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An awareness study of solid waste management in Gurugram District

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Abstract---Gurugram's trash collection, transportation, and disposal systems are chaotic. Rapidly rising urban populations create more solid garbage than urban local bodies (ULBs) can handle. Improper garbage management threatens the environment and public health. The present study examines Gurugram's solid waste management and suggests solutions.

Keywords---MSW waste, solid waste management problem, awareness and practice on solid waste management.

Introduction

Gurgaon is India's fastest-growing city. Rapid development and population in the city are creating a health and sanitary danger for its citizens. Gurgaon also creates e-waste (due to a large corporate sector) and bio-medical waste (due to a growing hospital sector). Growing industry also generates significant amounts of industrial waste (sludge, etc.). The city has a 167-km² urban area and 1,514,085 residents in 2011. It generates 449 metric tonnes of MSW daily, per MCG. MCG is responsible for trash planning and management in Gurgaon. MCG is only responsible for municipal trash (primarily old Gurgaon). Private contractors, RWAs, and HUDA staff handle waste in HUDA sectors. MCG collects, sweeps, transports, processes, and disposes of generators' waste. It collects garbage door-to-door. MCG has streamlined city trash handling.

Solid Waste Solid waste consists of solid or semi-solid domestic waste, sanitary waste, commercial waste, institutional waste, catering and market waste and other non-residential wastes, street sweepings, silt removed or collected from surface drains, horticulture waste, agriculture and dairy waste, treated bio-medical waste excluding industrial waste, bio-medical waste and e-waste, battery waste, and radioactive waste produced in the area (Gazette Notification, 2016).

Municipal solid trash includes common objects including product packaging, grass clippings, furniture, clothing, bottles, food, scrap, newspapers, appliances, paint, and batteries (Sharma, 2002). (Cointreau, 1982).

Definition of Solid Waste

The Indian Municipal Solid Wastes (Management and Handling) Rules, 2000, describe "Municipal Solid Waste" as "commercial and residential wastes generated in municipal or notified areas in solid or semi-solid form, excluding industrial hazardous wastes but including treated bio-medical wastes."

Statement of problem

During the field study done by the Municipal corporation of Gurugram, it was discovered that... Gurugram's daily per capita trash generation is 320 grammes, which includes residential, business, and institutional waste. In addition, the city generates approximately 700 tonnes per day (TPD) of construction and demolition garbage, 1.5 TPD of biological waste, and 70000 tonnes of electronic waste annually. According to the categorization of municipal solid trash, 71 percent are kitchen scraps, 12 percent are recyclable, and 17 percent are inert. The city creates more than one thousand tonnes of municipal solid trash every day. It is anticipated that the amount of solid waste will increase to 2,900 TPD by 2041. According to MCC data, the annual rate of trash creation growth in Gurugram is 1.33 percent.

Presently, the majority of metropolitan local governments lack an effective action plan for implementing the Solid Waste Management System (Rawat, et al., 2013). There is an average of 70 percent garbage collection in India, with the remaining 30 percent being recombined and lost to the urban environment CPCB. No city in India has a 100 percent segregation of waste living units (2000b). Existing and projected land requirements for the disposal of municipal solid waste, coupled with population increase, may be a significant concern in the future. For a solid waste management system to be efficient, it must be environmentally benign, cost-effective, and acceptable to the local population.

The city of Gurugram has been struggling with a severe solid waste management issue. The mechanism for managing solid waste has been dismal and incredibly inefficient. Overall, it can be described as a failure. It has failed if there are large piles of uncontrolled trash on the sides of streets, sidewalks, drains, water channels, and public spaces. Municipal Corporation of Gurgaon (MCG) is responsible for solid waste management despite long-standing financial, skilled human resource, and technical constraints. And found itself incapable and ineffective of providing improved solid waste management services. The magnitude of the garbage problem has been grossly exaggerated as a result of the public's lack of understanding regarding solid waste issues, their uncooperative attitude, and MCG's indifference. In light of the aforementioned setting, this study sought to determine the significance of people's participation in the waste management process for the improvement of municipal solid waste management.

Review of Literature

Dimpal (2012) examines urbanisation and solid waste management in India. His report describes urbanisation. High population growth, dwindling possibilities in rural areas, and a move from stagnant, low-paying agriculture to urban jobs contribute to urbanisation. Unexpected immigration has led to the expansion of slums, squatters, and informal housing in developing countries cities. Unscientific garbage handling creates health hazards and urban environment damage. Urbanization, changing lifestyles, and increased consumerism will make solid waste management in India more difficult. Financial constraints, institutional deficiencies, poor technological choices, and public apathy towards MSW have worsened the situation. Her report assesses India's current solid waste procedures and concerns. It also provides ways to deal with garbage in a healthy and environmentally responsible way, turning it into a resource.

Joseph, Rajendiran, Renthilnathan and Rakesh (2012) analysed trash creation, collection, disposal, and the legal environment to highlight sustainable solid waste management in Indian cities. The study focuses on increasing local capability with the help of educational groups. They've centralised the implementation of an integrated approach supported by political resolve to remedy the problem, which helps change citizens' perspectives and develop community participation for sustainable trash management. Saikia and Nath (2015) highlight that Tezpur's waste management system is very ancient and needs upgrading. Lack of collaboration between authorities hinders efficiency improvement. Encourage community participation and use technology. Authorities must require recycling and reuse. Iyer emphasised sanitation (2017). Swacch Bharat Mission contributed to this. He said SBM is a complicated behavioural change movement. Plans, applications, and cleanliness efforts were organised across. Mass media awareness is crucial, but grassroots motivators employing interpersonal communication with the target audience are the key to change. SBM was gathering pace, but the centre and state governments knew it was hard to maintain. The author said everyone should help with the mission.

Geographical Area of the Study

Gurugram is in Haryana at 28.3606° N and 76.8721° E. 30 kilometres south of India's capital, New Delhi. The district is part of the National Capital Region and one of Delhi's satellite cities. Gurugram is Haryana's economic hub. The district is in the state's south-east and borders Delhi on the north. Jhajjar, Rewari, Mewat, Palwal, and Faridabad share its eastern border. Gurugram has multiple Aravali and Mangar Bani hill ranges. Gurugram is one of Haryana's 22 districts, covering 1257 km² (976 km² rural, 281 km² urban). Gurugram (West), Gurugram (South), Badshahpur, and Pataudi are subdistricts. Gurugram, Sohna, Pataudi, Farrukh Nagar, and Manesar are further divided into five revenue tehsils and four sub-tehsils. Gurugram, Sohna, Farrukhnagar, and Pataudi are rural development blocks. Gurugram tehsil is 333 km²; 131.8 km² is rural and 201.3 km² is urban. Gurugram city is 250 km². This study focused on Gurugram city in Gurugram tehsil, Gurugram district.

MCG areas are separated into Zones I, II, III, and IV for solid waste management. Khekri Dhaula Toll to Old Railway Road (Zone I) and right (Zone II). Zones I and II, with 122 colonies, are under one SDO, one Senior Sanitation Inspector, and one Sanitary Inspector. One contractor handles door-to-door collection, while numerous contractors sweep streets. MCG is operating in some regions. Zone III (Star Mall, Sector 31 towards Delhi up to MCG limits): No door-to-door contractor. Three companies sweep roads. One Senior Sanitary Inspector and two sanitary inspectors assist the SDO. No private contractor collects door-to-door in Zone IV (Star Mall, 31 towards Jaipur to Kherki Dhaula Toll Tax). Two street-sweeping companies exist. Two sanitary inspectors help the SDO.

Aim of the Study

The purpose of this research is to conduct "An Awareness Study of Solid Waste Management in Gurugram District," which is the title of the study. The following are the goals of the study:

- To Conduct Research on the Social Aspects of the Management of Solid Waste in the Municipal Corporation of Gurugram
- Investigate the current procedures for the management of solid waste in areas chosen from Zones I and II in the city of Gurugram.
- To identify the most significant issues with the methods used for the management of solid waste in Zones I and II of the city of Gurugram.
- To identify the issues that stakeholders are facing in relation to the methods that are being used for the management of solid waste in certain Zones I and II of the city of Gurugram.
- To investigate the connection between people's awareness and their actual behaviours about the management of solid waste in the community.
- to make suggestions for workable solutions that will result in the successful application of solid waste management procedures.

Hypothesis

- The participatory waste management model is not holistically implemented in Zone I and Zone II of Gurugram district due to the lack of systematic integration of stakeholders in the solid waste management system.
- There is a significant relation with respect to awareness and practise on solid waste management among the community people in Zone I and Zone II of Gurugram district.

Methodology of the Research

The research has utilised a descriptive design in order to capture the current state of affairs in the field of study at the point in time when the inquiry is taking place. The researcher has purposefully relied upon a positivist world view to summarise the state of circumstances that are the focus of the investigation; as a result, the methodology is predominately quantitative. An inquiry is conducted into the level of knowledge and impression that individuals have regarding solid waste, as well as their engagement in waste management and the problems that are associated with these topics. The purpose of this project is to provide a

detailed description of the many factors in order to investigate the part that each household respondent plays in the efficient management of the solid waste that is produced. The responses from homes are compiled into a more coherent whole because to its design, which is one of the many reasons it is so beneficial. This, in turn, would help in deciphering the subject matter from numerous vantage points in a deductive manner and developing a comprehensive solution to the same in an inductive manner. Within the context of a descriptive design, the research also incorporates a qualitative component. This is accomplished by collecting qualitative data from one of the homes who participated in the study and presenting it in a narrative format in order to verify the findings as a whole.

Population and Sampling Procedure of the Study

The current research was carried out in Gurugram, which is located in the state of Haryana, in order to gain an understanding of the solid waste management techniques that are in place in the city of Gurugram, as well as people's engagement in the management of solid waste. Only two of the four Zones were included in the present study, Zones I and II (225 houses each), for a total of 450 families that served as respondents for the purpose of gaining an understanding of their perspectives about the management of solid waste. The topic is examined from a variety of perspectives throughout the course of the study. The amount of solid trash that is produced by households in the area will serve as the starting point for the investigation. When looking into the issue of waste generation, the focus of the study is on the type of garbage produced, the amount of waste produced, and the factors that contribute to the production of waste in excessive quantities. The 'management' component is another main point of the research that has been done. The terms "collection," "segregation," and "disposal and recycling" are going to be the primary focal points of the inquiry into waste management. Given that the purpose of the study is to determine the role that home respondents play in the efficient management of solid waste.

Tools of Data Collection

- Socio-demographic data sheet
- Interview schedules on solid waste and waste management that were developed for the houses that responded to the survey.

The socio-demographic data was prepared in order to offer questions to the respondents, which included information regarding their age, education, sex, religion, dwelling type, and other characteristics relating to the topic. Details such as socio-economic situations, the type of profession, leisure features, and sources of revenue for the livelihood have also been included as part of the study and obtained using the socio-demographic schedule. This information was gathered as part of the research process. In addition, a detailed interview schedule was established with the purpose of eliciting the respondents' perspectives on the generation, segregation, disposal, recycling, and reuse of solid waste. In addition to determining the responses' perceptions, the respondents' levels of knowledge on the management of solid waste were also evaluated. The use of the schedules has allowed for the identification of the respondents' perceptions and levels of knowledge in relation to the management of solid waste.

Method of data collection

Face-to-face interviews with the households that responded to the survey were used to acquire the primary data. The primary data was gathered over the course of a period of six months, beginning in June 2020 and ending in November 2020. The duration of each interview was twenty-five minutes. The secondary data that was necessary for the study was gathered from a variety of sources, including journals, reports, periodicals, books, seminar sessions, government publications, websites, policy and programme notes, and other documents connected to waste management.

Data analysis

In order to conduct an analysis, the main data that was gathered from the field was reviewed, revised, categorised, and coded. The initial investigation of the data consisted of a descriptive statistical analysis of the primary factors that were being investigated. Tables and figures are used to present the results of this process, which include frequency distributions, percentage breakdowns, means, and standard deviations. Inferential statistical methods are utilised as well, and the findings are summarised in tables for your convenience. Statistical Package for Social Science, Version 25 was used to perform an analysis on each and every piece of primary quantitative data.

Limitations of the study

- The scope of the study is limited to just two areas in Gurugram: Zones I and II.
- The only people who have been taken into consideration are stake holders from Zones I and II in Gurugram.
- The production of garbage by industries and other large-scale commercial parties was not taken into account at any point in the analysis.

Problems encountered in solid waste management service in Zone I and Zone II

- Insufficient service coverage (some people not given service)
- An unacceptable level of service (not frequent enough, spill, etc.)
- The inability to make administrative and financial decisions due to a lack of power
- An insufficiency of available financial resources
- A lack of staff with appropriate training
- A dearth of available vehicles
- A lack of necessary apparatus
- Old vehicle/ equipment frequent breakdown
- Difficulty in acquiring replacement parts
- An inability to do maintenance or repairs on the vehicle or the equipment
- There is no uniformity in the vehicles or the equipment.
- Lack of an adequate institutional framework for the administration of solid waste services

- The absence of legislation 14. The absence of enforcement measures and the competence to implement them
- A failure to plan ahead (short, medium and long term plan)
- Rapid urbanisation is outpacing the capability of service providers
- The unchecked growth of illegal squatter settlements
- It is difficult to find and purchase a location for a dump.
- Cover material is difficult to get as a result
- Unsatisfactory collaboration on the part of government agencies
- a lack of cooperation from the general public 22. an unchecked use of packaging material 23. an inadequate reaction to the reduction of trash (reuse and recycling)
- 24. A scarcity of private contractors with the necessary qualifications
- 25. Difficult to control contractual service
- 26. An absence of regulation regarding hazardous waste

Results and Findings

- In Zone I, the majority of the stakeholders, which accounts for 58 percent, are between the ages of 30 and 40 years old. This is followed by 27 percent of the stakeholders who are between the ages of 20 and 30 years old. Eleven percent of respondents are between the ages of 40 and 50 years old, and four percent of respondents are between the ages of 50 and 60 years old. In Zone II, the majority of the stakeholders are between the ages of 30 and 40 years old (52 percent), followed by 26 percent of stakeholders who are between the ages of 20 and 30 years old, 19 percent of respondents who are between the ages of 40 and 50 years old, and 3 percent of stakeholders who are between the ages of 50 and 60 years old.
- An examination of the data according to gender reveals that the proportion of male respondents in Zone I is 52 percent, which is a little higher than the proportion of female respondents in that zone, which is 48 percent; however, the proportion of female respondents in Zone II is 58 percent, while the proportion of male respondents in that zone is 42 percent.
- The methods pertaining to the effective execution of solid waste management, such as timely collection of garbage, suitable route plan for waste collection vehicle, and landfill management, are not being properly executed. As a result, it has come to light that the management of solid waste in the municipalities that were chosen suffers from an absence of adequate execution.
- The findings of the study indicate that the majority of the garbage produced is plastic waste.
- Based on the findings, one can draw the conclusion that the inhabitants collect rubbish in their homes using containers made of plastic. For the collection of the waste from the household, you need no more than two containers of a more compact size. The residents of the city do not cover the trash cans that are kept inside their homes. The dry trash and the moist trash are not collected in distinctive containers because this practise is not followed.

- After much consideration, it has been determined that residents should empty the container used for the collection of home garbage once per day or once every other day into a public bin or a waste collection vehicle.
- It has come to light that municipalities place garbage collection vans at the doorsteps of residents in order to facilitate garbage collection. However, residents are forced to contend with rubbish collection vans that operate inconsistently. The majority of the time, waste collection vehicles are completely stuffed with waste as they travel from house to house collecting it.
- The findings of the study indicate that the amount of waste produced each day is a significant factor in determining the kind of vehicle used by town municipalities for the collection of garbage.
- The findings lead us to the conclusion that certain municipalities and districts do not routinely replace the public waste containers.
- It has come to light that the machinery and tools utilised for the management of solid waste in the municipalities of the selected towns are antiquated. Since new equipment is not purchased as frequently as it should be, this has a negative impact on the collection and transportation of solid waste.
- It has been determined that the number of transport vehicles for solid waste management in the selected town municipality is insufficient due to either a shortage of funding or the redirection of funds to any other project.
- It has come to light that the transport trucks utilised for the collection of solid trash in the municipalities are not kept in the appropriate condition due to the difficulties associated with management and the improper management of monitoring procedures.
- Based on the findings, it can be deduced that the residents of the selected municipalities do not have adequate knowledge regarding the management of solid waste.
- Based on the evidence presented, it can be deduced that the residents of the municipalities under consideration do not provide the level of cooperation that is required for effective management of solid waste.
- In conclusion, it can be stated that the aforementioned issues pertain to the management of solid waste in the communities that were chosen. 1) A failure to properly plan and carry out the action. 2) An insufficient amount of motivation among the personnel 3) The utilisation of antiquated machinery for the collecting of solid waste. 4) The utilisation of vehicles that are not suitable for the collection and transportation of waste. 5) Inadequate vehicle upkeep and repair 6) Poor public bin management. 7) An insufficient amount of financing from the government 8) A lack of understanding on the part of the general population regarding the management of solid trash 9) A lack of participation from the general population in the management of solid waste
- It has come to light that the various stakeholders in the municipalities that have been chosen have the following challenges with relation to the management of solid waste.
 - A lacklustre attitude among the personnel. 2) Inadequate methods of trash disposal. 3) The lack of awareness among the general people. 4) A failure to

adequately plan and carry out the action. 5) There is insufficient waste management in public areas. 6) A failure to properly manage landfills.

- The research indicates that the performance of the selected municipalities with regard to the timely collection of waste, waste disposal methods, budgetary allocation, placement of public bins, regular replacement of public bins, adequate equipments for waste collection, and dumping site management is average. On the other hand, the research indicates that the performance of the selected municipalities with regard to the separate collection of dry and wet waste is poor.
- Given the current state of affairs, it can be deduced that public bin sites, the frequency of waste collection, the techniques of waste collection, the methods of waste separation, and the waste recycling system that are put into place in municipalities are not satisfactory.
- We have reached the conclusion that there is no feedback system about the practises of solid waste management in the areas that were selected.
- The majority of the extra garbage generated by floating populations is controlled by increasing the number of temporary staff members involved in the process of solid waste management.
- The floating population may produce a maximum of ten tonnes of garbage that is in excess of what is needed.
- 22 The majority of the cities and towns have their very own composting facility.

Suggestions for solid waste management

- Educate people and raising awareness about waste management
- Encourage laws that deal with proper waste disposal.
- Regulations regarding negative externalities (people/industry/institution etc. are not willing to reduce their garbage and this harmful behaviour should be punished)
- Make Effective waste management systems and resource management plans
- Re-use and recycling of materials
- Use a reusable bottle/cup while travelling
- Use reusable bags
- *Composting/Organic Waste Recycling*
- *Waste to Energy Incineration*
- Choose sustainable plastic-free options Such as:
 - Locally made
 - Plastic-free
 - Sustainable
 - Cruelty-free
- Avoiding toxic waste
- Such as : Bleach, furniture, carper or oven cleaners, air freshener, antifreeze, all-purpose cleaners etc.
- Saying NO to single-use plastics

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