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Perception of households of kolkata about e-wastes and its management

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Abstract

With the advancement of technology and throwaway culture among the consumers, electronic waste or simply e-waste has become a great threat for the environment if not handled properly. Kolkata has become a major e-waste generator in India. The consumers or users of e-goods are also responsible for a proper e-waste management process. The aim of the paper is to find out the perception of four types of households of Kolkata (slum, house owner, flat owner and rented household) about e-waste and its management. 192 households of all the 16 boroughs of Kolkata are interviewed to find out their opinion, practice, future plan and awareness about e-waste and its management. The study found that households of Kolkata are not at all aware about e-waste management though they know that e-wastes are harmful in nature.

Keywords: e-waste, e-waste management, household, Kolkata

1. Introduction

Electronic Waste or E-waste is now becoming a major 'hi-tech' environmental problem. StEP white paper 2014, defined E-waste as—"a term use to cover items of all types of electric and electronic equipment (EEE) and its part that have been discarded by the owner as waste without the intension of re-use". E-waste or electronic waste, therefore, broadly describes loosely discarded, surplus, obsolete, broken, electrical or electronic devices (RajyaSabha, 2011). ASSOCHAM-cKinetics study, 2016, revealed that the global volume of e-waste generated is expected to reach 130 million tons in 2018 from 93.5 million tons in 2016 at a compound annual growth rate of 17.6 percent.

The ASSOCHAM-Frost & Sullivan study (2016) found that India's electronic waste is likely to reach 30 lakh metric tonnes (MT) per year by 2018 from the present level of 18.5 lakh metric tonnes (MT) with a CAGR of 27.34%.

UNEP report 2005 revealed that –"every year 20-50 million tones of electrical and electronic scrap generated worldwide" which could bring serious risk to human health and the environment as the e-waste typically coming from hardware comprises of aluminium, cadmium, mercury, brominated flame-retardants, complex plastic blends and lead (UNEP report-2010). Due to the lack of governmental legislations on e-waste, standards for disposal and proper mechanism for handling, these toxic hi-tech products, mostly end up in recycling yards in developing countries like India and China, where poorly-protected workers dismantle them, often by hand, in appalling conditions (Vinutha, 2005).

Kolkata is the biggest and the most important commercial center in eastern India and one of the most populous cities of India. The city has also become a major hub of electronic wastes. Study showed that in 2016, Kolkata accounted for 55000 tons of e-waste and ranked fifth position (ASSOCHAM- Frost & Sullivan study, 2016) and from 2014 to 2016, the CAGR of Kolkata generated e-waste has been computed as 25.36% while for the first generator of e-waste- Mumbai, it is 11.80%.
Previous study disclosed that only House-holds of Kolkata produced approximately 1030MT of computer generated e-waste annually (Toxic link & Jadavpur University joint study.-2007). Thus, it is the need of the hour to assess the level of awareness and knowledge of households of Kolkata about e-wastes and its management.

2. Review of Literature

Joy and Chandrasekhar (2017) found that there is significant association between the Educational Qualification and the e-waste disposal methods

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followed by the households of Tamilnadu. They also said that most of the households prefer to buy new products rather used products because of the availability of umpteen electronic appliances at cheap and affordable prices.Toxic link (2016) disclosed a large number of Kolkatans feel that the Government should be solely accountable and responsible for a proper e-waste management. Saritha et al (2015) showed that the majority of respondents of Visakhapatnam articulated that they would exchange their old devices for newer ones every time they wanted to upgrade. KAM-GTZ study (2010) found that the obsolescence rate of the lower income group i.e. SEC C was higher as compared to SEC A & B. Toxic link & Jadavpur University joint study (2007) revealed that there is a very little awareness among the consumers of Kolkata regarding the hazards of improper disposal of EEE.

3. Objectives

The objective of the paper is to analyse the perception of households of Kolkata about e-wastes and its management

4. Materials and Methods

Due to high rate of obsolescence, the study is restricted on waste generated from personal computer and its peripherals, cellular phones, refrigerators, and television sets.

4.1 Data Collection

Data for the study are collected from both the primary and secondary sources.

4.1.1 Primary data

Primary data are collected on the basis of structured questionnaires administered to 192 household of Kolkata.

4.1.2 Secondary data

Secondary data are collected from books, journals, Govt. laws and announcements as well as relevant electronic media.

4.2 Sampling Method

Multi-stage sampling method is used for Household survey. Kolkata is divided into 16 Boroughs (source-kmcgov.in). Simple random sampling method is followed to select three wards from each Borough. Households are divided into four types as per their place of residence- slum, house owner, flat owner and rented house. Convenience sampling method is used to choose one respondent from each type of household from each ward.

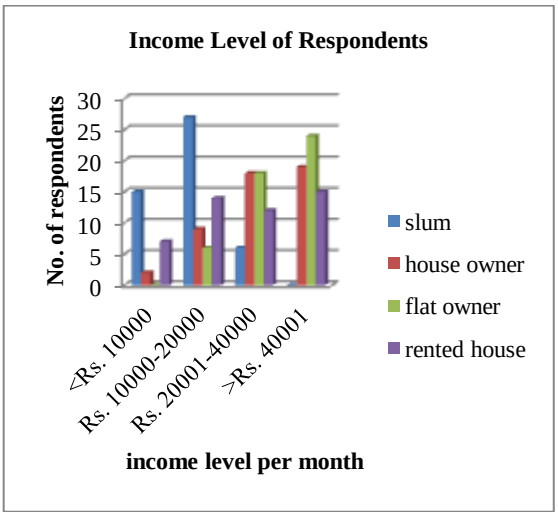
4.3 Sample Size

(16*boroughs*3 wards*4HHs) = 192

5. Results and Discussions

5.1 Demographic profile-

Chart-1

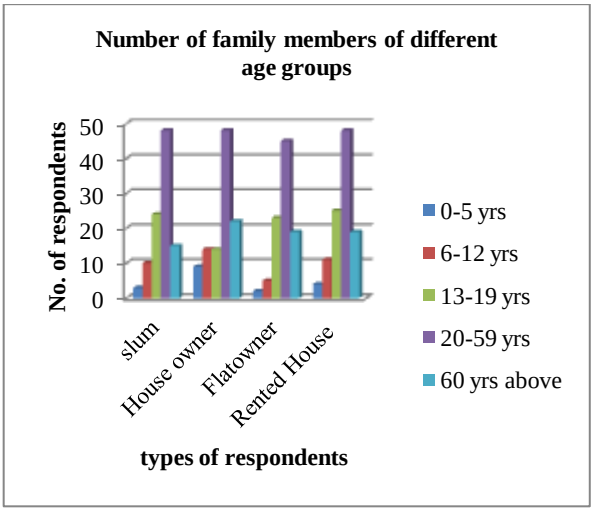


Source- primary data

Chart-1 shows that for <Rs 10000 monthly income levels, most of the respondents are slum dwellers. For other three levels i.e. Rs 10000-20000, Rs 20001-40000 and > Rs40000, most of the respondents are slum dwellers, house owner-flat owner jointly and flat owner respectively.

Chart-2 showed number of family members of different age groups in each category of household. It was found that for each category the highest number of family members fall under the age group of 20-59 years and the lowest number fall under the age group of 0-5 years.

Chart-2



Source- primary data

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5.2 Perception of households of Kolkata about e-wastes and its management-

Primary data revealed that within the last 5 years mobile phones are discarded mostly by all the categories of households of Kolkata. For slum dwellers, House owner, flat owner and rented house resident it is 62.5%, 72.91%, 60.41% and 58.33% respectively.

Table-1
Cross tabulation of discarded e-goods (last 5 yrs)

HH Types	E-goods			
	T.V.	Refrig-erator	Computers & its peripherals	Mobile phone
Slum	13 (27%)	4 (8.33%)	4 (8.33%)	30 (62.5%)
House owner	14 (29.16%)	11 (22.91%)	11 (22.91%)	35 (72.91%)
Flat owner	16 (33.33%)	18 (37.5%)	9 (18.75%)	29 (60.41%)
Rented house	19 (39.58%)	9 (18.75%)	3 (6.25%)	28 (58.33%)

Source- primary data

By analyzing the method of discard it was found that most of the household preferred to exchange the e-waste for a new purchase. For slum dwellers, House owner, flat owner and rented house resident it is 62.50%, 77.08%, 70.83% and 62.50% respectively. Except for the rented house residents the second preference is to sell the discarded e-wastes to scrap dealer. Rented house residents preferred to keep e-wastes in the house with other unused things.

Table-2
Cross tabulation of method of discarding e-wastes

Method of discard	HH types			
	slum	House owner	Flat owner	Rented house
Throw it in municipal vat	5 (10.41%)	5 (10.41%)	10 (20.83%)	1 (2.08%)
Sold to kawadiwala	4 (8.33%)	6 (12.5%)	1 (2.08%)	6 (12.5%)
Sold to scrap dealer	15 (31.25%)	25 (52.08%)	31 (64.58%)	4 (8.33%)
Exchanged for a new purchase	30 (62.50%)	37 (77.08%)	34 (70.83%)	30 (62.50%)
Returned to manufacturer	0 (0%)	0 (0%)	0 (0%)	1 (2.08%)
Gave it to someone	1 (2.08%)	0 (0%)	0 (0%)	5 (10.41%)
Kept in the house	5 (10.41%)	10 (20.83%)	0 (0%)	19 (39.58%)

Source- primary data

Study found the reasons behind the discarded e-goods are – 'it was not functioning' and for 'technology changed'.

Only 4 (2%) respondents have knowledge that their locality have e-waste drop box though 14 e-waste collection bins were established in various places of Kolkata under the European Union commissioned SWITCH Asia project for Establishing E-Waste Channels to Enhance Environment Friendly Recycling (WEEE Recycle), 2015. Out of that, only 1 respondent has thrown e-waste in drop box which indicates that the awareness level is very poor. The Mean year of e-waste left indisposed for slum stood as 1.645 while for house owner it is 2.062. For flat owner and rented house residence they are 1.77 and 1.645 years. May be the house owner is having sufficient place in his residence than the other three types to keep the e-waste indisposed.
Table 3 showed that the main reason of not having disposed the e-waste for slum household, house owner and rented households are 'not yet given it a thought'. For flat owner it is 'Not aware of any authorized disposal agent'.

Table-3
Cross tabulation of reasons for not disposing e-wastes

Reasons for not disposing e-wastes	HH types			
	slum	House owner	Flat owner	Rented house
Not aware of any authorized disposal agent	9 (18.75%)	15 (31.25%)	14 (29.16%)	9 (18.75%)
Not yet given it a thought	16 (33.33%)	18 (37.5%)	11 (22.91%)	17 (35.41%)
not generating enough e-waste to dispose	10 (20.83%)	9 (18.75%)	5 (10.41v)	8 (16.67%)
Others	1 (2.085)	4 (8.33%)	6 (12.5%)	4 (8.33%)

Primary data revealed that 73% of the respondents are aware that e-wastes are associated with health risks and 84% household knows that e-wastes pose a serious threat to the environment. Only 26% of them have knowledge about national or international laws pertaining to e-waste management.
Their future plans about the discarded electronic equipment depict that they would like to exchange it with new equipment. The result comes as 50%, 44%, 635 and 53% for slum dwellers, house owner, flat owner and rented house residents respectively.

Cluster Analysis of Respondents

- **Cluster 1**

This cluster consists of 35 respondents who believe that India does not have laws sufficient to regulate e-wastes. They also believe that it is profitable to reuse or resale e-wastes. They are not very clear about present e-waste disposal system. They also think that e-waste is not a significant problem and it is manageable.
Incidentally, this cluster is dominated by slum dwellers with monthly income less than Rs. 20000.

- **Cluster 2**

This cluster consists of 30 respondents who believe that e-waste management is not important for them since they produce very little e-waste. They also believe that it is profitable to reuse or resale e-wastes though they think that e-waste is somehow a serious problem. They are not very clear about laws to regulate e-waste and present e-waste disposal and management system.
Incidentally, this cluster is dominated by slum dwellers, flat owner and the residence of rented house with monthly income more than Rs. 20000.

- **Cluster 3**

This cluster consists of 33 respondents who believe that e-waste management is not important for them since they produce very little e-waste and also believe that it is not profitable to reuse or resale e-wastes. Though they agree that e-waste is a serious problem and present e-waste disposal system is not sufficient for its management. They are not very clear about laws to regulate e-waste and the possibility to manage e-waste effectively.
Incidentally, this cluster is dominated by slum dwellers with monthly income less than Rs. 20000.

- **Cluster 4**

This cluster consists of 60 respondents who believe in the possibility to manage e-waste effectively and agreed that e-waste is a serious problem. They also agreed that e-waste management is important for them though think that it is profitable to reuse/ resale e-waste. They also think that the present e-waste disposal system is not sufficient for its management. They are not very clear about laws to regulate e-waste.
Incidentally, this cluster is dominated by house owners with a high monthly income i.e. more than Rs. 40000.

- **Cluster 5**

This cluster consists of 34 respondents who think that India does not have laws sufficient enough to regulate e-wastes. They agreed that as e-waste is a serious problem, its management is also important to them though present disposal system of it is insufficient for its management. Therefore they believe that it is not possible to manage e-waste effectively and think that it is profitable to reuse/ resale e-waste
Incidentally, this cluster is dominated by Flat owner with a moderate monthly income of Rs. 20001-40000.

Factor Analysis

Factor analysis was done on the responses on 6 variables received from the respondents. The variables are as under:
V1= It is possible to manage e-waste effectively
V2= It is not profitable to reuse/resell e-waste
V3= India does not have laws sufficient enough to regulate e-waste
V4= E-waste is not a serious problem
V5= E-waste disposal system available at present is sufficient for its management
V6= E-waste management is not important for us since we produce very little e-waste

Four factors (identified on the basis of Eigen value=>1) explain over 78% of the variance of the data.
1st principal factor (F1) consists of variables 4 and 6 with factor loadings of 0.827 and 0.836 respectively. This principal factor can be renamed as “E-waste is not a significant problem”.
2nd principal factor (F2) consists of variables 3 and 5 with factor loadings of 0.750 and 0.727 respectively. This principal factor can be renamed as “E-waste management system”.
3rd principal factor (F3) consists of variable 1 with factor loadings of 0.974.
4th principal factor (F4) consists of variable 2 with factor loadings of 0.971.

From this Exploratory Factor Analysis we can infer that users of electronic goods in Kolkata believe that e-waste is not a significant problem. Their knowledge about present e-waste management and regulations are not adequate. Again they think that it is possible to manage e-waste effectively and lastly, they think that it is not profitable to resale or reuse e-wastes.

6 Conclusions

The changing lifestyles of people, urbanization and globalization of economy have lead to increasing rates of consumption of electronic products yet the life span of the product is becoming limited. This results in corresponding increase in electronic scrap or electronic waste. Kolkata ranked fifth in terms of e-waste generator in India. Unfortunately, the households of Kolkata are not aware of the hi- toxic e-waste and its management. They don’t think that

e-waste is a problem. Even they have lack of knowledge towards e-waste management laws. The four types of households of Kolkata- slum, house owner, flat owner and rented household- all of them prefer to exchange the discarded e-goods for a newer one instead of throwing it in the e-waste drop boxes.

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