Smart City and Waste Management: A Sociological Study in Bhubaneswar, Odisha

Suprava Sahoo
Department of Sociology, Utkal University, India

Waste is never an issue if it is properly managed to avoid harming both the environment and human health. However, increasing urbanization, rising per capita income, changing lifestyles and new technology have all improved human living while producing greater amounts of waste, which is challenging to manage. A larger amount of waste is gathered from different areas of the cities, which is not managed at a level that is comparable to that amount of its generation. This poor management has shocking effects on the urban environment and contributes to social and health issues in many of the world's cities. Furthermore, excessive usage of non-biodegradable materials, such as plastics, synthetic fibres, pesticides, harmful chemicals, paints and electronic devices, etc., is extremely hazardous to both human civilization and Mother Earth. The primary cause of the issue is poor management and a lack of public concern for this problem. The management of waste is a crucial function that must be handled by both municipal and local bodies. The consequences could be terrible if waste services are not delivered effectively.

The study was done in the smart city of Bhubaneswar, Odisha, emphasizing the above issues as key concerns. The state capital of Odisha, Bhubaneswar just won the top spot in the Smart City Challenge out of 100 cities in India. The main requirement for implementing a smart city effort is having proper waste management technologies that function effectively. According to the cleanliness study performed under Swachh Survekshan 2018, the city has dropped to 245th place from 94th place in 2017 among 4040 cities. Additionally, the city received a ranking of 331 out of 476 cities in the Swachh Bharat rankings carried out by the Ministry of Urban Development in 2014-2015 by the National Sanitation Policy of 2008, where open defecation and SWM (Solid Waste Management) indicators are the primary criteria for consideration. This shows the current state of the city and the implementation of necessary measures to meet the Swachh Bharat Mission, a campaign to improve city cleanliness with a zero-waste strategy.

The researcher has made an effort to cover every aspect to understand the entire waste management system of Bhubaneswar through a sociological lens. On average, Bhubaneswar produces 520 ton of solid waste each day or 500 g of waste per person. The generation of solid trash is predicted to reach 750 ton per day by 2030. In terms of municipal garbage, a sizable portion comes from households, hotels, schools, institutions, weddings, slaughterhouses and electronic sources, with the majority of the waste coming from residential zones. Increased population and rapid urbanization have led to the production of a large amount of waste, which is typically discarded on open dumping grounds. Uncollected waste and foul waste are commonly seen everywhere in the city. Even though people are fully aware of the problems and consequences of improper waste management, which can cause serious health and environmental damage still city dwellers are extremely hesitant to participate in the sustainable waste management processes. Urban local bodies and the state government's efforts to implement an organized waste management system are failing in urban areas because of the people's lack of commitment, they fail to

provide adequate services in this crucial area of waste management which leads to the spread of epidemics including chikungunya, dengue fever, malaria, hepatitis and several other unknown life-threatening diseases. The Municipal Solid Waste Management and Handling Rules of 2000 state that each municipality is in charge of managing all tasks related to waste collection, transfer, transportation, treatment and disposal within its respective municipal limits. The success of the MWM (Municipal Waste Management) system, however, depends on the participation and assistance of the general public as well as numerous organizations like residents' associations, self-help groups, NGOs (non-governmental organizations), private agencies and political parties. Therefore, it is extremely important to monitor how well the municipalities in Bhubaneswar are managing the collection, transfer, transportation, treatment and disposal, as well as the degree to which they are receiving cooperation from the general public and other organizations.

The study's primary aim is to gain an understanding of municipal waste management practices in Bhubaneswar, where the major focus areas are 1: Inspecting the role of municipal authority in the process of city waste management, 2: Stakeholder's involvement in the process of waste management and 3: Exploring people's attitudes, perceptions and participation towards waste management.

To investigate the waste management system in Bhubaneswar, the researcher used both descriptive and exploratory research designs. Both the primary and secondary methods of data collection are used to collect data from 3 different wards (12, 17 and 29) of Bhubaneswar, which span the city's central region. The three wards were chosen using a purposive sampling technique. The municipal corporation provided a ward-by-ward list of all the households and the researcher used a simple random sample technique to choose 120 households from those wards. The researcher used several techniques, including personal interviews using a semi-structured interview schedule, observation and group discussions with sanitation department staff and people in general.

The most difficult responsibility for BMC (Bhubaneswar Municipality Corporation) is to provide city residents with a clean and healthy environment. In comparison to earlier research, BMC significantly improved its waste management system. The sanitation services that BMC has provided are segregation of wastes at the source of generation; house-to-house collection of waste; cleaning of roads; transportation of wastes from different areas up to the selected disposal site; night cleaning on busy and important roads, market areas, etc.; non-retention of waste in a particular place for more than 24 hors; a collection of waste from a particular area or lane in a fixed time through wheelbarrows and pedal bicycles, etc. For the management of waste in the corporation's territory, BMC has created a detailed project report (DPR) with a total project cost of Rs. 23.68 crore. The DPR has been submitted to the Central Pollution Control Board for consideration of federal financing. All the 67 wards in Bhubaneswar Municipal Corporation are privatized and the wards are grouped into 10 packages for waste management activities (municipal waste collection and transportation, conservancy cleaning, drain cleaning and de-silting). While 6 private agencies under the Public-Private Partnership (PPP) mode, such as Pratyush, Jagruti, P. Harshavardhan, Ourland Engineering Works Pvt. Ltd., PMR Consortium and Green Circle Environment Pvt. Ltd., are carrying out the entire waste management activities in all the privatized wards daily and 8 NGOs (Non-Governmental Organizations) are also helping these agencies in the waste management process. A Women's Self-Help Group (WSHG), known as Swachha Sathi, also engaged in this system and helped to create public awareness about waste segregation by visiting house to house. The 2,120 Swachha sathis and 485 Swachha supervisors from mission Shakti groups are engaged in these activities all over Odisha. As 1785 swatch karmis from 1530 Mission Shakti Groups are operating the wealth centres. The 175 MCCs (Micro Composting Centers) with a capacity of 759 TPD (Tonnes Per Day) and 161 MRFs (Materials Recovery Facility) with a capacity of 1564 TPD have been built in Odisha. The 82 transgender people also co-opted to run wealth centres. In the city, there are about 300 rubbish collection locations as well as 2 dump yards, one near Sainik School and the other in Bhuasuni. There are 8 MCC and 8 MFC

sides in Bhubaneswar as of now. The Mo-khata yojana, which is gaining popularity in the city due to its high-quality compost nature, is a mechanism that the municipality recently developed for processing biodegradable rubbish through composting. Tricycles, LCVs (Light Commercial Vehicles) and BOVs (Battery Operated Vehicles) are used for door-to-door garbage collection. The music vehicle raises public awareness of segregation by providing information about it through music.

The majority of individuals are satisfied with the work done by private agencies, but very few are dissatisfied. People face several problems as a result of private agencies' poor oversight, including inconsistent collection, a lack of door-to-door collection, slum areas not served by LCVs, an erratic visit schedule and a lack of road sweeping. Many people have complained about the aforementioned issue, but only a handful have received favourable answers and a lot of comments have gone unreported.

The majority of city waste is biodegradable and comes from kitchens. After that, a sizable portion of the population continued to use plastics, which are not biodegradable and are harmful to society. In Bhubaneswar, SUP (single-use plastic) is still not completely prohibited. Because plastic is less expensive than other materials and is accessible in some stores, people are compelled to use it. A larger proportion of people (81 out of 100%) are not concerned about purchasing environmentally friendly items, which is why non-biodegradable waste is increasing and harming both human society and the environment. People are also not aware of the preventative, reduction, reuse and recycling (PRRR) concepts. Humans are therefore unable to handle waste efficiently. Those who are knowledgeable do not employ this strategy to significantly reduce it. According to the general public, waste personnel need additional training to handle waste effectively. School-level teaching is necessary to educate the public from an early age and effective multimedia campaigns can aid in proper trash management. If individuals are aware of the effects of improper waste management, they seem to be more concerned. Many people who are old, illiterate, or just have an elementary education still don't know about its effects. Many people who are aware of waste segregation do not practice it. Most of the respondents favoured more government funding for better waste management. Campaigning, meetings and seminars are some very effective ways to raise public awareness of waste management; however, the study found that very few people participate in or attend these kinds of events. Such programs are only attended by government employees and other BMC employees.

The BMC has now adopted the door-to-door collection approach, with 57% of residents finding it satisfactory. However, 33% still prefer community bins because their working hours do not coincide with the times when vehicles are visiting homes. Additionally, some regions, notably slum areas, do not receive regular visits by municipal vehicles. Another reason why they choose the communal bin over a small truck is that there aren't appropriate road amenities for small trucks to visit in slum areas. The poor trash collection makes the surrounding area unsanitary and people suffer from numerous health conditions such as dengue, malaria and so on. Pollution of the water and air is caused by waste that is dumped in open areas and near water bodies. People who live close to land-filling sites frequently experience headaches, nausea and vomiting, among other more significant health problems.

The general public of Bhubaneswar is not aware enough about the waste management system. Excessive print and visual promotion are essential to raising awareness among them. Early education is something that individuals will remember until life ends. Therefore, children must learn about how to manage waste at a young age. The waste pickup vehicles should visit frequently, arrive on schedule and cover all the locations, including slums. It is important to improve both the general public's and other stakeholders' understanding of waste management concepts to avoid waste from coming into contact with the ground before treatment and disposal. The government should establish more MCCs and MFCs to manage the waste, stop landfilling as soon as possible and clean the places where waste is dumped. In addition to promoting segregation, the WSHG educates the public on recycling, prevention, reuse and other

sustainable practices. It is recommended that administrators provide the public with all the information, suggestions and substitutes on how to handle waste, along with a relevant database. The general people have a completely apathetic attitude towards dealing with their trash and keeping the city clean. The BMC needs to work together to ensure active community involvement and collaboration.

KEY CONTRIBUTIONS

People's fast-changing lifestyles in Bhubaneswar make waste composition extremely vulnerable. However, waste management is not yet seen as a high-priority area by the government, which makes just a few efforts to address the ever-increasing waste issues. Research on the efficacy of municipal waste management in Bhubaneswar is particularly significant, as this is an area that the government should focus on but is presently receiving little attention. In the context of these key challenges, this study is being performed to shed some light on the MWM operations and issues of chosen wards in Bhubaneswar, as well as to serve as a torchbearer for policy making. The study aims to determine the public's level of awareness of the various components of waste management systems. It also investigates the efficacy of the various methods used by municipalities and other agencies, like private stakeholders, NGOs, SHG groups, etc., to collect, treat and dispose of waste inside municipal boundaries. This research is essential to guide policymaking on how to implement an effective waste management system that benefits both people and the environment.

FUTURE DIRECTIONS

Based on the findings of the present investigation, the following suggestions are made for future studies:

- Waste management systems all over the city, including shops, institutions, restaurants, etc.
- A research study focusing on how the intersections of caste, gender and ethnicity influence waste management in the city may be conducted
- A comprehensive survey approach may be implemented that includes every household in Bhubaneswar
- In this case, the researcher exclusively focused on the urban regions. A research study may be extended to rural areas
- Biomedical and electronic waste management in Bhubaneswar should be done
- A study applying the intersectional approach may be conducted to understand how class, caste, gender and ethnicity influence matter in urban waste management

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