

# Mobile Ecosystem in Delhi-NCR: A Perspective of Consumer Awareness towards E-Waste

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**Abstract:** Information technology is an indispensable part of people from every walk of life. Our dependence on variety of electrical and electronic equipments is an outcome of increased consumerism and availability of new and inexpensive low-cost technology. Though this has made our life easy but it results in unimaginable accumulation of waste referred as waste from electrical and electronic equipment or WEEE. This e-waste is one of the major contributors to the municipal waste in the cities of India. Among electrical appliances, mobile phones play significant role in overall e-waste generation. E-waste generation from mobile phones is estimated to be 1,700 tones in India only. It holds major concern among researchers as e-waste generated from mobile phones has not only deleterious effects on health but it is also a source of some of the valuable metals including gold and copper. In India, it is estimated to be 980 million subscribers of the mobile phones which reflect the rapid and low cost development of electronic device technology. Mobile phones are now a day's fastest growing e-consumables. However most of the people are not aware about the health hazard effects of the mobile phones. Through this paper, we attempt to study the consumption pattern of phones among the users of Delhi and NCR region followed by the awareness about the e-waste generation.

**Keywords:** E-waste, mobile phones, Electronic and Electrical Equipment, Delhi-NCR region

## 1. INTRODUCTION

Waste from Electrical and Electronic Equipments (WEEE), also known as E-waste is one of the fastest growing types of hazardous waste globally. E-waste comprise a broad and growing range of electronic devices ranging from large household appliances such as washing machines, refrigerators, tubes, bulbs, stereos, mobile phones etc. WEEE is considered as hazardous waste as it contains many toxic ingredients. It is a source of heavy metals and harmful chemicals which not only contributes towards the environmental pollution but also damage human health when it is processed or disposed of [1]. E-waste contains materials such as lead, mercury, cadmium, beryllium and

hazardous chemicals such as Brominated Flame Retardants (BFR) and Polyvinyl Chloride (PVC). These hazardous substances cause serious pollution and put workers at risk of exposure when they and their components are produced or discarded. Growing children and pregnant women are at greater risks as some of these heavy metals are highly toxic and can have deleterious effects on children and developing fetuses even at very low level of exposure. Hence, e-waste requires extra care to handle them and also special recycling methods to avoid its toxic effects on environment and human health.

In the last few decades, the global market of electronic equipments continues to grow exponentially. People are now becoming more and more dependent on these electronic products. Lifespan of these electronic and electrical products has become shorter. People are frequently buying, changing and upgrading electronic products. Moreover because of availability of many newer cheaper varieties, these products become affordable and people prefer to purchase rather than repair this equipment [2]. In India, increased demand for the key products like computers, TV, mobile phones in last 5-10 year has been responsible for the increasing amount of e-waste generation. According to the ASSOCHAM Expert Committee on Environment, the total e-waste generated in India amounts to approximately 150,000 tonnes per year [3]. The present data on e-waste generation suggests that mobile phones and computers have the highest rate of disposal. Hence, they are the major contributors of the total e-waste generated. In one of the study, it has been estimated that India's mobile subscriber base is expected to touch 450 million by 2015. According to the recent press release by Telecom Regulatory Authority of India (TRAI), there are 1006.96 million total telephone subscriber in India out of which 980 million are mobile phone subscribers. Urban subscriber have a share of 563 million and rural subscribers 417 million among these mobile phone users. [4]. This very high number of subscribers in India reflects the rapid and low cost development of electronic device technology. In another study, it has been estimated that by 2020, mobile phones will be one of the major contributor towards e-waste

generation. E-waste from the discarded mobile phones will grow 18 times than its level in the year 2007 [5]. This is a serious problem as most of the e-waste generated from the mobile phones is not recycled properly and either dumped in household or given to informal sectors such as *Kabariwalas*. These informal sectors sell these mobile at very low price to buyers who tried to extract valuable metals from these mobiles. This improper method of disposal leads to release of hazardous chemicals results in deleterious health effects on the workers.

Managing the increasing volumes of e-waste effectively and efficiently is therefore a complex task. Special logistic requirements are necessary for collecting them followed by their proper disposal. To reduce the harmful effects of e-waste generated specifically from the mobile phone on human health, it is important to educate people about e-waste and its proper disposal system. Keeping this in mind, through this research work, we attempt to study the consumption pattern of mobile phones among the consumers of Delhi and NCR region. We also tried to study the awareness among the people about the e-waste and its effects.

**2. METHODOLOGY**

**2.1 SURVEY ANALYSIS**

We have conducted a survey among the people who owned mobile phones, to collect data based on sample statistics of non-probability and convenience samples using random sampling. There were approximately one thousand respondents from Delhi and one thousand from NCR region of Faridabad and NOIDA. People selected were from different sections of the society and they were asked questions based on the following:

- a) gender b) age and occupation c) first/second hand mobile usage d) type of mobile used (branded/local) e) frequency of changing mobile f) awareness of waste g) behavior and awareness towards e-waste recycling in organized/unorganized sector and medical side effects if any over prolonged use of mobiles h) attitude towards recycling of unused electronic products.

We tried to collect data from different sections of the society such as urban, rural and slums with the aim to have a uniform data across the different strata of the society. As per the population census of 2011, New Delhi has a population of the order of 1,68,000,00, NOIDA and Faridabad has a population 1,648,115 and 1,809,733 respectively [6]. Due to the constraints of time, finances and human resources, random sampling technique is preferred by researchers for such large populations. While using random sampling, a confidence level of 95 percent is chosen to give a margin error of 0.05. For a finite population, the minimum sample size estimation was carried out using Krejcie&Morgan formula [7]. The sample size for the given population is calculated as 768 for Delhi. Calculated sample size of

NOIDA was 384 and Faridabad was also 384. Respondents to our survey from Delhi were 996, from NOIDA 527 and Faridabad was 447 which satisfy the condition of sample size. A detailed entry of the data sheets; each having questions mentioned above was carried out and analysis of these data was done using SPSS 17 statistical analysis tool.

**3. RESULTS AND DISCUSSION**

In Delhi 71.8% male and 28.2% female, in Faridabad, 80.3% male and 19.7% female and in NOIDA 78.6% male and 21.4% female respondents participated (Table 1). Possible reason for less female respondents could be their inhibition to interact with surveyors.

**TABLE 1: Percentage of Male and Female Respondents**

Region	Response in %	
	Males	Females
DELHI	71.8	28.2
NOIDA	78.6	21.4
FARIDABAD	80.3	19.7

The respondents were asked about their awareness towards e-waste. As shown in Table:2, it was observed that, among the people of Delhi responded, 69.46% of people were aware about e-waste. It was also observed that respondents from NOIDA were more aware about e-waste in comparison to respondents of Faridabad.

**TABLE 2: The response to question: Do you know what e-waste is?**

Region	Response in %	
	Yes	No
DELHI	69.46	30.34
NOIDA	61.49	38.51
FARIDABAD	26.91	73.09

43.5% respondents from Delhi, 54.4% from Faridabad and 46.9% from NOIDA were in the age group of 18-25 years. We are aware that India is a very young nation where more than 51% of population is under 25 years of age [8].

The respondents were also asked about the frequency of change in the mobile phones being used by them. As shown in Table: 3, 38.7% in Delhi, 26.6% in Faridabad and 55% in NOIDA had changed their mobile phone less than a year ago. It was also observed that majority of respondents had changed their mobile either less than one year ago or between one or two years. It has been reported previously that in the low-income households in Chennai, a large metro city in South of India; usage of mobile phones is 2.34 years

while in upper income class usage of mobile phones is for 1.63 years [9].

This attitude of frequent changing of mobile phones can be considered as one of the contributor towards accumulation of e-waste. Moreover, this also reflects the fact that it is now easier and more convenient to replace these electronic products than to repair them. People are also not aware about the ill effects of these electronic gadgets. In response to query about the environment and health hazardous effects

of these electronic products; it has been observed that in both NOIDA and Faridabad region respectively more than 80% respondents were not aware about their deleterious effects. In Delhi region also only 42.66 % of people were aware about the ill effects of e-waste. It was observed that people from west region of Delhi have more awareness about the environment and health impact of e-waste compared to people live in North, East and South region respectively (table:4).

**TABLE3: The response to question: How frequently you change your mobile phone?**

Region	Year of purchase of mobile phone in %			
	Less than one year ago	Between one and two years ago	Between two and three years ago	More than three years ago
DELHI	38.7	31.9	15.5	13.4
NOIDA	55	26.8	11.3	6.4
FARIDABAD	26.6	39.1	18.6	14.1

**TABLE 4: Response of people from different regions of Delhi with regard to awareness about ill effects of e-waste.**

Region in Delhi	Percentage of people aware about the ill effects of e-waste on Environment and Health
WEST	31.22
NORTH	25.34
EAST	23.08
SOUTH	16.74

Lack of awareness about the ill effects of the end-of-life products (e-waste) is the major concern in India [10]. Many consumers do not dispose of or recycle unused electronics items since they think that products still have some value [11]. E-waste management is practiced by the industrial sector but it is at the domestic or household level that e-waste management is an issue [12]. In order to reduce the adverse effect of these electronic products on both environment and health, it is very important that policy makers, manufacturers and the government prioritize awareness creation among the consumers about health and environmental impact of e-waste.

Recently Delhi Pollution Control Committee (DPCC) has given consent to 22 e-waste collection centers to establish common facility for the collection, segregation and storage of e-waste without dismantling them [13]. However there is still lack of knowledge and awareness on the issues of e-waste handling and management. Thus it is important to sensitize consumers not only to reuse and recycle electronic products but also to dispose them in formal sector.

**7. CONCLUSIONS**

In order to reduce the adverse effect of these electronic products on both environment and health, it is very important that policy makers, manufacturers and the

government prioritize awareness creation among the consumers about health and environmental impact of e-waste.

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