

# Analysis of consumer's behavior of E-waste recycling: A case study on Lucknow

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## ABSTRACT

In ongoing time, the utilization of electronic and electrical gadgets have expanded altogether, driving to exceptionally rising measures of waste electrical and electronic gadgets. Hardware industry are considered as the world biggest and quickest creating producing industry. The electronic gadgets reach at end of their helpful life they become a misuse of waste Electrical and hardware gear e-squander is a term used to depict old, finish of-life electronic gadgets, for example, versatile PCs, televisions, radios, fridge and so on. So the aim of this paper is to know about consumers' behaviors towards E-waste recycling in Lucknow. With this goal in mind a questionnaire survey was performed to explore consumers behavior, attitude and willingness to pay (WTP) for recycling of E-waste. There were 51 effective questionnaires, and the questionnaire were analyzed with principal component analysis and multinomial logistic regression analysis. The results revealed that the actual service life of E-products is generally 3-5 years. About 44% phone, 55% laptop and 62% TV waste is either stored at home or thrown as ordinary garbage. As India is a developing country so due to the current level of economic development and the traditional concept, only 47.9% of consumers agreed to pay for waste mobile phone recycling, and most consumers' WTP was 0.5% of the recycling costs. The main factors affecting the consumers' WTP were region, education level and monthly income. Therefore, producers of E-product and the government should mostly share the responsibility of waste mobile phone recycling. With an improvement in public environmental awareness, as most of the consumers do not know about "Green box Environmental program" it may be possible for consumers to afford recycling fees in the future, through either a prepaid deposit, or purchasing the product with the fee embedded in the price. In addition, it is important to support environmental education to promote environmental awareness.

**Keyword:** E-waste, recycling, survey, Lucknow

## 1. INTRODUCTION

Increased use of electrical and electronic equipment due to its consumption in the day to day life of individuals has indirectly explained the increase in the generation of e-waste. The management of e-waste has become an environmental worry in many developing countries as urbanization continues to take place. The present-day practices of e-waste management in India suffer from a number of disadvantage like unhealthy conditions of informal recycling, inadequate legislation, and poor awareness. India is facing the problem of e-waste management due to lack of awareness among people about dangerous effect of e-waste on environment and human being through informal e-waste collection and absence of implementation of rules for the process of e-waste in environment friendly manner. This paper focuses on the current status of e waste in India, problems associated with e-waste, e-waste handling practices, strategies and rules for handling e-waste. The aim of this paper is also to identify the attitude of consumers towards e-waste handling practices, e-waste disposal and e-waste recycling in some areas of Lucknow district of Uttar Pradesh. Global business outline of the several green ambitions, waste However, the area are very current with few some corporate player into India and universally. Most of these electronic waste handling sector are nowadays managed by the unorganized /informal area in India. Anyhow due to scarcity of skills, knowledge, attention, etc., the area have remained highly employment intensive, environmentally unkind and unhealthful. If complete in

the correct way, and in a systematic fashion, e-waste management can become a commanding economic sector in the world. E-waste are originate in domestic and corporates (in addition to private and government companies). As per one study 67% of WEEE are store up in USA (HP, 2005). In India, the number is probable to be considerable higher. The collation of that waste happens in various ways. The chains begin from junk dealer, and step up to regional junk dealers, field aggregators and ultimately recyclers. Corporate business houses deal their old EEE



**Fig -1 E-waste**

to second-hand buyers near different medium such as auction sale, scrap sale or open bidding. At one time e-waste is collected from its originators, it is resold or hired or sacrificed or demolished for component or sold on basis of weight to junk dealers. Most of the recycling community active in the informal division. The amount WEEE are occupied by a larger junk dealer who categorize the material as per his own comfort. The non-usable equipment is dismantled with your hands. The easily detachable component such as plastics, glass, alloy cabinets etc. are directly disposed in various markets. The extra complex component such as mother boards, assemblies, fused parts are commonly sold to an everyday recycler. Those metals were sold to smelters. In almost cases, the origin approach are so crude that the output are also contaminated. Also the efficiency of alike techniques are only about 30%. From the usable piece of the collected WEEE, some is sold directly in second hand sale, some is restore and sold as a restore product, some is donated to charity and some is rented.

## **2. MATERIAL AND METHOD**

This paper follows an exploratory methodology based on a qualitative review of the environmental and social aspects in the area of e-waste sector. An exploratory methodology was adopted due to non-availability of sufficient information on e-waste. Data collected through comprehensive analysis of qualitative data related to the topic that have been published in various Government and NGOs' reports, research papers, news articles, websites etc. In this research paper a survey has been conducted with the help of questionnaire which has total of 15 questions each regarding recycling behavior of E-waste (in this paper phone, laptop and TV has been considered), which include 51 people after that data has been analyzed by principal component analysis and multinomial logistic regression analysis method with the help of SPSS software .

**2.1 Sample size** –research includes the survey report of 51 people.

**2.2 Sample unit** – UP (LUCKNOW): There are four areas which are rural, urban, residential and commercial areas of Lucknow and have been selected, which are Mutkkipur, Lucknow municipal carp., Aliganj, Naza E-market place, so that heterogeneity of the sample can be ensured.

**2.3 Users of electronics** – Students, self-employed, salary based, govt. and private employers etc.

## 2.4 Questionnaire design:

Before the final data gathering, 51 questionnaires were distributed to consumer through a pilot survey carried out in Lucknow from January to May. Based on the feedback, a revised survey was conducted from 15 Feb to 15 May. The survey contained question on basic socioeconomic information and three other parts. The socioeconomic information included question regarding sex, age, city, education level, and monthly income. The first of the three additional survey parts uncovered consumer behaviors and attitude on recycling and treatment of E-waste. The second part aimed to investigate the consumer environmental awareness of E-waste recycling and treatment. The third part survey the consumer willingness to pay for recycling and treatment of waste mobile phone and factor influencing their willingness.

## 3. RESULT AND DISCUSSION

### 3.1 Results

We are taking lot of unavailable questionnaires via in-person questionnaires, we distributed 54 questionnaires in the 4 regions through an on-site, and home questionnaire, to ensure the sample size. We seen that total number of question which are not answered was 5, and the number of question are done by suitably was 51. The survey completing rate was about 96.7% and the people participate rate in survey was about 94.1. the main reason behind high survey completing and high participating rate was as followed (1) in the on- site method, we give lot of surprised gift and fast food and many more like free movies ticket etc. and (2) for home system people are easily give the answer because many of free and someone due to parents availability give the answer effectively. If people does not give the answer they are not able to take any gift and someone are scold by her parents.

In my survey report total male(53.3%), 21-31year old (41.5%), and junior college and bachelor (53.5%) give answer, this type of people make more interested to participate in survey, or because these people had more time to search the web site of the questionnaires. The demographic composition of the sample is presented in a survey report.

**Table -1:** Demography composition of the sample

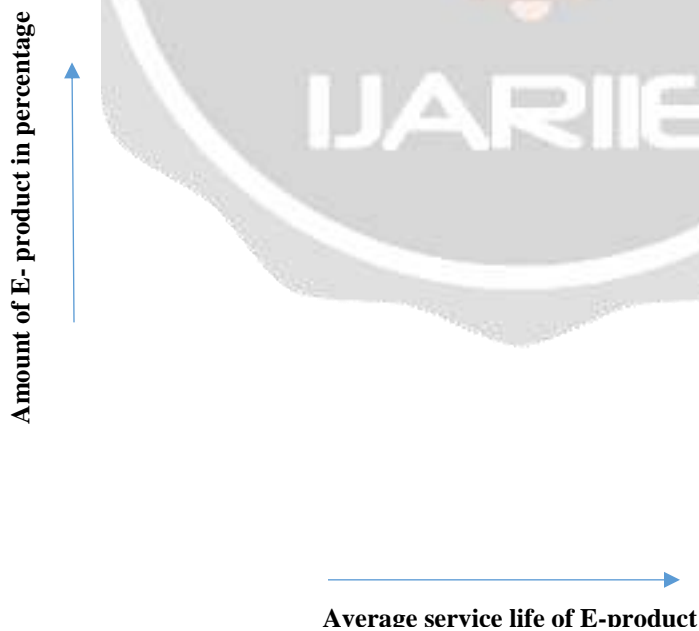
Sex	Male	28	54.91%
	Female	23	45.09%
Age	10-20	8	15.60%
	21-30	21	41.17%
	31-40	15	29.41%
	41-50 and above	7	13.72%
Monthly income	0	1	1.96%
	1-2000	11	21.56%
	2001-3000	10	19.60%
	3001-5000	9	17.64%
	5001-8000	3	5.88%

	8001-15000	17	33.33%
Education level	Senior high school	4	7.84%
	Graduate	22	43.13%
	Post graduate	25	49.01%
Region	A	11	21.56%
	B	14	27.45%
	C	10	19.60%
	D	16	31.37%
TOTAL		51	100%

**3.2 Discussion**

**3.2.1 Average service life of mobile phone, laptop and TV in India:**

Due to development of country Electronic appliance will be increase day by day, most of the people change our mobile, laptop due to fashion and more and more new specification will be added on mobile and laptop, so the outcome coming that life of mobile and laptop will be very short and in the case of tv most of thing will be seen in mobile and laptop so life of tv will be comparatively increase due to less use. According to the survey the life of phone is less than 3 year and in laptop it will less than 4 year and in TV it was about 5 year which was comparatively low to the design life of that appliances. The main problem come to change the mobile, laptop, and tv that most of them will damaged, fashine out of market and new specification increase day by day due to that average life of this electronic appliances is very less so that E-waste increase rapidly. Which are too much toxic and hazardous for environment.



**Chart -1:** Average service life of E- product by survey report



### 3.2.2 Consumers' mobile phone, laptop and TV treatment methods:

From that survey, we seen that about 25% mobile was lost or given to someone or donate it and in laptop about 35% was donate and very small one are lost and in tv about 20% given to someone. These phones, laptop and mobile again used by consumer that's why life of these electronic instrument was increase to some year. About 44% of waste mobile phones, 55% of laptop and 62% of tv are stored in home. Only 31% mobile, 10% of laptop and 18% of tv were recycled in different ways, and some amount will recycled by "Green Box Program". And some one recycled by the "Old-for-New activity". And remaining of mobile, laptop and tv were sell to second-hand markets, in that many one was not recycled by reasonably ways only someone was recycled. In the second-hand market valuable element are kept and remaining electronic appliances are sold in very small amount like village and other component are damp in open space in the environment. Many of the phone, laptop and tv are sell to private work-shop for dismantlement using outdated technology, such as acid bath or open incineration, which would cause serious secondary pollution. All of that electronic substances will be hazardous for the environment.

### 3.2.3 Factor obstruct the behavior of customers in e-waste recycling:

From my survey report, the main cause come to that why large amount of electronic gadgets are not recycled, In that most of them does not know where to send the electronic waste that's why people give waste mobile, laptop, tv to our relative. And many of them afraid to their privacy so they kept their phone to themselves. And very small amount are used as a data storage of waste gadgets.

### 3.2.4 Consumers attitude towards the low recycling rate:

From the investigation the result that the recycling rate of waste mobile, laptop and TV is very low in India. So that we asked what is reason behind that the low rate about 31% of people show that the main reason is the absence of sound recycling system. About 26%, 23%, and 15% believed that main reason behind that is weak environmental knowledge, not proper law and regulation and absence of week government management, respectively in India. Someone said that there are not large amount of publicity about e-waste management. So that it is very necessary to make a proper recycling system to improve the e-waste recycling rate, we also need to strengthen publicity through various means to raise environmental protection awareness among the general public.

### 3.2.5 Consumers preference of waste mobile, laptop and TV recycling:

If we want to improve the recycling system in India, it was too much important to made easy and acceptable recycling management system. The survey of people show that about 25%, 18% and 12% of people are willing to send their phones, laptop and mobile respectively to sell through the "Old-for-New activity", and some people want some bonus for recycling our mobile, laptop and TV. Some people think that government should make collecting sites in their area, or their mobile should be collected by government. The main cause for this selecting by people are that the collecting sites or business halls are largely distributed and close to communities, give a more easy recycling location for people. And other methods like choice of door to door collecting process are very low (13%) due to fear of privacy. And only very small amount (8%) of surveyor go to service centre because centers was too concentrated and very far from home and communities. Based on the laws and regulations encouraging WEEE to be recycled through a variety of ways, the "Old-for-New activity" should be standardized as soon as possible, and the "Green Box Program" should be given more publicity. Meanwhile, the government should build collecting sites in communities. Consequently, waste mobile, laptop and TV could be recycled effectively through these three main methods.

### 3.2.6 Consumers' recovery consciousness:

So by the use of SPSS we can make a conclusion that by the using of independent sample, the second part of survey has high reliability and discrimination and good make validity. So from the questionair analysis we make a thought that regarding the toxic, hazardous substance and much valuable metal substance contained in mobile, laptop and TV. But some people does not know about "Green Box Environmental Protection Program" and the principle of EPR. In fact, people are more knowledge about the valuable metal are present in the TV, laptop and mobile. Generally, people have very less knowledge about the E-waste recycling process. In my view government should provide more valuable knowledge about e-waste and also NGO taking participating in it for social aspect, especially knowledge about law, management policy and also recycling system of e-waste. And other thing that if we want people take large participate in e-waste recycling so it is very nessary to provide knowledge, information at regular interval in whole over the India and make large population to responsible for e- waste.

### 3.2.7 Consumers' WTP:

To the related law make the theory of EPR in relation to the issue of payment process of WEEE recycling. The one important process in EPR that the responsibility will be equally distributed in all people. It can include that key element of EPR consist of multi-stakeholder collaboration and coordination. The Management process of Recycling and Treatment of Waste Electronic Products, implemented on Jan. 1, 2011, determined that the government should provide special funds to support the recycling and treatment of waste electronic products; and other thing that consumer and producer both are pay for recycling. However, there was no any commercial responsibility requirements of sellers and consumers. Based on the experiences and study of developed countries a suitable and stable e-waste recycling system requires collaboration of stakeholders, including the government, producers, sellers, mobile telecom carriers and consumers. However, from my survey report many people does not think they should be held responsible for the take-back fees because of the tradition that in India they can obtain a bonus by selling their obsolete cell phones instead of paying recycling fees for waste mobile phone recycling. Other one, only very small consumers think that the five stakeholders mentioned above should participate jointly.

### 3.2.8 WTP:

According to the beneficiary pays principle, as the ultimate beneficiaries of production and services, people should be responsible for a part of the charge for waste laptop, TV and mobile recycling and treatment. However, 52.1% of the people from the questionnaire does not agree from that 2 due to current status of our nation's because economic condition is not good and also we are a developing country. Another 47.9% of people are agree to pay some part of money for recycling process and treatment; however, the people have different opinions regarding the payment method. Approximately 20.3% wanted to pay deposits at the time of purchase, deducting costs from the deposits and returning the remaining part when handing in their e-waste products. The remaining 11.9% of consumers were more inclined to pay the costs to the recyclers as part of the actual e-waste collection. In this case, consumers exhibited low WTP. About 65.2% of consumers' WTP was 0.5% of recycling costs, and 19.1% of consumers' WTP was 6.10%. Only a small number of consumers would accept higher take-back fees.

## 4. CONCLUSION

According to the analysis of the survey result, the following result are gives:

- (1) Although the Indian government has enacted 12 laws and regulations to manage the recycling and treatment of e- waste, a special legal framework on small WEEE aiming to encourage stakeholders to participate in waste mobile phones, laptop and TV recycling is still necessary to be developed. All of the current recycling activities in India are voluntary initiatives, and there is no guarantee that consumers will participate in the formal program because they can obtain a bonus by selling their obsolete cell phones.
- (2) This survey show that in India, the actual service life of TV is less than 5 year and for laptop it is less than 4 year and for mobile it is less than 3 years, that is shorter than the designed service life because of consumers' force demand for new functions and styles.  
Due to this large number of e- waste generated.
- (3) Generally 6 main ways that consumers will show their waste TV, laptop and mobile phones. About 54.1%, 49.5% and 47.1% of the consumers' TV, laptop and mobile phones respectively were stored at home, and most of the waste TV, laptop mobile phones will not be recycled effectively, meaning that this waste could be potentially hazardous to the environment and that the manufacture of new TV, laptop and phones would waste energy and resources.
- (4) Consumers' knowledge of regarding e-waste was very low due to weak absence of environmental publicity and education in India.
- (5) It is very important to establish a reasonable and acceptable recycling system to improve the recycling rate. The "Old-for- New activity", the "Green Box Program" and collection sites in communities were more popular with consumers in the questionnaire.

## 5. REFERENCES

- [1] Jianfeng Yin, Yingnan Gao, He Xu (2014) survey and analysis of consumer behaviour of waste mobile phone recycling Jianfeng Yin, YingnanGao, He Xu (2014) survey and analysis of consumer behaviour of waste mobile phone recycling in china (517-525).
- [2] Feng Wang, JacoHuisman, Ab Stevels, Cornelis Peter Balde(2013) Enhancing e-waste estimates: improving data quality by multivariate input-output analysis(2397-2407).
- [3] Jean-Daniel M. Saphores, Oladele A. Orgunseitan, Andrew A. Shaprio(2012) Willingness to engage in a pro-environmental behavior: an analysis of e-waste recycling based on a national survey of U.S. households(49-62).
- [4] I.C. Nnorom, j. ohakwe, o. osibanjo(2009) Survey of willingness of residents to participate in electronic waste recycling in Nigeria – a case study of mobile phone recycling(1629-1637).

