement or mineral filler. Fire retardants are used with-plastic material in order to increase fire safety when generates toxic substance during combustion. The miniaturization of electronic equipment reduces the volume of waste make collection, repair and recycling more difficult.

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