

A Study on Public Understanding and Awareness of E-Waste Management

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Abstract

The issue of E-Waste is increasing a lot in today's time and the main reason for this is fast growing technologies, the problem of e-waste is increasing due to fast growth of technology. If we talk about e-waste then it includes every electronic device that has become old and is no longer in use, be it a phone, a computer or a T.V. etc. If they are not disposed of properly then they can cause harm to the environment and health as well. The main aim of this study is to understand the understanding and awareness level of the public regarding e-waste, so that it can be known how much knowledge people have regarding e-waste and whether they know about the right disposal and recycling. For conducting this study, understanding and awareness level of people was understood through questionnaire for which Likert scale was used and by interviewing people and with the help of secondary data, it is understood how people dispose of e-waste and what barriers there are which limit their understanding. This study is a step to evaluate people's views, e-waste awareness, understanding and current disposal methods. Some recommendations have also been given at the end so that public awareness can be improved and sustainable practices can be promoted.

Keywords: E-Waste, Public understanding, Awareness, E-Waste Management

1. Introduction

E-Waste i.e. electronic waste is a subject of attention today, in today's digital era technology has become a regular part of everyone's life, due to upgradation of technologies many new gadgets and electronic devices are launched in the market every year and with this e-waste is also increasing as everyone has to keep updated gadgets and have to buy new phones and other electronic devices every few months. If e-waste is not disposed of in the right manner, then it can be hazardous for human health and our environment as well. Till the time the public is not able to understand the proper disposal of e-waste and management of e-waste, it is a matter of great concern. India has witnessed a rise of 72.54% in e-waste generation in the last 5 years, from 1.01 million metric tonnes (MT) in 2019-20 to 1.751 million (MT) in 2023-24. Approx 57% of e-waste remains untreated in a year or annually. After the US and China, India is the third-largest producer of e-waste worldwide. E-Waste is the quick-growing waste stream across the world. According to a 2024 study, out of the almost 62 million tons produced each worldwide, only 22.3% are officially recorded as being collected and recycled; the remaining is frequently handled illegally in underdeveloped nations, which poses major concerns to human health and the environment. Hence, the UN's term "tsunami of e-

waste." Key raw materials are lost in the present recycling technologies at an estimated cost of \$60 billion USD.

E-waste is a very serious concern for India as India is one of the countries that generates the most e-waste. Every year different devices and gadgets are launched in the market and people dump the old devices in the wake of trend and technology advancement or give them to the local scrap dealer who recycles them in an informal and unsafe manner. The government has also issued rules and guidelines related to e-waste, E-waste management rules 2016 which were then revised to form e-waste management rules 2022 but its impact is very limited due to its awareness being very low or almost nonexistent among the public.

The main focus of this study is to understand the public's understanding and awareness related to e-waste. How do people of different age groups dispose of their electronic devices and whether they are aware of e-waste management and the rules related to it. Through survey and data analysis, the awareness level of e-waste management among people can be found out which can fill this gap. Apart from promoting environmental awareness, this study will also guide the educational institutions and policy makers as to what steps they can take by which they can engage the public in building a sustainable e-waste management system. Unless the general public is aware about how to properly dispose of e-waste, no system or policy can be successful in creating an effective and sustainable e-waste management system. Therefore, only understanding and awareness regarding e-waste management among the public can become a long term solution to the growing problem of e-waste.

2. Literature Review

- B.Vamsridhar, (2022) in "Telangana E-Waste Management policy", concluded that by adopting a collaborative approach and collectively delivering on identified aspects, Telangana can create a clean and green habitat for everyone and also suggested that a portion of ITE&C budget should be set aside for running an awareness campaign to educate citizens of the effects of irregular disposal of e-waste and government should set up an application to help citizens dispose e-waste through the right channel.
- Chand, S.,& Deepmala (2018) "Impact and Management of E-Waste for Sustainable Environment", found that majority of people are not aware about toxic substances like mercury, cadmium, nickel, beryllium, etc present in e-waste which increase risk of cancer, asthma, stress disorders and many more health issues. The study suggested proper labelling or sign put on electronic gadget to make people aware about its harmful effects during disposal.
- Chatterjee, S., & Kumar, K. (2009) "Effective electronic waste management and recycling process involving formal and non-formal sectors", found that the nonformal operators are motivated to extract precious metals from printed circuit boards (PCB) using unscientific and unhygienic practices in non-formal sectors and will protect pollution of environment, soil, water and will also protect the health of the worker.
- Garg, N.,& Adhana, D. (2019) "E-Waste Management in India: A study of current scenario" suggested that separate department in urban local bodies to deal with e-waste, privatization of recycling, collaboration of the government with the industry and awareness campaign.
- Heart, S., & Agamuthu, P. (2012) "E-Waste: Aproblem or an Opportunity? Review of issues, challenges and solutions in Asian countries", found that the informal sector is quite active in the pre-processing stage of recycling operations and EPR (Extended Producer Responsibility) is

considered globally as one of the most powerful policy mechanisms in dealing with the e-waste problem.

- Joseph, K. (2007) “Electronic waste management in India-Issues and strategies”, found that an effective take-back program providing incentives for producers to design products that are less wasteful and are easier to disassemble, reuse and recycle may help in reducing the wastes.
- Kiddee, Naidu & Wong (2013) “Electronic waste management approaches: An overview”, finds that there are various methods of e-waste management like Life cycle assessment (LCA), Material flow analysis (MFA), Multi-Criteria analysis (MCA) and Extended producer responsibility (EPR) and a national scheme such as EPR is a good policy in solving the growing e-waste problems.
- Kahhat.et.al (2008) “Exploring e-waste management system in the United States” finds a solution termed as ‘e-market for returned deposit system’, which will be the mechanism for residential customers to dispose of their devices in a way that motivates collection, recycle and reuse of e-waste.
- Kumari, Jha & Suryavanshi (2022) “Metal extraxtion from electronic waste with microbe oriented technology”, find that the effectiveness of biological methods for metal extraction would be improved if it is utilized with a mixture of diverse processes like nanoparticles and some non contaminating biodegradable agents.
- Mundada, Kumar & Shekdar (2004) “E-Waste: A new challenge for waste management in India” finds that e-waste resulting from e-products are toxic and hazardous and outlines the course of action for improvement in e-waste management covering technological improvement, institutional arrangement and operational plans.
- Nnoram & Osibanjo (2008) “Overview of electronic waste (e-waste) management practices and legislations, and their poor applications in the developing countries”, finds that effective management of e-waste in developing countries are appropriate legislation, control of e-waste dumping, implementation of EPR and transfer of technology on sound recycling of e-waste.
- Perkins, Drisse, Nxele & Sly (2014) “E-Waste: A global hazard”, found that policy frameworks aimed at protecting vulnerable population exist but are not effectively applied.
- Terazono.et.al (2006) “Current status and research on e-waste issues in Asia” finds that the informal sector that are deeply involved in materials cycling must evolve into more formal sectors, 3 Rs for e-waste management Reduce, Reuse & Recycle should be used and all costs must be internalized rather than ignored as externalities.
- Widmer.et.al (2005) “Global perspective on e-waste” found some key points from the assessment that are: e-waste recycling has developed in all countries as a market based activity and in China & India it is based on small to medium-sized enterprise (SME) in the informal sector whereas in South Africa it is in the formal sector.
- Zeng X., (2017) “Examining environmental management of e-waste: China’s experience and lessons” find that the economic incentives are key to the success of the new WEEE (Waste of electrical & electronic equipment) regulations.

3. Objectives

1. To study public understanding on e-waste management.
2. To study public awareness about e-waste management.
3. To identify current disposal methods used.

4. To recommend ways to improve public awareness on e-waste management.

4. Research Methodology

Research Design

This study used quantitative, descriptive research design to assess the level of public understanding and awareness regarding e-waste management.

Sample

The sample size for this study comprises 55 respondents, selected by using the convenience sampling method. Participants were selected based on their availability and willingness to respond and participate. The sample includes individuals belonging to different demographic and educational backgrounds, to make sure diverse perspectives on the topic e-waste understanding and awareness.

Data Collection Tool

The data for this study was collected through a well-structured online questionnaire framed and distributed using Google Forms. The questionnaire was designed to ensure the wider reach and easy accessibility. The forms were distributed via Email, WhatsApp and other social media platforms.

Data Analysis

Data collected for this study was quantitative in nature and solely consisted of closed-ended questions. The responses were recorded using google forms and automatically organized into visual formats like bar graphs, column charts and pie charts by the platform itself.

5. Results and Findings

Demographic Profile

This study included **55 respondents** participation. The majority of the age group belonged between **18-35** (76.4%), followed by the age group between **36-45** range (18.2%). A small portion were **below 18** (1.8%) and between range of **46-60** years (3.6%).

On the basis of gender, majority of the respondents were **female with 61.8%** and **male 38.2%**.

Occupationally, majority of the respondents were **employed (54.5%)**, **23.6% were students** and **self employed were 12.7%**, which shows that most of the participants are actively involved in professional or academic field.

Public Awareness, Attitudes, and Practices Regarding E-Waste Management

Awareness of E-Waste: A majority of participants (92.7%) had heard about the term *e-waste*, indicating basic awareness. The majority of respondents (90.9%) correctly identified old outdated and unused electronic gadgets as e-waste.

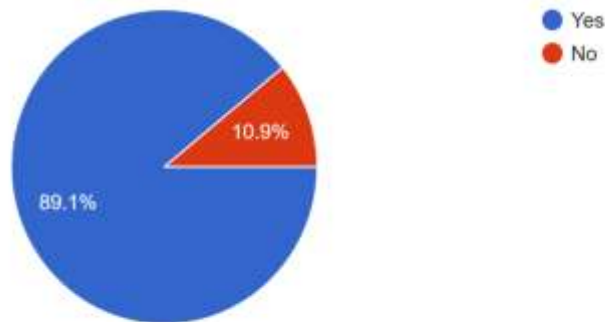
Disposal Frequency: 50.9% of the respondents dispose of their electronic items rarely, while 25.5% dispose once in a year. 14.5% reported disposing it in every six months.

Disposal Methods: 32.7% of the respondents store e-waste at home, followed by 30.9% respondents who gave it to scrap dealers or recyclers, 25.5% sell or donate their e-waste. 10.9% participants admitted to throwing e-waste in regular garbage, which indicated lack of responsible disposal behavior among some of the individuals.

Some of the results are reflected in the form of Pie-charts:

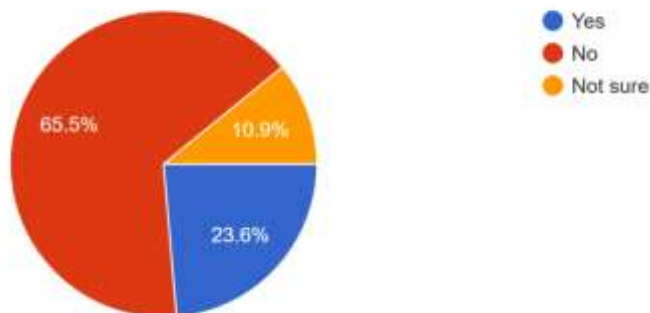
10. Are you aware that e-waste contains harmful chemicals and metals that can affect health and the environment?

55 responses



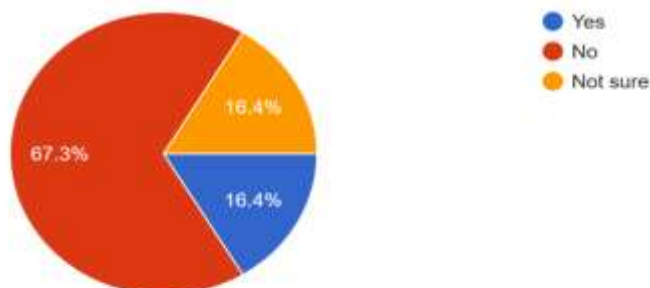
11. Have you ever seen or used an e-waste recycling facility or collection center?

55 responses

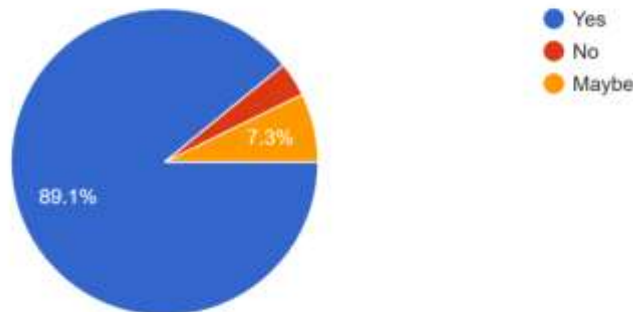


12. Do you think your city or locality has enough awareness programs on e-waste management?

55 responses



13. Would you be willing to separate and give your e-waste to proper recycling centers if available?
55 responses

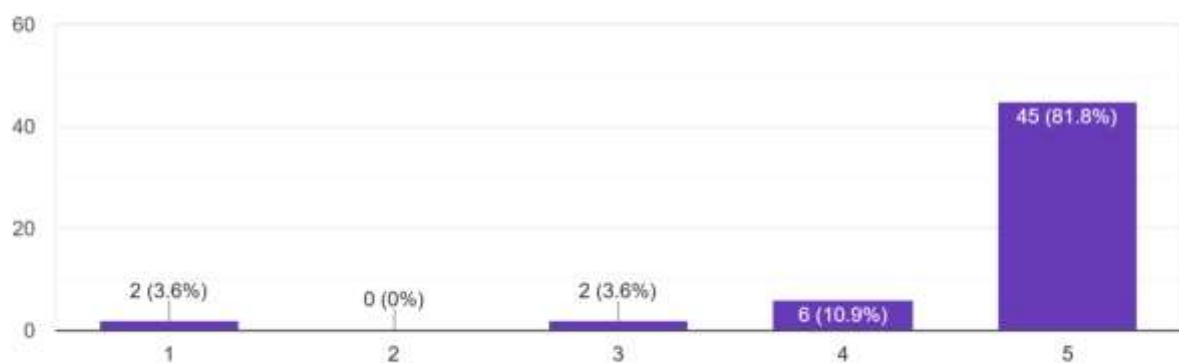


Preferred Awareness Methods: As per the responses the most supported method to increase understanding and awareness were:

- Social media campaigns (87.3%)
- School/college programs (74.5%)
- TV/radio advertisements (56.4%)
- Community workshops (63.6%)

Perceived Importance of E-Waste Management: On a 5-point scale, 81.8% of the participants rated e-waste management as *very important* for environmental protection, highlighting a strong understanding of its relevance.

15. On a scale of 1 to 5, how important do you think e-waste management is for environmental protection?
55 responses



Conclusion

According to this study, majority of the respondents acknowledged the impacts of e-waste and its environment and indicate a high level of public awareness. But even after this understanding, the actual disposal methods are different than this understanding, which indicates a disconnect between knowledge and action. There is a need for awareness programs for responsible e-waste handling and there is a need to expand the access to proper e-waste disposal techniques. The guidelines and rules of e-waste

management given through the government need to be strictly and properly enforced. In this way, a sustainable practice will be promoted and this gap can be eliminated through involvement and education.

References

1. B. VAMSRIDHAR, "TELANGANA E-WASTE MANAGEMENT POLICY", International Journal of Creative Research Thoughts (IJCRT), ISSN: 2320-2882, Volume.10, Issue 11, pp.f22- f28, November 2022,
2. Dr. Subhash Chand, Deepmala, "Impact and Management of E-Waste for Sustainable Environment", International Journal of Creative Research Thoughts (IJCRT), ISSN:2320-2882, Volume.6, Issue 1, pp.779-784, March 2018,
3. Chatterjee, S., & Kumar, K. (2009). Effective electronic waste management and recycling process involving formal and non-formal sectors. International Journal of Physical Sciences, 4(13), 893905.
4. Garg, N., & Adhana, D. (2019). E-waste management in India: A study of current scenario. International Journal of Management, Technology And Engineering, 9.
5. Herat, S., & Agamuthu, P. (2012). E-waste: a problem or an opportunity? Review of issues, challenges and solutions in Asian countries. Waste Management & Research, 30(11), 1113-1129.
6. Joseph, K. (2007, October). Electronic waste management in India—issues and strategies. In Eleventh international waste management and landfill symposium, Sardinia.
7. Kiddee, P., Naidu, R., & Wong, M. H. (2013). Electronic waste management approaches: An overview. Waste management, 33(5), 1237-1250.
8. Kahhat, R., Kim, J., Xu, M., Allenby, B., Williams, E., & Zhang, P. (2008). Exploring e-waste management systems in the United States. Resources, conservation and recycling, 52(7), 955964.
9. Anuradha Kumari, Pooja Jha, Akash Suryavanshi, "METAL EXTRACTION FROM ELECTRONIC WASTE WITH MICROBE ORIENTED TECHNOLOGY.", International Journal of Creative Research Thoughts (IJCRT), ISSN:2320-2882, Volume.10, Issue 4, pp.b101-b107, April 2022,
10. Mundada, M. N., Kumar, S., & Shekdar, A. V. (2004). E-waste: a new challenge for waste management in India. International Journal of Environmental Studies, 61(3), 265-279.
11. Nnorom, I. C., & Osibanjo, O. (2008). Overview of electronic waste (e-waste) management practices and legislations, and their poor applications in the developing countries. Resources, conservation and recycling, 52(6), 843-858.
12. Perkins, D. N., Drisse, M. N. B., Nxele, T., & Sly, P. D. (2014). E-waste: a global hazard. Annals of global health, 80(4), 286-295.
13. Terazono, A., Murakami, S., Abe, N., Inanc, B., Moriguchi, Y., Sakai, S. I., ... & Williams, E. (2006). Current status and research on E-waste issues in Asia. Journal of Material Cycles and Waste Management, 8, 1-12.
14. Widmer, R., Oswald-Krapf, H., Sinha-Khetriwal, D., Schnellmann, M., & Böni, H. (2005). Global perspectives on e-waste. Environmental impact assessment review, 25(5), 436-458.
15. Zeng, X., Duan, H., Wang, F., & Li, J. (2017). Examining environmental management of e-waste: China's experience and lessons. Renewable and Sustainable Energy Reviews, 72, 1076-1082.

Websites

1. https://en.m.wikipedia.org/wiki/Electronic_waste_in_India
2. <https://pib.gov.in/PressReleasePage.aspx?PRID=1941054>