

# E-Waste Management Practices: Specific Focus on Indore & Jabalpur

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**Abstract-** The e-wastes are old electronic and electrical product or communication and computer products which attain the end of life. These e-wastes are categorised into different categories. The developed countries are used to send the e-waste to developing countries and it now becomes a matter of concerns for developing countries. The changing technology is also a reason for increase in e-waste generation. In this paper a study on e-waste management practices was done by conducting a survey in two cities of India i.e. Indore and Jabalpur and results were obtained regarding awareness among people about e-waste, method of e-waste management and suggestions were obtained about e-waste management. Based on this survey it was recommended that role of government should be increased for controlling the informal method of e-waste management and for promoting the formal method and increasing the awareness among people about hazardous effect of e-waste and for its proper disposal. Also the responsibility of manufacturer should also increases for buy back method of e-waste management by the manufacturer.

**Keywords—** e-waste, hazardous, formal and informal, suggestions, developing, responsibility

## INTRODUCTION

India is a developing country and is having world's second largest population after china. The present growth rate of 4.7 percent of GDP and achieved growth of 8 percent during eleventh five year plan from 2007 to 2012.[1] As per this growth rate needs and lifestyle of Indian people changes continuously. Due to a huge revolution in technology there is advancement in every sector. The electronic and communication market is also booming in India. Due to this a large number of people are changing their old electronics and communication product with new product. Because of it a large amount of old electronic and communication products are enhancing large quantum of e-waste in India.

Electronic waste (e-waste) comprises of old electronics/electrical items which are not fit to deliver good services and intended use or have reached their end of life. This may include items such as computers, servers, mainframes, monitors, CDs, printers, scanners, copiers, calculators, fax machines, battery cells, cellular phones, transceivers, TVs, medical apparatus and electronic components besides white goods such as refrigerators and air-conditioners. E-waste contains valuable materials such as copper, silver, gold and platinum which could be processed for their recovery.[2]

### A. Categorisation of e-waste:

The e-waste are categorised into following different categories as shown in table below.

Table 1. WEEE categories according to the EU directive on WEEE(EU, 2002a)[3]

S No	Category	Label
1	Large Household appliance	Large HH
2	Small household appliance	Small HH
3	IT and Telecommunication s equipment	ICT
4	Consumer equipment	CE
5	Lighting equipment	Lighting
6	Electrical and electronic tools(with the exception of large-scale stationary industrial tools)	E & E tools
7	Toys, leisure and sports equipment	Toys
8	Medical devices(with the exception of all implanted and infected products)	Medical equipment
9	Monitoring and control instruments	M&C
10	Automatic dispenser	Dispenser

Source: Rolf Widmera et al., (2005)

Out of the ten categories listed in above table, category 1-4 contributes for almost 95% of the WEEE generated. These categories include following products which leads to e-waste generation:[4]

- Large Household Appliances- Washing machines, Dryers, Refrigerators, Air conditioners, etc.

- Small Household Appliances- Vacuum cleaners, Coffee Machines, Irons, Toasters, etc.
- Office, Information & Communication Equipment- PCs, Laptops, Mobiles, Telephones, Fax Machines, Copiers, Printers etc.
- Entertainment & Consumer Electronics- Televisions, VCR/DVD/CD players, Hi-Fi sets, Radios, etc.
- Lighting Equipment- Fluorescent tubes, sodium lamps etc. (Except: Bulbs, Halogen Bulbs)
- Electric and Electronic Tools- Drills, Electric saws, Sewing Machines, Lawn Mowers etc. (Except: large stationary tools/machines)
- Toys, Leisure, Sports and Recreational Equipment- Electric train sets, coin slot machines, treadmills etc

### **B. Process of e-waste management:**

According to the Basel Action Network (BAN) which works for prevention of globalisation of toxic chemicals, it has found that 50 to 80 per cent of e-waste collected by the US is exported to India, China, Pakistan, Taiwan and a number of African countries. It is possible because of cheaper labour availability in these countries and in US export of e-waste is legal.[5] In India, the process of e-waste management is done mostly by informal sector. The practices of e-waste management performed by informal sector are very dangerous for environment and for human being also.[6]

## **METHODOLOGY**

In view to know pattern of growth and disposal of e-waste management in India, a survey had been conducted in two cities i.e. Indore and Jabalpur of Madhya Pradesh state. The process of survey was done in two steps which are given below:

1. Collection of secondary data
2. Primary data collection & analysis

### **A. Collection of secondary data:**

In this step The status of electronic and communication products in Indore and Jabalpur could be estimated by measuring the percentage of household possessing Television, Computer/Laptop and Mobile phone which are the main constituents leading to e-waste generation. The percentage of household possessing these items in Indore and Jabalpur are shown below.

Table 2: Percentage of household possessing different products

District	Total Household	Total Percentage of Household having		
		Television	Computer/Laptop	Mobile phone
Indore	6,15,334	75.5	18.1	62.1
Jabalpur	5,15,029	55.4	11.4	43.7

Source: Census of India 2011

From the above table it could be concluded that majority of household possesses television followed by computer/laptop and mobile phone in both the cities. Therefore the percentage of e-waste generated from these household follow the same pattern.

### **B. Primary data collection:**

#### **Sample size:**

- A. For this survey a sample size of ten sellers in each of the following business group have been identified according to different market location, size of firm, and type of firm like retailer, dealer or branded showroom owner. The data collected is shown below.
- B. Group A- Computer & peripheral Seller
- C. Group B- Electrical & Electronic goods Seller
- D. Group C- Mobile & Accessories Seller
- E. In addition to it some scrap dealer/ vendor of e-waste were also interviewed and findings are obtained.

### **Mode of communication:**

For communicating to respondents of all groups interviewing technique was used and relevant information was obtained.

## DATA COLLECTION, ANALYSIS AND RESULTS

The survey conducted mainly has three points to be identified which are

1. Awareness about e-waste and its management among seller
2. Use of item received under exchanged from purchaser
3. Suggestion/ recommendation regarding e-waste management
4. Result from scrap dealers or vendors

### A. Awareness about e-waste and its management among seller

The data regarding awareness among seller about e-waste and its management was obtained by asking them questions regarding hazardous effect of e-waste, safe disposal of e-waste and knowledge of recyclers. Based on the answers given by them all the three group seller are categorised into three categories as seller having deep knowledge, shallow knowledge and no knowledge. The findings are summarised into table and result is shown in graph.

Table 3: Awareness & Knowledge among Businesses on e-waste management

Level of knowledge about e-waste	Number of Group A respondents	Number of Group B respondents	Number of Group C respondents
Deep knowledge	3	2	2
Shallow knowledge	6	6	7
No knowledge	1	2	1

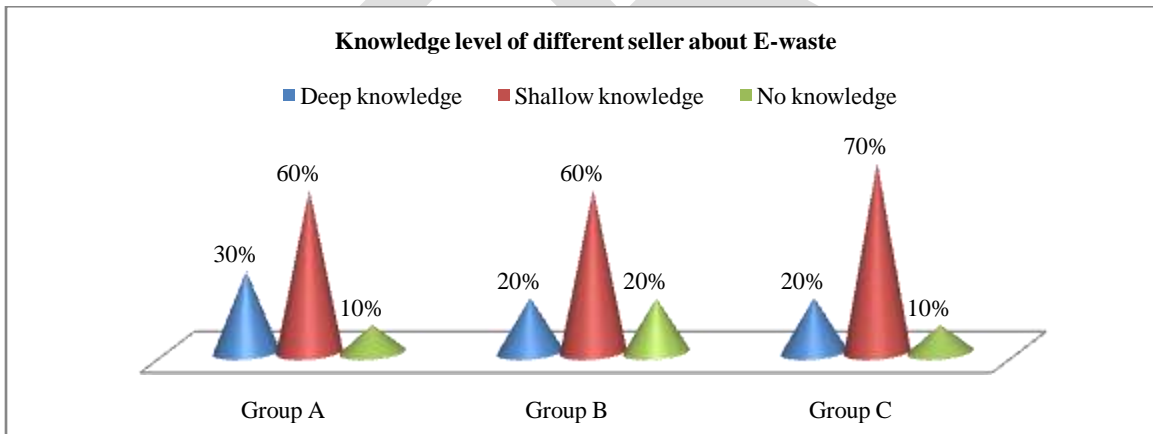


Fig 1: Result showing percentage wise distribution of different product seller according to their knowledge about e-waste

### Result from the level of knowledge of first three categories product seller about e-waste:

It was observed from graph that about 30% computer and peripheral seller, about 20% electrical and electronic goods seller and about 20% mobile and accessories seller have deep knowledge of e-waste, which means they know about how e-waste is generated, how it is passes from one customer to other and how it get disposed and recycled.

It was also found that about 60% computer and peripheral seller, about 60% electrical and electronic goods seller and about 70% mobile and accessories seller have shallow knowledge of e-waste, it means they have brief understanding about e -waste generation but lack of knowledge on the environmentally sound disposal of end of life IT/communication and electronic product, they only know about the process used by them to manage e-waste coming to them through exchanged process.

Further it was observed that about 10% computer and peripheral seller, about 20% electrical and electronic goods seller and about 10% mobile and accessories seller have no knowledge of e-waste.

**B. Use of item received under exchanged by first three groups**

The seller takes old product of customer in exchange of new product. The seller then manages these old product i.e. e-waste in different methods such as sell to second hand market/ mechanic, or sell to scrap dealer/ vendor.

**Group A: Computer and peripheral sellers:**

The finding obtained from computer and peripheral seller is summarised in table and result is shown in graph.

Table 4: Computer & peripheral showroom owner/ retailer using different methods to manage e-waste

S No.	Code of showroom owner/retailer →	1	2	3	4	5	6	7	8	9	10
1.	Sell to second hand market /mechanic	Y	Y	Y	Y	N	Y	N	N	N	Y
2.	Sell to scrap dealer/ vendor	Y	N	N	Y	N	Y	N	Y	N	Y
3.	Whether exchange facility available	Y	Y	Y	Y	N	Y	N	Y	N	Y
4.	Company support for recycling	N	N	N	N	N	N	N	N	N	N

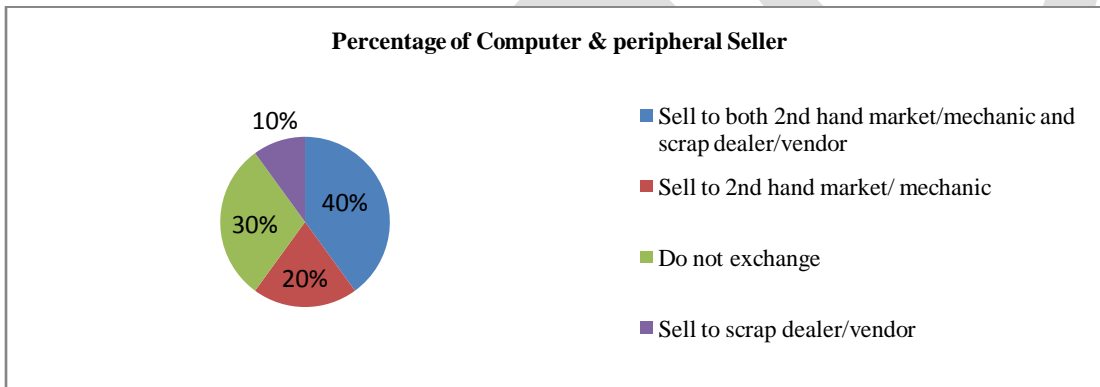


Fig 2: Result showing percentage wise distribution of Computer and peripheral showroom owner/retailer according to method of e-waste management

**Result from computer & peripheral related e-waste**

From the study it is found that about 40% computer and peripheral seller sell their old exchanged item from customer to both in second hand market and to scrap dealer.

About 20% computer and peripheral seller sell their old exchanged item from customer to second hand product customer or mechanic.

About 10% computer and peripheral seller sell their old exchanged item from customer to scrap dealer or vendor.

About 30% computer and peripheral seller who sell computer and laptops of branded company only do not offer exchange facility.

Many computer manufacturer companies mention about e-waste programme and collection facility in their website but at ground level there is no such information to the showroom owner and retailer.

**Group B- Electrical & Electronic goods Seller**

The finding obtained from Electrical and Electronics seller is summarised in table and result is shown in graph.

Table 5: Electrical & Electronic showroom owner/ retailer using different methods to manage e-waste

S No.	Code of showroom owner/retailer →	1	2	3	4	5	6	7	8	9	10
1.	Sell to second hand market/mechanic	Y	N	Y	N	N	N	N	N	N	N
2.	Sell to scrap dealer/ vendor	N	N	N	Y	N	Y	Y	Y	Y	Y
3.	Whether exchange facility available	Y	N	Y	Y	N	Y	Y	Y	Y	Y
4.	Company support for recycling	N	N	N	N	N	N	N	N	N	N

Y-Yes, N – No

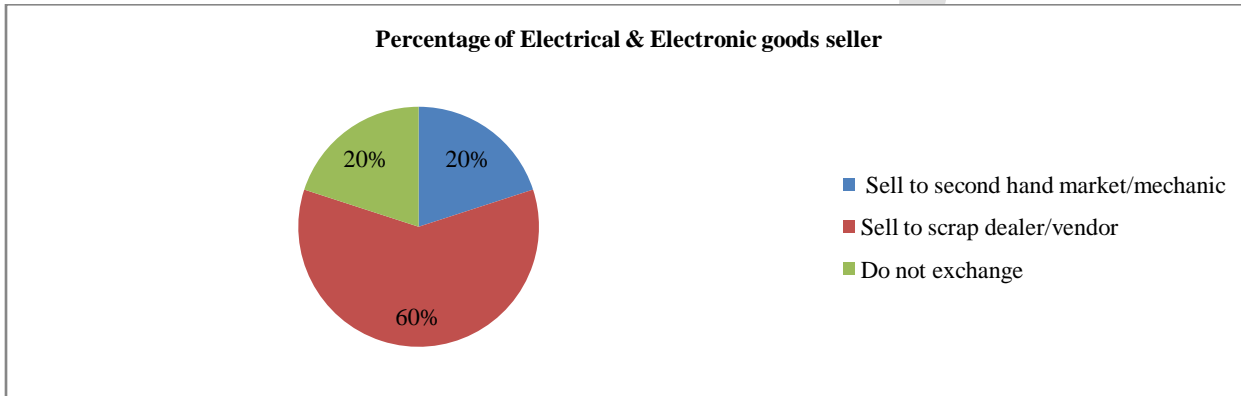


Fig 3: Result showing percentage wise distribution of Electrical & Electronics showroom owner/retailer according to method of e-waste management

### Result from electronic goods seller:

As found from the survey about 10% of electronic goods seller sells their old electronic items exchanged from customer to second hand market or to mechanic.

About 80% of electronic goods seller sells their old electronic items exchanged from customer to scrap dealer or vendor.

About 10% of electronic goods seller does not provide exchange facility.

Most of the electronic goods manufacturer does not provide any support to retailer and showroom owner for management of exchanged items.

### Group C- Mobile & Accessories Seller

The finding obtained from Mobile and accessories seller is summarised in table and result is shown in graph.

Table 6: For Mobile Company/ private showroom owner/ retailer using different methods to manage e-waste

S No.	Code of showroom owner/retailer→	1	2	3	4	5	6	7	8	9	10
1.	Sell to second hand market /mechanic	Y	N	N	N	N	N	N	N	N	N
2.	Sell to scrap dealer/ vendor	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
3.	Whether exchange facility available	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4.	Company support for recycling	N	N	N	N	N	N	N	N	N	N

Y- Yes, N- No

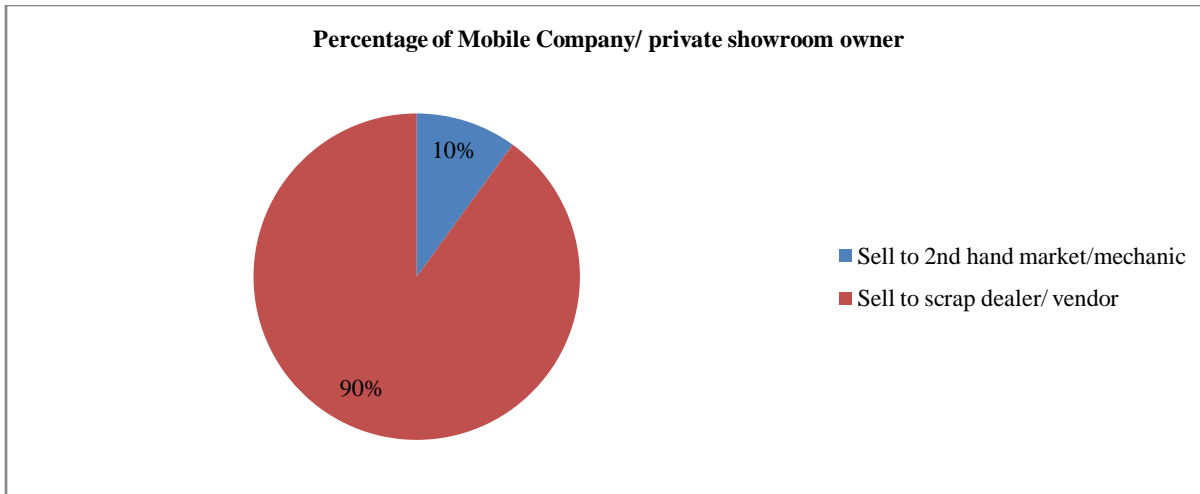


Fig 4: Result showing percentage wise distribution of mobile and accessories showroom owner/retailer according to method of e-waste management

**Result from Mobile Company/ private showroom owner:**

About 10% of mobile phone seller sells the old mobile phones exchanged from customer in second hand market or to mechanic. About 90% of the mobile phone seller sells old mobile phones exchanged from customer to scrap dealer or vendor.

**C. Suggestion given by different product seller:**

During the survey, different product seller provide different suggestion and recommendation based on their knowledge of e-waste. Based on these suggestions a table comprising different suggestions is formed as shown below.

Table 7: Data on suggestion given by different product seller:

S. No.	Seller → Suggestions ↓	Group A	Group B	Group C
1.	Increase in govt responsibility by providing training to scrap dealer and increasing e-waste collection/recycling centre	4	2	1
2.	Increase in awareness among people about e-waste and its ill effect	1	-	5
3.	Company should establish buy back channel for old used product	1	3	-
4.	Not willing to give any suggestion	4	5	4

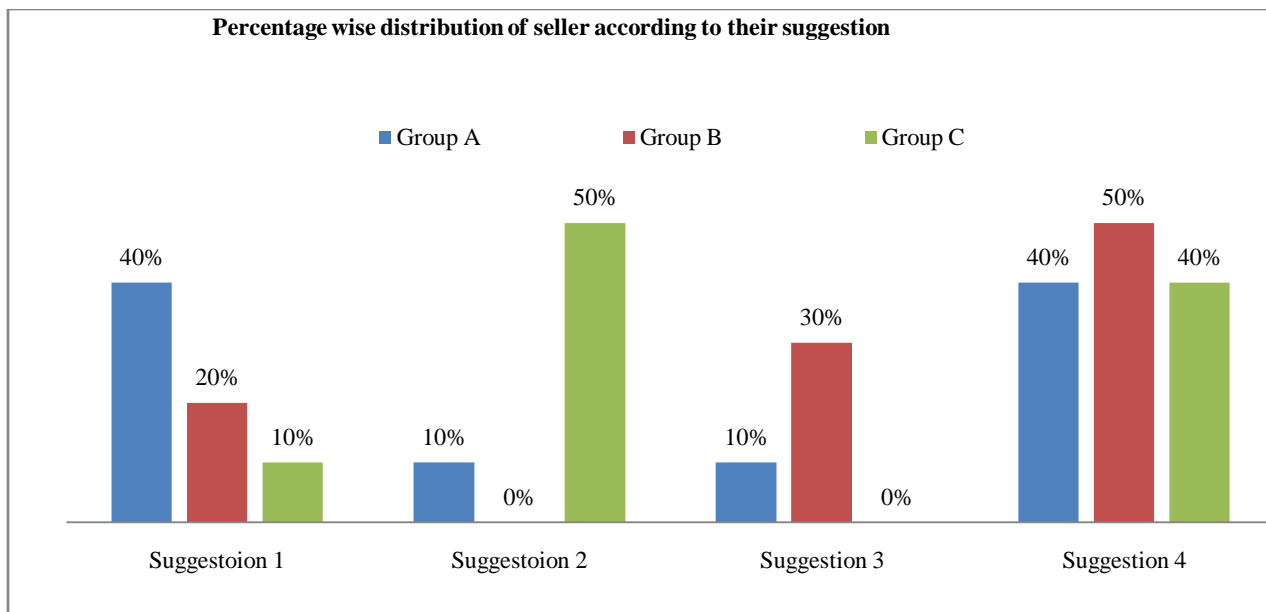


Fig 5: Result showing percentage wise distribution of different product seller according to suggestion given by them:

#### Result of suggestion given by different type of seller:

It was observed from graph that about 40% computer and peripheral seller, about 20% electrical and electronic goods seller and about 10% mobile and accessories seller suggest to increase the government responsibility by establishing more collection centre and recycling facility and by promoting door-to-door collection.

It was also found that about 10% computer and peripheral seller and about 50% mobile and accessories seller suggest to increase the awareness about e-waste among people by organizing awareness camp in school, collages, market place, offices, and in other public places. Awareness could also be increases by highlighting the ill effect of e-waste on human being and environment.

Further it was observed that about 10% computers and peripheral seller and about 30% electrical and electronic seller suggest establishing buy back facility by the manufacture. The manufacture should establish the process of taking back old and obsolete product from customer and from retailers.

It was also observed from graph that about 40% computer and peripheral seller, about 50% electrical and electronic goods seller and about 40% mobile and accessories seller are not willing to give any suggestion as most of them are company employees and are not authorised to give any such suggestion which have inverse effect on their company.

#### D. Results from scrap dealers or vendors:

As it is observed from the survey that majority of the sellers of all the three categories are managing their e-waste by giving it to scrap dealer or vendor. Therefore some scrap dealer or vendor are approached during the survey and try to find out what these scrap dealer do with the e-waste collected from households, shops and offices. The finding obtained could be described as a process which includes following steps:

**Step 1: Sourcing by informal recyclers-** In this step the e-waste is collected by informal scrap dealer from household and business. The household sell e-waste to second hand market or to showroom owner/retailers in exchange schemes. Sometimes scrap collector directly collect the e-waste from household. Informal scrap collector collects e-waste also from government organization or business firms by participating in auction or by directly approaching the offices or through exchange scheme.

**Step 2: Aggregation-** After the e-waste collected by scrap dealer they checks the material receive and divide it into three part as material which can be resold in second hand market as first part, second part include items which could be repaired or refurbished and resold and third part consist of what is to be sent for recycling.

**Step 3: Segregation & dismantling-** Those parts of e-waste which cannot be resold in original form are dismantled either by scrap collector himself or sell it to a dismantler. The dismantling of only electrical and electronic products mainly fridge, TV, and washing machine are performed at local level. Most of the computers and mobiles could not be dismantled here and are taken by e-waste collector from Delhi where dismantling is done by experts of informal sector. After dismantling the product, the components are again checked to know if any part or components could be reused. The reusable components or parts are sold at higher price as compared to non reusable part.



Step 4: Recycling- After segregating and dismantling the waste electronic product the parts which could not be resold are recycled. Each stage workers are expertise in their job and perform the specific job. Most of the recycling job is performed by informal sectors.

Although there is a availability of government authorised recycler in Indore which is the only e-waste recycler in Madhya Pradesh, most of the scrap dealer/vendor do not give the recyclable e-waste to that recycler. Instead they retain it as a dump or give it to e-waste collector from Delhi who gives them a handsome amount for that e-waste. Due to this approach of scrap dealer/vendor, this formal e-waste recycler could not get enough amount of e-waste to run its recycling plant regularly. It is the only authorised recycler of Madhya Pradesh registered under Hazardous waste (Management, Handling and Transboundary, Movement) Rules, 2008.

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### **CONCLUSION & RECOMMENDATIONS**

By performing the above analysis of data it is concluded that the responsibility should be decided at various levels. The government should develop a model through which the informal recycler could also get involved in environment friendly recycling of e-waste. The government should permit only those recyclers for taking part in auction of e-waste who perform recycling in environment friendly manner. The government should also make planes to increase the awareness among people regarding the hazardous effect of e-waste and emphasis them to give their e-waste to collector who recycle it in environment friendly manner. The companies should also spread awareness among end user about the hazardous effect of e-waste and provide proper information about disposal of product after using it along with the product. The company should also promote buy back facility for proper disposal of e-waste by the end user. For this collection and dropping centre should be open by company for customer other then the already available dealer location.

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