

4

E -Waste Management Awareness and Practices by Households in Bangalore

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ABSTRACT

The revolutionary changes in the field of science and technology has made the industries breed faster across the world. The swift growth factor has its own merits and demerits when it comes to the impact on society. The technological revolution in the electrical, electronic equipments and gadgets are getting upgraded very frequently resulting in diverse change in preferences of the customers for the same. One looks at change for the need of hour after a definite period of time. The question arises about what to do with the existing one. Companies have methodical policies/procedures to dispose electrical and electronic waste to abide by the compliances for business to run smoothly up to convinced extent with legal obligations. Whereas, the households are not bound by the formal obligations or compliances and the e-waste generated is disarray leading to lot of harm. The paper focuses on the process/procedures concerned with e-waste management by the households. It also gives a quick look at the awareness level among the Bangalore households concerning e-waste management. This article also gives insight into strategies, that can be implemented to educate the people about the vulnerability of e-wastes and the suitable alternatives for waste management by the households.

Key words: Waste, E-Waste.

1. INTRODUCTION

E-waste includes a lot of appliances, products, components, accessories, devices, etc. which becomes useless or non-functional after a certain period of time. This form of waste is referred to as e-waste generated by electrical and electronic products. The technological revolution has not only paved way to the development activities but it has also led to many harmful effects on human beings and other living organisms in nature. E-waste in households comprises of discarded camera, computer/laptop, cell phone, television, mp3/mp4 player, radio/hi-fi set, printer, cartridges, VCD/DVD/CD player, headset/earphones, batteries, telephone, microwave/oven, refrigerator, flat iron, washing machine, air-conditioner, electric fan and fluorescent lamps/bulbs.

If these accumulations of e-waste are not recycled or disposed properly then it would affect the ecosystem. In developing countries, when these materials are discarded into landfills the acidic conditions cause these harmful materials to leak out and pass through the liners of the landfills going right into groundwater. These materials can also harm the environment by damaging the air and the soil. Dangerous materials such as Lead, cadmium and mercury are all found within e-waste. Lead is found in the glass of computer monitors and in printed circuit boards.

Estimated E-Waste Generation (2010 -2025)

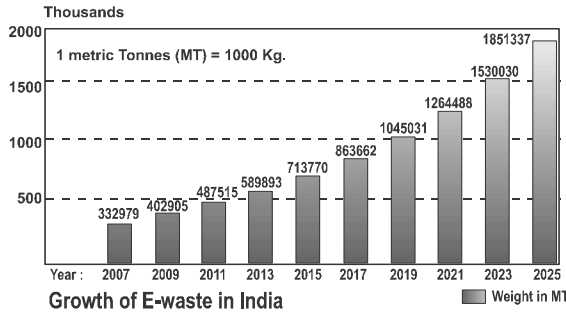
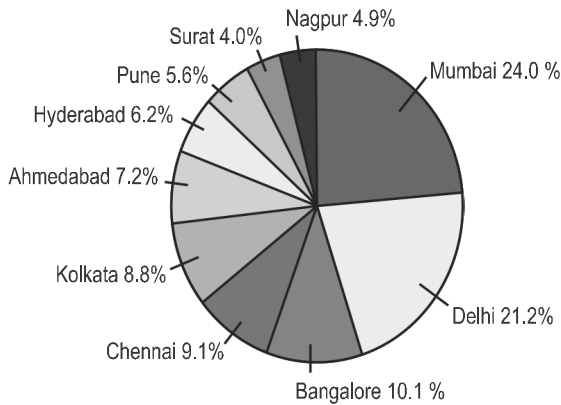


Fig No 1.1

Source: Department of Information Technology

The recent report from Center for Science and Environment (CSE) states that India is accountable for generating 350,000 tons of electronic waste (e-waste) each year and imports further 50,000 tons. Out of this enormous e-waste pile, only 19,000 tons are recycled. Some of the top generators of e-waste in India are Maharashtra, Tamil Nadu, Andhra Pradesh and Uttar Pradesh.



City-wise E-waste Generation in India (Tonnes/year)

Fig No 1.2

Source: Department of Information Technology

If one looks at the Indian cities, the E-waste generation is more in Mumbai, Delhi and Bangalore. Bangalore accounts for 10.1% of the e-waste generated in India.

The toxicity results to lead, mercury, cadmium and a number of other substances. The unsustainable factor of the redundant electronics and computer

technology is one more cause for the need to recycle. Due to lesser environmental standards and functioning conditions in India, the massive accumulation of e-waste is being sent to the underdeveloped and under developing countries for processing which is through illegal means for example, in Africa electronic gadgets and equipments are reused.

2. LITERATURE REVIEW

In recent times, waste electrical and electronic equipment (WEEE) or electronic waste (e-waste) generation, transboundary movement and disposal are becoming issues of concern to solid waste management professionals, environmentalists, international agencies and governments around the world (Musson et al., 2000~ Cui and Forssberg, 2003). According to a report by Confederation of Indian Industries (CII), the total waste generated by obsolete or broken down electronic and electrical equipment in India has been estimated to be 1,46,000 tons per year (CII, 2006). The results of a field survey conducted in the Chennai, a metropolitan city of India to assess the average usage of the personal computers (PCs), television (TV) and mobile phone has revealed that the average household usage of PC ranges from 0.39 to 1.70 depending on the income class (Ramesh, Shobbana and Joseph, Kurian, 2006). It is estimated by Greenpeace that an estimated 20–50 million tons of e-waste discarded globally each year, Asian countries alone are responsible for an estimated 12 million tons (Greenpeace, 2008) of e-waste.

Exposure to Lead could result in extensive damage of central nervous system and kidneys, in addition, effects on the endocrine system have also been observed, leading to serious negative effects on children’s brain development. The most dangerous form of burning e-waste is the open air burning of plastics in order to recover copper and other metals. The toxic fall-out from open air burning affects the local environment and broader global air currents, depositing highly toxic byproducts in many places throughout the world (Gupta, Saroj 2011).

3. STATEMENT OF THE PROBLEM

Electrical, electronic waste management awareness and practices by households in Bangalore is something that has to be studied and understood because the research findings from recent report of Center for Science and Environment say Bangalore is becoming the hub for e-waste generation. This title deals with the problem that is vibrant in many countries and many cities of the world. E-waste is hazardous if appropriate method of disposal and recycling isn't adopted. Households are not aware of this issue and the awareness level is very low in them. This study targets only households of Bangalore city. The awareness level and practices of people who stay in Bangalore related to e-waste management can be declared as the boundary of the study.

4. OBJECTIVES

The main objective of this study is to get an insight into the awareness level of households in Bangalore on E-waste management and practices. The sub objectives revolve around finding out current level of e-waste practices and also problems that are hindering the diffusion and adoption of E-Waste practices.

5. RESEARCH METHODOLOGY

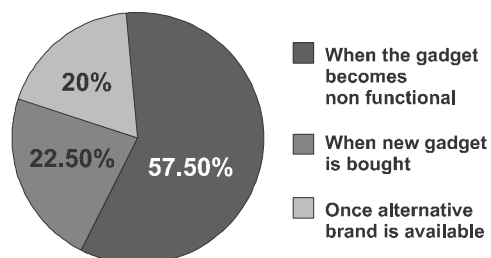
The simple random sampling design has been applied for this study as sample frames were available. Total of 198 wards of Bangalore city (BBMP) limits were considered as target areas for data collection and were given a number (1 to 198) and random numbers were generated from a table. Over 40 respondents were chosen from 40 random areas and questionnaires were administered after pilot testing. This study was conducted through a survey questionnaire among randomly picked respondents from selected areas of Bangalore. The survey was accompanied with a one on one discussion and telephonic interaction. A total of 40 questionnaires were administered to different respondents of Bangalore. Further source of primary data was observation method by personally visiting the site of second-hand market, scrap dealers, repairs shops and dump sites. Further the sources for

secondary data included Government documents and similar research conducted in other countries and previous studies in India. Data collected was checked for completeness before being analyzed using Statistical tools like graphs and charts. This was supplemented by using MS Excel for analysis and illustration.

6. RESULTS AND DISCUSSION

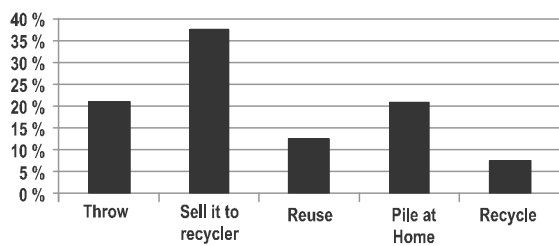
The questionnaire was administered to total number of 40 respondents across Bangalore. The respondents were selected randomly and questionnaire was administered in person as well as over telephonic conversation. Total 12.5% were below 20 years of age group, 77.5% of the respondents were between 21 to 40 years and 10% were aged between 41 to 60 years. Gender wise respondents were equal in proportion with 50% male and 50% female respondents. Most of the respondents produce e-waste from their households which comprises of discarded cameras, computer/laptop, cell phone, television, mp3/mp4 player, radio/hi-fi set, printer, cartridges, VCD/DVD/CD player, headset/earphones, batteries, telephone, microwave/oven, refrigerator, flat iron, washing machine, air-conditioner, electric fan, fluorescent lamps/bulbs, etc.

Respondents have less concern towards recycling e-waste products. Respondents felt that they would like to opt for the long lasting and more durable brands rather than choosing the less durable products, equipments or gadgets. Most of the respondents don't have the knowledge of e-waste segregation practices. The need of buying second hand gadgets and re-assembled gadgets are preferred by some respondents.



GRAPH 6.1: CHANGING PREFERENCES IN ELECTRICAL/ELECTRONIC GADGETS.

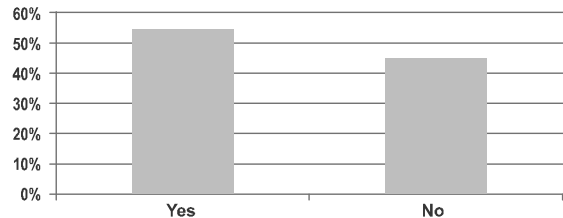
Demand of the respondents for electrical/ electronic gadgets is never-ending since there is a need for each individual or household. 57.50% of the respondents expressed their intention of buying when the existing one becomes non-functional. Second preference of the respondents was of 22.50% that helps to understand if respondents buy because they want to use new gadgets. Some of the respondents switch over to other brand over period of time which accounts to 20% of the respondents'. The observation is very clear that electrical and electronic gadgets or equipments would become non-functional very soon as the life span of these things are very short.



GRAPH 6.2: STATE OF ELECTRICAL/ ELECTRONIC GADGETS AFTER THEY HAVE BEEN DAMAGED BEYOND REPAIR.

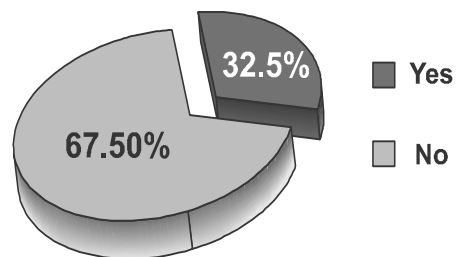
The damaged or beyond repair electronic/ electrical gadgets is an immense trouble since the scientific process of recycling is not happening at the user end according to the survey. Over 37.50% of respondents sell their e-waste to the recycler. Visit to the scrap shops and go-downs reveal that not all the e-waste is sent for recycling, but they burn certain e-waste to separate metal content. This burning process is very harmful to the environment and people as the process pollutes and contaminates the air. The next 21.25% expressed their opinion by opting throw option as they expect the rag pickers to sell the items to scrap shops and some of the e-waste is never picked or sold from the dump yards or bins which is scattered over everywhere. Some of these would harm the cattle and other living beings, disturb the biological cycle and environment. The amount of reuse is less and 21% of the respondents pile e-waste at home leading to so many ill-effects over a period of time. The important aspect of recycling

is completely low due to 7.50% of them hardly get into the process of recycling. e-waste management is highly neglected and there are many factors for it.



GRAPH 6.3: AWARENESS OF HEALTH RISKS ASSOCIATED WITH E-WASTES.

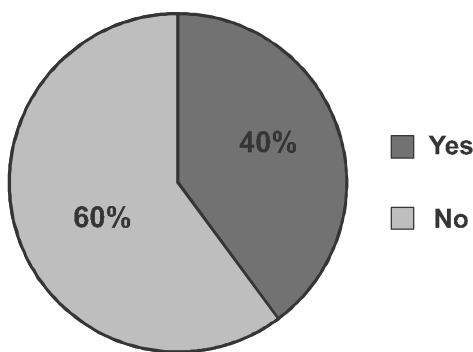
Awareness level of health risks associated with e-wastes is low among the respondents. This needs to be seriously addressed because 55% of them are aware of the health issues and remaining 45% of them aren't aware of such hazardous impact of improper recycling process. The contents of certain hazardous substances in the e-waste are a threat to human beings and other living beings. The households have practice of dumping everything in the same garbage without segregating it. Those would definitely affect the environment and our ecosystem. There are various health risks and challenges associated with this problem.



GRAPH 6.4: AWARENESS OF LOCAL PROGRAMS OR ACTIVITIES RELATED TO E-WASTE MANAGEMENT.

The governments, non-governments environment friendly associations and other volunteering groups should focus on educating the people about e-waste practices by organizing awareness programs and activities. But in Bangalore the effort is not made and it remains to be only a formal legislation. Since 67.50% of the sample population

expressed their opinion which is shocking result of not being aware of programs and activities about e-waste. If people are unaware about recycling and essential care of recycling process, then it's a serious concern for the local governments to implement and execute the activities. Government focuses most of the time on only factories, companies and other industries rather than making public aware of need and necessity of the same. People are clueless about imperatives of improper e-waste practices.



GRAPH 6.5: AWARENESS OF RECYCLING/ TRADE FAIRS FOR E-WASTE MANAGEMENT

Recycling fairs and trade fairs are a good source of educating customers and other people of the society about best e-waste practices. But 60% of the sample population is clueless about such fairs and shows. It can be ascertained from this response that the interest in people for such activities is low. It may not be the actual reason because we hardly find few advertisements on television channels on the same and very rarely any hoardings or flex boards, hand-outs, brochures. etc on the same across Bangalore. One thing which sensitive citizens need to observe is about how illiterate people are educated about e-waste management practices when educated people are not aware of the facts. Starting few e-wastes processing units and existing legislation on the papers would not address the need of the current situation.

7. CONCLUSION

The authority for controlling e-waste management should be more competitive by giving resources and linking the initiatives to other beneficial programs of government to the people of Bangalore. Schemes, incentives and developmental work should be introduced across Bangalore for the areas that work towards scientific disposal and recycling of the e-waste. Awards and recognition for the areas can be declared as e-waste free zones or areas. Legislation on papers needs to be efficiently implemented by putting it into practice. Waste segregation process is already introduced in Bangalore by BBMP for wet and dry waste. Further a step ahead BBMP can relook at segregation of e-waste to tackle this menace. E-waste management concerned organizations and associations like E-Parisaraa, Earth Sense Recycle Private Limited, Trishyiraya Recycling India Pvt. Ltd (TPL), Environmental Protection Agency (EPA), Saahas (NGO), etc. should be taken into the decision making body of the competent committees by BBMP to work towards e-waste management problem and its awareness among Bangalore households. Science, Engineering, Management and other institutions of Bangalore should look at encouraging its students in taking up some projects in developing new technologies and methods for e-waste management. Factories within BBMP limits and companies should earmark funds under social responsibility initiative and support projects of these colleges. Local media also holds the responsibility of educating the people of Bangalore about e-waste management practices and health risks associated with that. Compulsory training programs for workforce employed in this task about the scientific precautions should be taken while dealing with recycling and disposing process. Authorities should give necessary gloves, masks, uniforms, boots and regular health checks for them. Restraining workforce from dangerous processes of recycling and disposing should be taken care with usage of appropriate technologies and machineries. These skilled workforces can opt

for training the households in the e-waste recycling process up to some extent which can be done at the initial stages of processing.

E-waste is much talked about issue at international level with its hazardous chemical reactions and problems. E-waste is a matter of trouble due to toxicity of some substances from unprocessed e-waste. To avoid future problems and difficulties in handling e-waste, many governments have enacted several legislations and policies which organizations and industries should adhere to sustain business. On the other hand problem lies with households in many countries who are producers of large e-waste and are not educated about risks associated with the improper ways of disposing e-waste. Even the legislations are not controlling the individuals but most of the times they are passed keeping industries in mind. The workforce involved in the process needs a great support from authorities with necessary precautionary kits for their safety and health issues. It's the responsibility of each and every household to take accountability and be responsible to understand complexity of e-waste problem and make a genuine effort of making e-waste free areas and zones across Bangalore. The technical assistance and resource power to handle various initiatives of various teams and organization are vital for in-depth research. The necessary funding available for e-waste management researches and the projects can be taken up by Research Centers, Universities and other organizations and reports of studies/projects should be published and made accessible to general public to increase awareness.

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