

Literature Survey on Assessing Solid Waste Management Strategies : Challenges and Solution

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Abstract

This paper investigates solid waste management strategies in Gadchiroli, a region experiencing significant challenges due to escalating waste generation driven by population growth and evolving lifestyles. Improper waste disposal has led to adverse health and environmental impacts, underscoring the urgent need for effective waste management systems. Through a comprehensive review of existing literature and case studies from Indian cities such as Sholapur, Indore, Nagpur, Salt Lake City, and Khamgaon, the study identifies common issues, including illegal dumping, inadequate infrastructure, and low public awareness. To address these challenges, the study proposes actionable recommendations, such as enhancing community engagement, adopting the 4R principles (Reduce, Reuse, Recycle, Recover), and improving infrastructure for waste collection and recycling. These measures aim to mitigate the detrimental effects of improper waste management, safeguard public health, and foster sustainable urban living conditions in Gadchiroli and similar regions. The findings contribute valuable insights into developing robust and scalable waste management solutions for rapidly urbanizing areas.

Key Words: Municipal Solid waste management, 4R principles

1. INTRODUCTION

Population is increasing day by day, and with it, solid waste generation is also gradually increasing. The management of solid waste is one of the most significant issues for a healthy lifestyle and a safer environment. In many cases of solid waste management, it has been observed that there is public apathy and a lack of coordination between different civic bodies.

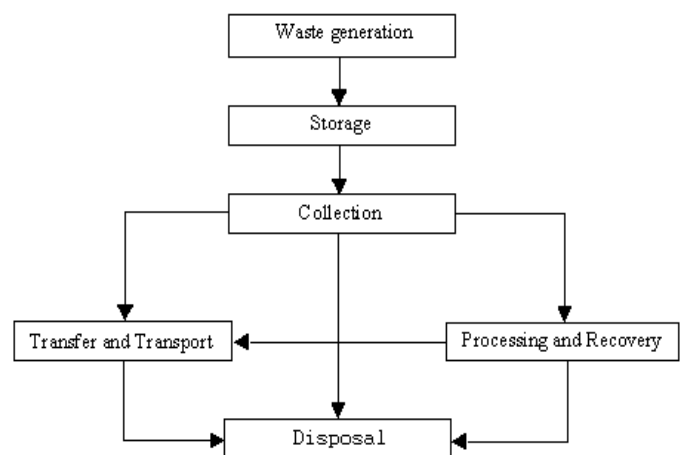
Modern and unorganized lifestyles are putting great pressure on natural resources. To cater to the needs of people, various products are created. The specialized products made by industries demand careful handling and treatment. Disposal of solid waste without proper treatment negatively impacts soil, water, air, human health, and aesthetic value. Uncollected waste accumulates on the

streets, public areas, and vacant lots, leading to the creation of illegal open dumps. Residents may simply throw their waste into the nearest stream or burn it.

The course forms the basis for helping students understand solid waste management, health theories, concepts, and practices. It also equips students with the knowledge, skills, and attitudes needed to manage hazardous and electronic waste. The main solid waste generators are households, commercial areas, public areas, RWAs (Residents Welfare Associations), public and community toilets, offices, and schools. These generate large quantities of solid waste daily, which must be processed and disposed of properly.

Waste management involves the collection, transportation, processing, recycling, disposal, and monitoring of waste materials. It relates to discarded materials produced by human activity and is generally undertaken to reduce their impact on health, the environment, and aesthetics. Waste management is also carried out to recover resources from waste. It involves the use of solid, liquid, gaseous, or radioactive substances, with different methods and fields of expertise applied to each.

The primary sources of municipal solid waste include waste generated from domestic, institutional, and commercial activities, as well as garden and municipal services. Domestic waste is produced in large quantities and varies with time and season.



2. STUDY AREA

The study is being conducted in Gadchiroli city. In ancient times the region was ruled by the Rashtrakutas, the Chalukyas, the Yadavas of Deogiri and later the Gonds of Gadchiroli. Gadchiroli district was carved out on the 26th of August 1982 by the division of erstwhile Chandrapur district. Total population of the district is 10, 72,942. The Surjagarh region of Gadchiroli is among the largest reserves of iron ore in Maharashtra.

3. LITERATURE REVIEW

Sanket Talewar & Anurag K. Gahalod (2023) studied on solid waste management for Kanhan city. It points out that a lot of waste comes from homes, businesses, and public places. The paper highlights problems with the current waste management system, such as illegal dumping and ineffective collection methods, which can harm people's health and the environment. To improve the situation, the study suggests better waste management strategies, like recycling, proper disposal, and recovering energy from waste. It recommends actions such as stopping open waste storage, making sure waste is collected from people's homes, and using better disposal methods.

Joy Karmakar (2023) worked on challenges of Municipal Solid Waste management in Kolkata. The situation in Kolkata Metropolitan Area (KMA) reflects broader trends observed in urban waste management across Indian cities. Addressing these challenges requires targeted improvements in waste segregation practices, infrastructure development, and the expansion of waste processing facilities to ensure sustainable waste management in the face of increasing urbanization. A better waste collection system is needed to save money and work more efficiently. The paper calls for better infrastructure, funding, and strategies to address these issues. The paper references various studies on waste management in India and globally, highlighting ongoing challenges and solutions.

Rasmeet Singh et. al. (2021) studied on solid waste management in Indore city aims to analyze the current situation of waste generation, collection, transportation, and disposal. This study provides readers with a clear understanding of the existing Municipal Solid Waste Management (MSWM) system in Indore. The plan is developed by closely monitoring key parameters such as population density, road connectivity, waste generation and disposal capacity, and the transportation of waste from collection sites to disposal sites. The study highlights the complexities of municipal solid waste management in urban areas and underscores the need for integrated, inclusive, and innovative approaches to address these challenges. It also emphasizes the importance of public awareness, institutional capacity, and technological advancements in achieving effective waste management. The study includes the implementation of centralized composting plants and

bio-methanation facilities for generating Bio-CNG. Indore has achieved 100% door-to-door waste collection and source segregation, setting an example for other cities to follow.

R. Gajalakshmi & S. K. Manivannan (2020) studied focuses on solid waste management in Chennai, India, and its effects on health and the environment. It examines the volume of waste generated and the risks faced by waste collectors. The study highlights health and environmental issues caused by improper waste disposal, such as harmful gases and contaminated water. The paper emphasizes the need for improved waste management practices and increased public awareness. It suggests promoting recycling, composting, and adopting the 5R principles (Recycle, Reduce, Reuse, Refuse, and Recover).

V.N. Patil & R.S. Patil (2018) focused on solid waste management (SWM) in Ichalkaranji city, Maharashtra. The paper examines the current scenario of SWM in Ichalkaranji, highlighting its pros and cons, and discusses the need for treatment facilities in the future, along with some environmental implications. The study evaluates how solid waste is managed in Ichalkaranji, where current waste management practices are insufficient, with much of the waste not being treated properly. The amount of waste is increasing due to the city's growth and rising consumption.

The paper suggests that adopting the 4R technique (Reduce, Reuse, Recycle and Recover) in current practices could save costs and improve the administration's potential for effective SWM. The investigation reveals that the current waste management processes need to be coupled with a refuse-derived energy recovery system, which would add economic value and lead to more effective waste management practices. The study also suggests that waste management can be improved through better practices and greater public awareness. Sustainable waste management in the city requires better facilities and community involvement. Additionally, the study identifies different types of waste, including municipal (household), industrial, and biomedical waste.

D.S. Salgude (2017) conducted a review on solid waste management and recycling to understand the waste generation rate and the corresponding management approach using qualitative techniques in Nashik city, Maharashtra. Both qualitative and quantitative data were collected through a feedback assessment test. Approximately 350 tons of waste are generated in the city each day. The simplest way to reduce waste is to treat it as a resource that can be reused or recycled. This approach helps conserve resources, reduce pollution, save energy, and assists the Earth in coping with human demands.

In the future, there could be a drastic reduction in waste if more manufacturers design and produce durable goods that are easy to disassemble, repair, reuse, or recycle. Solid waste is first sorted and then processed through various recycling

methods, such as biomethanization, inert processing, windrow processing, and refuse-derived fuel (RDF) plants. The non-recyclable waste is sent to sanitary landfills. The reprocessing and reuse of waste plastics help reduce the use of natural materials and energy, leading to a decrease in carbon dioxide emissions.

Nashik has taken a leading role in the scientific management of municipal solid waste, in line with the Municipal Solid Waste (Management and Handling) Rules, 2000.

Ashwini S. Bhagat (2017) conducted a study on solid waste management in Khamgaon City, with a particular focus on children, rag pickers, and employees working in the waste management sector. Solid waste is generated from various sources, including domestic households, commercial establishments, industrial activities, medical facilities, and institutions. A significant percentage of workers who handle refuse, as well as individuals living near or on disposal sites, are at risk of infections caused by gastrointestinal parasites, worms, and other related organisms. Contamination is prevalent at all stages where waste is handled. Gases are produced in landfills through anaerobic digestion by microbes, commonly known as "landfill gases." These gases consist of approximately 45-55% methane, which can be captured through a network of gas collection pipes and converted into a source of energy. Given the expansive area around Khamgaon City, the process of sanitary landfilling can be easily adopted and proven to be one of the most effective methods of waste disposal.

Bhushan R. Ambade et al. (2015) studied on Opportunities and Challenges in Municipal Nagpur has a population of over 2.8 million and generates approximately 905 tons of waste per day over 100 tons of the daily generated waste are sent to the landfill without processing due to limited processing plant capacity. additional issues include inefficient waste segregation, unscientific dumping practices, and unauthorized access by animals and rag pickers, enhancing waste segregation at the source, Increasing the processing plant's capacity, implementing daily compaction and covering of waste, ensuring proper monitoring of landfill gas and leachate to prevent environmental contamination, Conducting regular health checks for workers.

B.L. Chavan and N.S. Zambare (2014) conducted a study on Municipal Solid Waste Management (MSWM) in Solapur city. The study primarily focused on investigating the present status of MSWM. A detailed study was conducted, covering the methods and practices associated with the generated quantity of waste, its collection, transportation, treatment, and disposal in the city. An anaerobic digestion treatment plant is under development to extract energy from organic waste by generating biogas. The combined effects of uncollected waste, poor handling, and inadequate disposal safeguards for municipal waste have significant implications for public health, increasing the risk of disease transmission,

the spread of epidemics, and the loss of a healthy, urban, and amenable environment.

B.K. Bhattacharyya et al. (2011) conducted a study on Municipal Solid Waste Management (MSWM) in Salt Lake City, West Bengal. The study, undertaken in 2011, aimed to understand the challenges and perspectives associated with solid waste management in the city. It focused on the collection and disposal of municipal solid waste, an issue exacerbated by rising consumption levels.

The investigation included a detailed analysis of the methods and practices related to the sources, quantity of waste generated, collection, transportation, storage, treatment, and disposal of municipal solid waste in Salt Lake City. The city comprises a total of 78 blocks. Greater priority must be given to municipal solid waste management by the local authorities, with a systematic approach being essential to optimize the entire SWM process. This approach should include segregation of waste at the source, timely and efficient collection, optimization of transportation routes and vehicle types, as well as the development and proper management of a sanitary landfill site.

3. CONCLUSIONS

The research highlights that cities are facing big problems with waste management due to growing populations and changing consumer habits. A detailed study comprising the method of practices associated with generated quantity of waste, collection, transportation, treatment and disposal of (MSW) in city was conducted. To improve the situation, the study suggests better waste management strategies, like recycling, proper disposal, and recovering energy from waste. The complexities of municipal solid waste management in urban areas and the need for integrated, inclusive, and innovative approaches to address the challenges. The paper also encourages following the 4R's principle: Reduce, Reuse, Recycle and Resources Recovery to improve waste management in the city. Many cities have trouble collecting and transporting waste properly, which can harm health and the environment. Waste workers are especially at risk because of poor working conditions. The paper suggests that cities need to improve their waste management practices, raise public awareness, sort waste at the source, recycle more, recover energy from waste, and build better infrastructure. Overall, there is an urgent need for better waste management strategies to protect public health and the environment.

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