DOI : 10.18843/ijms/v5i2(4)/14 DOI URL :<u>http://dx.doi.org/10.18843/ijms/v5i2(4)/14</u>

An Analytical Study on Households Awareness and Issues of E-Waste in Coimbatore City

Dr. M. Anbukarasi,

Ms. M. Nithyasri,

Assistant Professor, Department of Commerce, Bharathiar University, Coimbatore, Tamil Nadu, India. Ph.D Research Scholar (PT), Department of Commerce, Bharathiar University, Coimbatore, Tamil Nadu, India.

ABSTRACT

Electronic waste (E-Waste) is one of the growing waste streams globally. Managing and recycling of these wastes have a greater challenge to the society. The present study is being confined to assess the awareness and issues of E-waste among the households. For the purpose of data collection the study utilizes a structured questionnaire of 100 household respondents on convenient basis. Percentage analysis, ANOVA and ranking technique were used to analyze the data. The findings of the study state that there is a lack of awareness among the households with regard to the hazardous components, handling technique, agencies and regulations with regard to E-waste. The educational level of the household respondents plays a significant role towards the awareness of E-waste management.

Keywords: E-Waste, Awareness, Households, Components.

INTRODUCTION:

The usages of Electrical and Electronic Equipment (EEE) have grown wide in the global arena and this has increased the manufacturing activities. The information technology sector also plays a vital role towards the development of electronic market and with also a coupled reason of urbanization and industrialization. Globally the Electronic Industry has accounted a growth rate of 4% during 2017 (Statista, 2018). This has paved a way to produce electronic waste. India being the developing nation have identified as the fifth largest producer of E-Waste accounting to 18.5 lakh metric tonnes each year and also as a dumping site by the developed nations (Dr. Sindhu Bala and Sukirti Goel, 2012). E-waste can be defined as used electronics which are destined for reuse, resale, salvage, recycling, or disposal. India's dramatic economic growth has largely promoted the domestic market for a variety of electronics, most notably mobile phones, personal computers, televisions, refrigerators, and washing machines. However, upon purchase of new products, most consumers do not know about the proper methods for disposing of the older product.

Developing countries like India, today, is burdened with the colossal problem of E-waste which is either locally generated or internationally imported, causing serious menace to human health and environment. The hazardous components in Electrical and Electronic Equipment are a major concern during the waste management phase. In the context of India, Recycling of Waste Electrical and Electronic Equipment is not undertaken to an adequate degree. Thus, unused electronics lie unattended in homes, offices, and warehouses until they are eventually mixed in with regular waste and dumped in landfills.

However, it seems that most countries, except for those in Europe, have been slow in implementing effective strategies that comply with Waste Electronic and Electrical Equipments (WEEE) regulations, which also originated in Europe. Handling of WEEE in developing countries is largely done by the informal sector, which often utilizes repair and reuse practices that are harmful to health. In both developed and developing nations, the land filling of WEEE is still a concern; in India, most landfills are not well equipped to handle such waste, and

thus can promote air, water, and soil pollution. With the projected growth of e-waste streams in this country, management solutions will become ever more necessary in the coming years.

Hence, the present study has a focus on household awareness and problems in relation to E-Waste in Coimbatore City.

REVIEW OF EARLIER STUDIES:

Genandrialine L. Peralta and Psyche M. Fontancy (2006) have made a study on issues and measures of E-waste in Phillippines. The estimate of current and future quantity of E-waste on Televisions, Refrigerators, Air Conditioners, Washing Machines and Radios has been used. Secondary data source from National Statistics Office (NSO) have been collected to carry out the study. The estimates state that at the end of 2005, approx 2.7 million units become obsolete and about 1.8 million units would be land filled. The results derive that several measures have to be taken to tackle the E-waste issues such as buy-back policies, establishing and strengthening of recycling centres which may help to divert the E-waste from landfills.

Heinz Boeni, Uca Silva and Daniel Ott (2008) have made a study to know about the global Information and Communication Technology (ICT) trade, E-waste quantities and generation in Latin America. The study also concentrates on its framework and policy principles and recycling infrastructure, its major challenges and socio-economic potentials. The study found that Televisions reached 45 millions, computers 230 millions and mobile phones by 1 billion during 2006 globally and also estimated that 4.1 million tons of computer wastes in 2010 contain about 64 tons of gold, 84 thousand tons of copper and 264 thousand tons of lead. The study also concluded that Extended Producer Responsibility (EPR) models need to be tailor-made to different levels of economy and collective responsibility to be encouraged.

Korin Franklin (2011) made a study to determine Wisconsin Business and Institutions electronic waste awareness levels and disposal practices. The study utilizes online survey method and the responses were received from businesses and institutions located in 51 out of 72 countries in Wisconsin with 130 respondents. The study found that understanding of E-waste regulations lags behind awareness of E-waste issues and varies by industry, location and size of firm among these entities.

Anthony Okoye and Chijioke Odoh (2014) have made a study to analyze the awareness level of the regulation, mode of their disposal and the dangers in improper handling of E-waste. The study consists of 176 samples of which 11 were importers, 55 samples were scavengers and the rest 110 samples of household individual respondents of Onitsha, South-eastern Nigeria. The study revealed that scavengers, importers do not follow government regulations and low among selected householders. It also found that importers, scavengers and households are much concerned with environmental conditions and are not aware of harmful content of electronics.

Dr. Mandira sikdar and Ms. Sohini Vaniya (2014) have a study to ascertain the awareness of E-waste and recycling of these wastes of higher secondary students of English medium schools at Anand City, Gujarat. For the purpose of the study 258 samples were randomly selected from standard X1 of Anand City during the academic year 2010-11. The present study have found that the awareness of E-waste among the students are more in a positive direction and regarding recycling of E-waste was found to be satisfactory only.

Orhan Ercan and Kadir Bilen (2014) aimed to investigate that E-waste awareness level and environmental attitude of primary school students. The study was conducted using 250 random samples. The data was analyzed using t-test and ANOVA. The findings of the study reveal that the type of school and the income level of the students' families cause significant differences in their environmental attitudes. The study also concluded that there is a statistical difference in environmental attitudes of students in regard to battery as an electronic waste. Therefore, majority of the students are aware of copper material present in the electronic products and have also noticed the warning symbols and signs.

Statement of the Problem:

The discarded and unused electronic equipments mostly end up with landfills and open burning. In India majority of the E-waste is recycled by the informal players like scavengers who have a direct contact with the households. This is due to lack of awareness among the individual households and strong regulations on importation on managing E-waste. The issues on managing and handling E-waste play a vital role in India. Hence, the present study has made an attempt to analyze the awareness level and issues on managing E-waste in Coimbatore City.

OBJECTIVES OF THE STUDY:

- > To assess the awareness of e-waste among the household individuals of Coimbatore city
- \succ To analyze the issues with regard to E-waste.

RESEARCH METHODOLOGY:

Sources of Data:

Since the primary objective of the study is to assess the awareness level and the issues in regard to E-waste among the individual households, the required primary data is being collected from the households using a structured questionnaire by targeting the households in Coimbatore city. Despite, the study also employs the secondary data and the secondary source is being collected through magazines, journals, published articles and internet websites.

Sampling Design:

In the present study convenient sampling was adopted and accordingly 100 households were selected on convenient basis.

Analysis of Data:

For the purpose of evident analysis the researcher had employed percentage analysis, ANOVA and ranking.

Limitations of the study:

- Since the present study is confined only to the Coimbatore city, the result may/may not be applicable to the universe.
- The study is being limited only to the households and has not targeted the dealers or other players of electronic waste

ANALYSIS AND INTERPRETATION:

Table 1: Demographic Profile of the Respondents

Demographic Profile	Variables	No of Respondents	Percentage
	21 Years- 30Years	28	28
A ===	31 Years- 40Years	42	42
Age	41 Years- 50Years	19	19
	Above 50 Years	11	11
Condor	Male	29	29
Gender	Female	71	71
	Illiterate	3	3
	School Level	38	38
Educational Qualification	Graduate	44	44
	Post Graduate	6	6
	Professional	9	9
	Housewife	40	40
	Private Employee	42	42
Occuration	Govt Employee	5	5
Occupation	Business	5	5
	Professional	7	7
	Agriculture	1	1
	Single	18	18
Marital status	Married	77	77
	Widow	5	5
	2	8	8
Number of members	3	22	22
Number of members	4	48	48
	Above 4	22	22
	Panchyat	3	3
Noture of Decidence	Town Panchyat	18	18
Nature of Residence	Municipality	12	12
	Corporation	67	67

Demographic Profile	Variables	No of Respondents	Percentage	
Nature of living	Own House	55	55	
	Rental	40	40	
	Lease	5	5	

Source: Primary Data

Interpretation:

The above table infers that 42 per cent of the respondents belong to the age group of 31 years-40 years, 28 per cent of the respondents are 21 years-30 years, 19 per cent of the respondents are 41-50 years and the rest 11 per cent of the respondents are above 50 years of age. The majority 71 per cent are female and the rest 29 per cent of the respondents are male. It is also been inferred that 44 per cent of the respondents belong to the education qualification as graduates, 38 per cent in school level, 9 per cent are professionals, 6 per cent as post graduates and the rest 3 per cent of the respondents are illiterate.

The table also reveals that 42 per cent of the respondents are in the occupation as private employee, 40 per cent are housewife, 7 per cent are professionals, 5 per cent are in the occupation as government employee, business and the rest 1 per cent belong to agriculture. 77 per cent of the respondents are married, 18 per cent are single and the rest 5 per cent of the respondents are widowed.

It is also revealed that 48 per cent of the respondents have 4 members in their family, 22 per cent have 3 members followed by above 4 and the rest 8 per cent have 2 members in their family. The majority 67 per cent of the respondents resides in corporation limits, 18 per cent in town panchyat followed by 12 per cent in municipality limits and the rest 3 per cent resides in panchyat limits. 55 per cent of the major respondents' lives in own house, 40 per cent in rental house and the rest 5 per cent of the respondents live in leased property.

Category	Scales	No of Respondents	Percentage	
E Wasta	Yes	57	57	
E- waste	No	43	43	
WEEE	Yes	2	2	
WEEE	No	98	98	
	Agencies			
Fourth Songo Dooyolo Dyt Ltd	Aware	20	20	
Earth Sense Recycle Pvt Ltu	Not Aware	80	80	
Electronic Decusiine Schutions	Aware	28	28	
Electronic Recycling Solutions	Not Aware	72	72	
Crean Dhaami	Aware	26	26	
Green Bhoonn	Not Aware	74	74	
Mieroscience	Aware	20	20	
Microscience	Not Aware	80	80	
ŀ	Regulations			
E. Weste (Management) Bules 2016	Aware	20	20	
E – waste (Management) Rules 2010	Not Aware	80	80	
Hazardous and Other Waste Management	Aware	23	23	
(Transboundry Movement) Rules 2016	Not Aware	77	77	
Hand	ling Techniques			
	Highly Aware	5	5	
Incineration	Aware	38	38	
	Not Aware	57	57	
	Highly Aware	24	24	
Open burning	Aware	33	33	
	Not Aware	43	43	
	Highly Aware	25	25	
Land filling	Aware	35	35	
	Not Aware	40	40	

Table 2: Awareness Level of the Respondents

Category	Scales	No of Respondents	Percentage
	Highly Aware	7	7
Detoxication	Aware	28	28
	Not Aware	64	64
	Highly Aware	9	9
Shredding	Aware	26	26
	Not Aware	65	65
	Highly Aware	10	10
Refining	Aware	39	39
	Not Aware	51	51
Enviro	nmental Hazards	ł	
Air Dollytion	Aware	86	86
Air Pollution	Not Aware	14	14
Water Dellution	Aware	86	86
water Pollution	Not Aware	14	14
L and Dollution	Aware	82	82
	Not Aware	18	18

Source: Primary Data

Interpretation:

The above Table-2 infers that the majority 57 per cent of the respondents are aware of the term E-Waste and the rest 43 per cent are not aware. Only 2 per cent of the respondents are aware of the acronym WEEE and the majority 98 per cent are unaware. The majority 80 per cent, 72 per cent, 74 per cent and 80 per cent of the respondents are not aware of Earth Sense Recycle Pvt Ltd, Electronic Recycling Solutions, Green Bhoomi and Microscience the agencies dealing in E-Waste and only 20 per cent, 28 per cent, 26 per cent and 20 per cent are aware of these agencies.

It also interprets that 80 per cent are not aware and the rest 20 per cent are aware of E-Waste (Management) Rules 2016. The majority 77 per cent of the respondents are not aware and only 23 per cent of the respondents are aware of the law Hazardous and Other Waste Management (Transboundry Movement) Rules 2016. It is also been inferred that the majority 57 per cent, 43 per cent, 40 per cent, 64 per cent, 65 per cent and 51 per cent of the respondents are not aware, 38 per cent, 33 per cent, 35 per cent, 28 per cent, 26 per cent and 39 per cent are aware and only 5 per cent, 24 per cent, 25 per cent, 7 per cent, 9 per cent and 10 per cent are aware of the recycling techniques such as incineration, open burning, land filling, detoxication, shredding and refining. The majority 86 per cent of the respondents are aware and 14 per cent are not aware of air and water pollution, 82 per cent are aware and the rest 18 per cent are not aware of land pollution.

Demographic profile		Sum of Squares	Df	Mean Square	F	Sig.	Result
	Between Groups	.081	1	.081	.089	.766	NS
Age	Within Groups	89.229	98	.910			
	Total	89.310	99				
	Between Groups	.249	1	.249	1.199	.276	NS
Gender	Within Groups	20.341	98	.208			
	Total	20.590	99				
Educational	Between Groups	10.973	1	10.973	13.961	.000	S
Ouclification	Within Groups	77.027	98	.786			
Quanneation	Total	88.000	99				
Occupation	Between Groups	1.020	1	1.020	.699	.405	NS
	Within Groups	142.980	98	1.459			
	Total	144.000	99				
Marital Status	Between Groups	.103	1	.103	.477	.492	NS
	Within Groups	21.207	98	.216			
	Total	21.310	99				

Table 3: ANOVA on Awareness of E-Waste

Demographic profile		Sum of Squares	Df	Mean Square	F	Sig.	Result
No of	Between Groups	.001	1	.001	.001	.978	NS
NO 01 Momborg	Within Groups	73.439	98	.749			
Members	Total	73.440	99				
Nature of Residence	Between Groups	.091	1	.091	.113	.737	NS
	Within Groups	78.419	98	.800			
	Total	78.510	99				
Nature of Living	Between Groups	.255	1	.255	.719	.398	NS
	Within Groups	34.745	98	.355			
	Total	35.000	99				

Source: Computed

Significance at 5% level

Interpretation:

The above one-way ANOVA table reveals that the p-values of demographic factors age (.766), gender (.276), occupation (.405), marital status (.492), number of members (.978), nature of residence (.737) and nature of living (.398) is more than the significant level and states that there is no significant difference between the demographic factors and awareness of E-Waste. The demographic factor educational qualification (.000) is less than the 5 per cent significant level, so the null hypothesis gets rejected and states that there is a significant difference between education and awareness on E-Waste.

S. NO	Issues	Mean	Rank
1	Poor awareness among the households	3.37	Ι
2	Inadequate enforcement	4.49	III
3	No clear indication of E-waste management	4.03	II
4	Lack of enforcement	5.43	IV
5	Cost burden	5.44	V
6	Security implications	6.17	VII
7	Reluctance of authorities	6.07	VI
8	Lack of infrastructure	6.48	VIII
9	Lack of research	6.94	Х
10	Lack of incentive schemes.	6.60	IX

Table 4: Ranking Table on Issues of E-Waste

Source: Primary Data

Interpretation:

The above ranking table-4 elucidates about the issues of E-Waste, "Poor awareness among the households" was ranked first by the respondents with the mean score of 3.37. "No clear indication of E-waste management" and "Inadequate enforcement" was ranked second and third with the mean score of 4.03 and 4.49. "Lack of enforcement", "cost burden" and "reluctance of authorities was ranked fourth, fifth and sixth with the mean score of 5.43, 5.44 and 6.07. The seventh and eighth rank was given to the issue "security implications" and "lack of infrastructure" with the mean score of 6.17 and 6.48. "Lack of incentive schemes" and "lack of research" was ranked ninth and tenth with the mean score of 6.60 and 6.94.

FINDINGS:

- > The majority 42 per cent of the respondents belong to the age group 31 years -40 years
- \geq 71% of the major respondents are female
- ➤ 44 per cent of the respondents are graduates
- \blacktriangleright 42 per cent of the respondents are private employees
- > 77 per cent of the major respondents are married
- > The majority 48 per cent of the respondents have 4 members in their family
- ➢ 67 per cent of the respondents resides in corporation limits
- > The major 55 per cent of the respondents live in own house
- > 57 per cent of the major respondents are aware of the term E-waste

- > 98 per cent of the major respondents are unaware of the term WEEE
- > Majority of the respondents are not aware of the agencies dealing in E-waste
- > 80 per cent of the respondents are not aware of E Waste (Management) Rules 2016
- The majority 77 per cent of the respondents are unaware Hazardous and Other Waste Management (Transboundry Movement) Rules 2016
- > Majority of the respondents are not aware of the handling techniques
- Majority of the respondents are aware of the environmental hazards and health issues in regard to electronic waste
- > The demographic factor educational qualification has a significant difference on awareness of E-Waste.
- Poor awareness among the households was ranked first by the respondents with the mean score of 3.37 as a major issue towards E-waste

SUGGESTIONS:

- The government should take initiatives to create awareness among the respondents regarding e-waste, its handling techniques and the agencies dealing in E-waste.
- Strong regulations on E-waste management should be laid towards handling and recycling of E-waste

CONCLUSION:

This study offers several interesting findings on the issues and awareness level of the household individuals in the study area. It has found that there is a lack of awareness among the households with regard to the hazardous components, handling technique, agencies and regulations in regard to E-waste. Educational qualification plays a significant role towards the awareness of E-waste management. UNEP report estimates that E-waste is increasing by 40% per year and this type of waste is growing faster. Hence, the government should encourage the NGOs and agencies to create awareness to the citizens in regard to E-waste.

REFERENCES:

- Anthony Okoye & Chijioke Odoh. (2014). Assessment of the Level of Awareness of E-Waste Management and Concern for the Environment amongst the Populace in Onitsha, Southeastern Nigeria, *Journal of Environmental Protection*, 5, 120-134.
- Dr. Mandira Sikdar & Ms.Sohini Vaniya. (2014). The New Millennium and Emerging Concerns, *International Journal of Scientific and Research Publications*, 4(2), 1-12.
- Dr. Sindhu Bala & Ms. Sukirti Goel. (2012). A Study of E-Waste Management in Relation to Awareness of College Students, *International Journal of education and Psychological Research*, 1(2), 31-35.
- E-Waste. Available: https://en.wikipedia.org/wiki/Electronic_waste, retrieved on 1.3.2018.
- Genandrialine L. Peralta & Psyche M. Fontanos. (2006). E-waste issues and measures in the Philippines, J Mater Cycles Waste Management, 8, 34–39.
- Heinz Boeni, Uca Silva & Daniel Ott. (2008). E-Waste Recycling in Latin America: Overview, Challenges and Potential, *Global Symposium on Recycling, Waste Treatment and Clean Technology*, Cancun, Mexico, 12th-15th October.
- India fifth largest producer of e-waste: study (2016). Available: http://www.thehindu.com/sci-tech/energy-andenvironment/India-fifth-largest-producer-of-e-waste-study/article14340415.ece, dated May 25th 2016, *retrieved on 1.3.2018*.
- Korin Franklin. (2011). E-waste Awareness and Practices among Wisconsin Businesses and Institution, University Of Wisconsin System Solid Waste Research Program, 1-11, Available: https://www.wisconsin.edu/waste.../2011.../11%200SH%20 Franklin%20e waste. pdf, retrieved on 1.3.2018.
- Orhan Ercan1and Kadir Bilen. (2014). A Research on Electronic Waste Awareness and Environmental Attitudes of Primary School Students, *Anthropologist*, 17(1), 13-23.
- Robinson B.H. (2009). E-waste: an assessment of global production and environmental impacts, *Science and Total Environ*, 408,183-191.
- Statista. (2018). Global electronics industry growth outlook 2016-2018, Available: https://www.statista.com/statistics/268396/estimated-growth-rates-for-the-electronics-industry-byregion/, *retrieved on 1.3.2018*.