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# Analysing Consumer Behaviour Patterns and Institutional Practices Towards E-Waste Disposal in Patna

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## Abstract

*With rising per capita income and improving living standards among Patna residents, the consumption of electronic goods has increased significantly. Rapid consumerism, coupled with the frequent introduction of advanced models of electronic appliances, has led consumers to replace older devices more often—thereby contributing to a continuous rise in e-waste generation. According to the WHO (2025), e-waste is the fastest-growing stream of solid waste globally. An IIT Patna report further indicates that Patna is the largest consumer of electronic goods in Bihar. The city hosts numerous IT companies, major corporate houses, business enterprises, and shopping malls. Although there are 142 authorised collection centers listed by the Bihar State Pollution Control Board and two electronic-waste recycling units in Patna, the infrastructure for formal e-waste recycling remains inadequate. While Extended Producer Responsibility (EPR) regulations are in place in the state, public awareness regarding e-waste disposal and recycling is low. A majority of consumers continue to discard e-waste through raddiwalas operating in the informal sector. This paper analyses consumer behaviour patterns and institutional policies and practices concerning e-waste disposal and management in Patna. The study is based on both primary and secondary data*

**Keywords;** e-waste, consumer behaviour, e-waste management, recycling practices.

## INTRODUCTION

Continuous technological progress, shorter lifespans of electronic products, and increasing consumerism have greatly boosted the amount of e-waste in our society. This growing problem is not a sudden or unexpected crisis but the result of long-term human habits and unsustainable consumption. The quick turnover of electronic devices, combined with poor disposal methods, has worsened this man-made issue. If not tackled proactively, the environmental and health impacts of growing e-waste will heavily strain communities and institutions.

E-waste consists of various metals and non-metals. The composition pattern for E-waste is generally as follows: 30% organics (e.g., polymers, flame retardants, and glass fiber), 30% ceramics (e.g., silica, mica, and alumina), and 40% inorganics (e.g., ferrous and non-ferrous metals). Inorganic materials in E-waste consist of base metals (e.g., aluminum, iron, copper, and tin), noble metals (e.g., silver, gold, and palladium), heavy metals (e.g., cadmium, nickel, chromium, zinc, mercury, beryllium, and lead), and rare earth metals (e.g., gallium, tantalum, and platinum groups). The presence of hazardous materials such as lead, cadmium, mercury, nickel, hexavalent chromium, and brominated flame retardants (BFRs) increases the complexity of E-waste treatment or recovery (Rautela et al.,2021).

Every year, millions of electrical and electronic devices are discarded as products break or become obsolete and are thrown away. These discarded devices are considered e-waste. Common items in e-waste streams include computers, mobile phones, large household appliances, and medical equipment. In 2022, an estimated 62 million tonnes of e-waste were produced globally. (The Global E-waste Monitor 2024).

Only 22.3% was documented as formally collected and recycled (World Economic Forum, 2019). At times, the 21st century is referred to as an era of e-tsunami. (<https://www.downtoearth.org>).

India is the third largest contributor to the global e-waste burden, currently next to China and the United States.

According to a research report, it is estimated that in the year 2013, Bihar was generating around 23.5 thousand tonnes of e-waste, which has increased to 90 thousand tonnes per annum and a major portion of e-waste is generated from its capital city, Patna.

Millions of tonnes of e-waste are recycled using unsound activities. When e-waste is recycled using unsound activities, it can release up to 1000 different chemical substances into the environment, including known neurotoxicants such as lead. E-waste is one of the fastest-growing solid waste streams in the world. Electrical and electronic items contain many different toxic substances. Users are unlikely to have contact with these substances while the items are functional. When they become waste, these toxicants can be released into the environment if the devices are managed using environmentally unsound practices and activities.

- Scavenging
- Dumping on land or in water bodies
- Landfilling along with regular waste
- Open burning or heating
- Acid baths or acid leaching
- Manual disassembly of equipment.
- These activities are considered hazardous to the environment and health as they release toxic pollutants, contaminating the air, soil, dust, and water at recycling sites and in neighbouring communities.
- Open burning and heating are considered the most hazardous activities due to the toxic fumes created.
- Once in the environment, these toxic pollutants can travel significant distances from the point of pollution, exposing people in faraway areas to hazardous substances.

#### AIMS AND OBJECTIVES

This paper examines the e-waste disposal behaviour of residents in Patna and evaluates the implications of their practices. It also analyses existing policies and institutional mechanisms for e-waste management. Finally, the study offers policy recommendations to enhance coordination between consumer behaviour and institutional strategies for building a sustainable society.

#### RESEARCH METHODOLOGY

This research paper is based on both primary and secondary data. A sample of 300 respondents was developed to get the information regarding the e-waste disposal behaviour of residents of Patna. Data is collected from various government reports, and information from various websites is collected and collated to analyse the facts related to e-waste generation and management in Patna.

#### LITERATURE REVIEW

**Sengupta et al. (2023)** have conducted a case study on informal methods of e-waste collection in India and have found that scrap dealers or *kabadiwalas* play a vital role in e-waste collection in our country. They have expressed that around 90 percent of the total e-waste disposed of in our economy is processed through informal channels, mainly the *kabadiwalas*. In the course of collecting solid waste from the household, they also receive e-waste in the waste, which constitutes around 10 percent of the solid waste collected from various houses of the city. They have also recommended the integration of these *kabadiwalas* in the formal e-waste management system.

**Debnath et al. (2022)** have discussed the concept of the circular economy as one of the ways for e-waste management. They have explained that e-waste is increasing at an alarming rate in developing economy but it can be utilised as a source of secondary raw materials. They have explained various possibilities of implementing the concept of circular economy as a solution of e waste disposal in our country.

**Papiya Raj and Aditya Raj (2015)** have analysed the trends of municipal solid waste production in Patna. They have highlighted that the city is witnessing rapid urbanization, increasing population and consumerism -all these factors contributing to increasing heaps of solid waste in the city. Lack of civic sense and public morality is also contributing to unsystematic waste disposal in the city.

**Chaudhary, K., & Vrat, P. (2019)** have analysed the consumer behaviour towards e-waste in India. They have found that there is a lack of awareness among Indian citizens towards e -waste disposal rules. They have also found that incentives play an important role in influencing consumer behaviour towards e -waste disposal in the organized sector.

**E-Waste (Management) Rules, 2022**, as per the report of the Bihar State Pollution Control Board, the State Pollution Control Boards in Bihar are responsible for managing e -waste dismantling activities and regulating registration on

the CPCB portal of Bihar. They are responsible for issuing licences for e-waste dismantlers and monitoring their activities in accordance with environmental standards and policies. SPCB Bihar is also expected to create awareness among people regarding proper e-waste disposal in Bihar. The Board is also expected to regulate the informal disposal of e-waste with penalties for non-compliance.

## DISCUSSION

According to the Bihar Economic Survey 2025-26 reports, Patna has been declared the richest city in Bihar, with a Per Capita Gross District Domestic Product (GDDP) of Rs 1,31,332 at constant prices. It is higher than the state average per capita income of Bihar, Rs 76,490 at current prices. Patna maintained its dominance in fuel consumption, with diesel and petrol consumption topping in the State. (Bihar Economic Survey 2025-26). Patna is one of the most populous cities in Bihar, with a decadal growth rate of population (2001-2011) standing at 22.34 percent and a population density of 1,102 persons /sq.km. as per the 2011 Census reports. (Census Report, 2011) Patna ranks very high based on e-waste generation as compared to other cities in India. The key factors contributing to the increasing rate of e-waste production in the city are the city's economic growth, growing population, rapid urbanization, and rising trends of consumerism. With this significant economic growth and population growth in the city, the scope of use of electronic goods is increasing, thereby increasing the burden of e-waste in the city (Kumari, K., 2024).

A sample of 300 respondents from the city was formed. The sample comprises households of the middle-income group, with an average monthly income ranging from Rs. 30 thousand to Rs 3 lakh monthly.

## MAJOR FINDINGS

This study showed that the majority, 90 percent of participants, were aware of the ill effects of e-waste on health and the environment.

A major proportion of participants, 93%, were not aware of the e-waste legislation and rules in our country.

Most respondents, 70%, stated that e-waste recycling was an important aspect of a responsible citizen's life. This may be due to the lack of proper e-waste drop-off facilities in their area and also because of poor management of e-waste in Bihar, where most e-waste ends up in landfills.

Targeted interventions for consumers in educational institutions and informal sector industries will help improve e-waste management in the city.

It was observed that around 60 percent of respondents dispose of their e-wastes through scrap dealers or *kabadiwaalas*. The majority of respondents expressed that they followed this approach due to the lack of proper e-waste drop-off points and the lack of awareness regarding formal e-waste collection systems in the city.

Around 25 percent of the respondents disposed of their e-waste with household waste. They did not take care to segregate e-waste and dispose of it separately.

Some of the respondents mentioned that an exchange offer is a motivating factor for disposing of old electronic durables, as it includes a monetary benefit.

People in the city prefer to gift their electronic durables if they are in working condition to their support staff.

## Government Policies and Institutional Practices for E-Waste Management in Patna, Bihar

The Central Pollution Control Board (CPCB) is responsible for estimating the e-waste generation at the national level based on the countrywide sales data provided by producers, and the average life of notified electrical and electronic equipment (EEE), as mandated under the E-waste Management Rules, 2016. According to the information available with the CPCB, e-waste generated in the country from twenty-one (21) types of EEE notified under the E-Waste (Management) Rules, 2016, during 2020-21 and 2021-22 was estimated at around 13,46,496.31 tonnes and 16,01,155.36 tonnes respectively. (<https://pib.gov.in>)

The existing E-Waste Management Rules 2022 were revised by the Ministry. The revised E-Waste Management Rules have been enforced since 1st April 2023. The objective of these new rules is to manage e-waste in a sound and environmentally friendly manner. It also aims to establish an improved Extended Producer Responsibility regime for e-waste management and recycling. As per the new guidelines of CPCB, all the manufacturers, recyclers and refurbishers must register on the portal developed by the CPCB. These provisions will be helpful in channelizing the informal sector to the formal sector for conducting business and recycling of e-waste appropriately. These rules aim to promote the Circular Economy through scientific recycling of e-waste and the Extended Producer's Responsibilities regime.

The e-waste disposal policy of Bihar follows the national E-Waste Management Rules, 2022. This rule mandates Extended Producer Responsibility, according to which manufacturers themselves are responsible for the disposal of e-waste. These manufacturers are expected to register on the CPCB portal using authorized recyclers with the Bihar State Pollution Control Board. In Bihar, there are no producers of electronic goods in the state. The E-Waste (Management) Rules, 2018, have been enforced by the Bihar State Pollution Control Board. The Bihar State Pollution Control Board (BSPCB) was constituted under Section of the Water Prevention and Control of Pollution Act, 1974. BSPCB is entrusted with planning and executing programmes for the control and prevention of pollution.

### **Role of the Bihar State Pollution Control Board (BSPCB)**

The Board is entrusted with the enforcement of rules and guidelines for proper e-waste disposal in the State. The Board is also responsible for conducting an awareness drive in the State to motivate people to adopt proper e-waste disposal behaviour. The Government of Bihar has authorized 142 e-waste collection points in various districts.

### **Key Policies and Regulations**

E-Waste Management Rules, 2022: It focuses on the producer's accountability, as it stress upon the importance of Extended Producer Responsibility. As per this rule, producers must ensure sound recycling of e-waste in society.

All producers, refurbishers, and recyclers must register on the BSPCB's online portal.

Large consumers, for example, government offices and private institutions, must dispose of their e-waste to registered recyclers.

Mixing the e-waste with municipal waste is strictly prohibited. Electronic goods should not be dismantled informally, nor should they be given to scrap dealers or kabadiwalas in the informal sector.

### **Policy Recommendations**

Our findings indicate that awareness of e-waste disposal methods needs to be improved. Although people's perceptions were positive, most still used unsafe disposal practices that created a toxic environment for humans. Therefore, more research should focus on developing new eco-friendly recycling methods, enhancing the performance

of existing devices, and reducing the unsafe disposal of outdated products. Authorities should establish more disposal sites, conduct awareness campaigns to educate consumers about the harmful effects of e-waste, and enforce rules for segregation at collection points, as well as legislation regarding e-waste.

There is an urgent need to spread awareness among households in the city to practice eco-friendly behaviour for e-waste disposal. Households should be educated to segregate e-waste from other solid waste at home. (Kumari, K. 2025).

Awareness campaigns should be promoted towards the practice of 4R- Refuse, Reduce, Reuse, and Recycle. This means consuming fewer resources, developing a practice of reusing things as far as possible and recycling what cannot be reused. (European Scientific Journal June, 2015)

There is an urgent need for efficient management and effective monitoring of e-waste disposal in Patna. (Singh, S. 2019).

Regular exchange offers provided by the companies can help collect e-waste on a mass scale.

The Extended Producer Responsibility Policy should be implemented effectively in the State

The government should promote start-ups in the area of e-waste management through granting loans at lower rates of interest and tax holidays.

### **CONCLUSION**

E-waste management is a great challenge for a city like Patna. There is a wide gap between the behavioural pattern of consumers and the institutional practices followed in the city. The e-waste management rules should be strictly followed. Involvement of the public in waste management is very important. The government should ensure that the fundamental rights of the city dwellers are protected, and the citizens should be motivated to perform their fundamental duties. This will be of great help in practicing e-waste management with greater efficiency. There is an urgent need to devise an improved framework with the incorporation of better technology in E-Waste Management for Patna town, the capital city of Bihar. The plan should be implemented effectively for the entire city. Public apathy should be altered by massive awareness campaigns with the help of print, electronic and social media and educational measures. It requires Policymakers, households, manufacturers, and

recyclers to come forward in cooperation and active participation in combating this critical problem of e-waste aggravation in our society so that we live our lives in a cleaner and healthier environment.

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