



An analytical study of reducing the generation of solid Municipal waste to check the rate of pollution and develop sustainable economy

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Abstract

Background- In recent years, India's unsolved municipal solid waste management (MSWM) issue has been exacerbated by exponential population expansion, high urban density, diversified culture, changing dietary preferences, and lifestyles. As a result, communities have had to deal with a slew of additional difficulties relating to solid waste collection, treatment, and management. The current work is a thorough assessment that summarises the current state of SWM in India, identifies related obstacles, and derives prospective MSWM solutions. **Goal-** The goal of this study is to find out the ways through which the generation of solid waste from Municipalities can be reduced and a sustainable economy can be maintained. **Methodology-**A combined methodology approach was used to produce the best possible results. This research included both primary and secondary sources. Both primary and secondary approaches were used to obtain data. The original sources were acquired via questionnaire dissemination. A total of 60 people from various Indian firms took part in this poll. Published papers, journals, websites, and other credible sources were used as secondary sources. **Results-** The result of the study is reflecting the fact that the solid waste generation from the Municipalities have to be checked so that people can get a sustainable economy.

Key words- Municipal Solid waste, Sustainable economy, disease, generation.

INTRODUCTION: -Residential, industrial, institutional, commercial, municipal, and construction and demolition trash are all examples of municipal solid waste (MSW). MSW is defined as garbage collected by the municipality or disposed of at a municipal waste disposal site. MSW is also known as garbage or garbage. With a population of around 1210 million people, the country's urban population is more than 377 million people, accounting for 31.16 percent of the overall population. Due to migration and loss of natural resources, municipalities with such a high pace of urbanisation are confronting an additional load on



their socio-economic and environmental prospects. According to India's central pollution control board (CPCB), per capita garbage creation has grown exponentially (0.26 kg/day to 0.85 kg/day) (CPCB India). It is believed that 80 to 90 percent of municipal trash is disposed of in landfills without suitable management procedures or open burning, resulting in contamination of the air, water, and soil. This article is being written in order to understand the ways through which the generation of the solid waste can be done in a proper manner and also the sustainability can be totally maintained. Unsorted solid waste at the source, societal taboos, citizen attitudes, poor evaluation, insufficient potential options, an unorganised informal trash industry, unprepared fiscal policies, and poor government policy execution As a result of the discussion in this review paper, there is an urgent need for appropriate treatment and recycling techniques to be implemented in accordance with the Indian solid waste composition. Through different scientific treatment methods, the relevant consequences of prospective MSW solutions at the centralised and decentralised levels must be emphasised. As a result, municipalities must concentrate on establishing prospective possibilities, as well as including the informal sector and commercial organisations, in order to realise the long-term aim of MSWM sustainability for Indian cities.

Literature survey

The quantity of MSW created is also affected by living standards, the size of the economy, the kind of business conducted, eating habits, and geographical and climatic circumstances. Migrants looking for work exacerbate the problem. According to the latest statistics from the MNRE Report, India is now producing roughly 145 million tonnes of garbage per year and is predicted to reach roughly 260 to 300 million tonnes per day by 2047. According to the CPCB, around 117,644 MT was collected in India, with just 49,401 MT being processed. Waste landfills, according to estimates, will demand around 1400 square kilometres of land by the year 2051. It should be emphasised that trash output, land requirements, and population expansion have all increased over time, resulting in a shortage of suitable dumpsites.

Therefore, it can be said that there are many methods or initiatives that are being taken by the State for developing some methods of establishing a sustainable economy. However, in the similar fashion, one must try to work for the development of the environment through solid Municipal Waste reduction. However, it has been seen that the methods of waste reduction



are not designed in a sustainable way. In order to reduce the waste, often the dumping methods are used. The dumping or the landfill methods are used in order to ensure that the waste gets destroyed. However sufficient emphasis have not been given in designing the methods in a sustainable way. There is the requirement of more land cover area so that the landfilling or the other methods can take place in a proper manner.

II. RESEARCH METHODOLOGY:

2.1 Research Approach:This research survey, which was conducted at the request of the investigator among 60 postoperative workers from India, employed a descriptive survey approach.

2.2 Population and Sample:Residents from various locations of India were included in the study's sample. For this investigation, around 60 people were chosen. Residents were given questionnaires to complete in order to get replies.

2.3 Research Tools:The research used in this study was descriptive or analytical. The researcher would examine and do a descriptive study after obtaining data. Researchers will employ the following data collection strategies.

2.4 Data Collection Method:A primary source is a site where we may receive first-hand information or authentic facts about a topic. Solid waste management (SWM), which is a serious concern in developing countries like India, was the primary study goal. India's population, which now stands at 1.2 billion people, is predicted to grow at a rate of 3-3.5 percent every year. Rubbish output is increasing at a rate of around 5% per year, whereas garbage production per capita is increasing at a rate of 1.3 percent per year.

Secondary Data Collection

Businesses, newspapers, and publications were used to acquire secondary data. This is a minor but important part of the research. Websites, journals, books, published papers, and an organization's records would all be used to obtain information for this part. This information will be gathered and recorded by another person or organisation, for a variety of reasons..

2.5 Statistical Analysis:The quantitative testing was carried out using SPSS Statistics 28, a widely utilised statistical programming application. The images and tables were created using Microsoft Word and Microsoft Excel.

III. RESULTS AND DISCUSSION:

3.1 Availability of sufficient dumpsites for the landfilling of solid municipal waste for disposal

	agree	Strongly agree	disagree	Strongly disagree
Availability of sufficient dumpsites for the landfilling of solid municipal waste for disposal	5	5	20	30

Table 3.1- Availability of sufficient dumpsites for the landfilling of solid municipal waste for disposal



Fig 3.1- Availability of sufficient dumpsites for the landfilling of solid municipal waste for disposal

It is evident from the chart that there is a huge lag in the total land area available for the dumping of the solid Municipal Waste. It is for this reason that all the wastes are not properly decomposed. This gives rise to the gradual increase in the overall accumulation of the wastes and the environment is damaged due to this. About 30(50%) of the total respondents have said that there is no properly availability of land cover available for the decomposition procedures to be carried on properly.

3.2 Composition of wastes that makes up the solid waste in the typical cities of India

	Food waste, trimmings from garden, biodegradable waste	Constriction waste, Inert Silt	cloths	Glass or metals
Availability of sufficient dumpsites for the landfilling of solid municipal waste for disposal	30	19	6	5

Table 3.2 Composition of wastes that makes up the solid waste in the typical cities of India

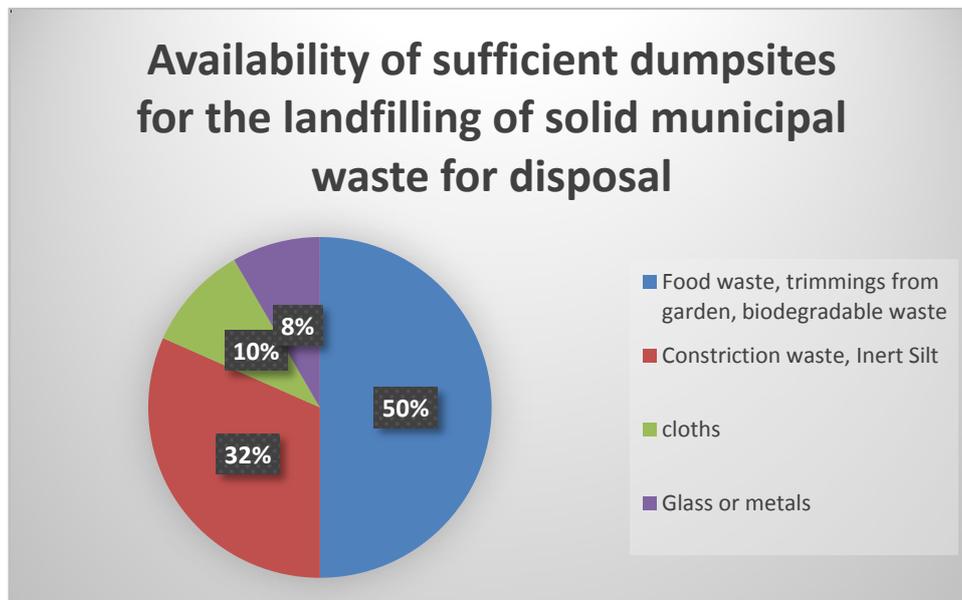


Figure 3.2 Composition of wastes that makes up the solid waste in the typical cities of India



It is evident from the figure 3.2 that there are different types of wastes that are generated from the different sources. It is needed that there is a proper classification of the waste so that the right corresponding measures can be taken. About 30(50%) of the respondents have said that the major amount of waste is from the gardening, biodegradable wastes and others that accumulate on the solid. These solid wastes cannot be decomposed just by adopting the method of landfilling. It is for this reason that proper land areas must be made available.

Discussion

As per the earlier literature Environmental deterioration has a strong link to human health (Shukla et al., 2000). Without the usage of suitable gloves, uniforms, and safety equipment, both formal and informal employees are exposed to direct health risks. Those who reside near the dumping site are infected with a high proportion of gastrointestinal parasitic worms. Open dumps generate methane as a result of biodegradable garbage breakdown in anaerobic circumstances, which has been linked to fires and explosions, and is a significant contribution to global warming. There are issues with aroma and leachate migration into receiving water and soil. Discarded tyres at landfills absorb water, enabling mosquitos to reproduce and spread illnesses including malaria, dengue fever, and West Nile fever. Uncontrolled waste burning at dumpsites releases fine particles and smog, which are a significant cause of respiratory diseases (harmful gases such as CO, CO₂, PM_{2.5}, Mercury, and polycyclic aromatic hydrocarbon (PAHs), plastic pyrolysis, and even arsenic in water cause cancer and death in newborn babies and adults). The ocean's ecology and food chain are being disrupted by microplastic. Total H₂S and COS are removed from syngas using ZnO nanosheets (ZnO-nS). According to the Ministry of Urban Development of India's expert committee, substantial capital and maintenance costs in class 1A cities were between Rs. 900 and Rs. 269 per capita/year (Mani and Singh, 2015). Municipalities and urban local governments are suffering due to a lack of financial and managerial systems in the garbage sector, as well as a lack of comprehensive strategy. As a consequence, non-segregated garbage is not lucrative, thus it is not used or stored. The government of India has sanctioned grants and funds under the 12th and 13th finance commissions for projects such as JnNURM and UIDSSMT, with a total budget of Rs.20000. However, as per the past investigations by Di Maria et al (2020) the allocation of the budget are not being distributed uniformly for the waste reduction system in India.



As per the earlier works conducted by Abas & Wee (2014) crores provided under the Swachh Bharath Mission when developing national policy, one of the top objectives should be the management of solid waste created in a country (Abas and Wee, 2014). Economic expansion, migration from cities, unplanned land use, and, most crucially, a lack of effective solid waste management law are the key factors, especially in metropolitan areas. The institutional framework for solid waste management is currently being developed. The Ministry of Urban Development (MoUD) of the Indian government is in charge of the Swachh Bharat Mission (SBM). Local municipal bodies (ULBs) must make cities open defecation-free and concentrate on the SWM system with social goals as part of a nationwide campaign (Mani and Singh, 2015).

Because segregation is uncommon, governments often collect unsorted garbage on a daily basis with the support of an insufficient number of employees; rubbish collection is done door to door on a manual basis from severely crowded and narrow streets. According to the report of State Pollution Control Boards/ Pollution Control Committees (from 2009 to 2012), the nation produced 127,486 tonnes of MSW per day in 2011–12, of which 89,334 tonnes per day (70 percent) was collected. Solid trash is mostly disposed of in communal and individual containers. Residents often use the single mixed garbage can, which is often discovered unmanaged and full with leachate, particularly during wet seasons. In most cities, solid trash collection vans come on a weekly basis; when trucks seem to be uncovered, holding insufficient capacity, and using conventional and manual collecting techniques. Even more difficult is the shortage of land for trash disposal.

Municipalities are having trouble managing their garbage treatment processes. It should be emphasised that Indian states have handled their solid waste, despite the fact that treatment plants are still insufficient and want more. The variability of recycling plants is the most major difficulty they confront. As a consequence, treating solid waste to create bio-methanation, waste to energy, and composting seems to be in its early phases. Unscientific garbage disposal, usually at open dumps, is a frequent practise; around 90% of all trash is still dumped on open grounds, and covered sanitary landfill facilities are uncommon. In the big centres, landfill sites are running out of space. It should be noted that the terms scientific reclaimed/capped; 40; and landfill turned into sanitary landfill; 21 are very uncommon in Indian states, with a total number of dump sites of 2120. (CPCB India, 2018a). According to



a 2015 CPCB study, India's seven megacities accounted for roughly 48 percent of the country's total methane emissions from disposal sites. In addition, the proper disposal of sanitary, battery, E-waste, and other hazardous waste must be integrated into different treatment procedures independently (Rarotra et al., 2020)

In terms of ambient air quality, groundwater, leachate/compost quality, and volatile organic components, the monitoring system is in poor shape (VOCs). These problems must be addressed as soon as possible, using long-term scientific methodologies and taking into account environmental impact assessments.

Therefore, it is evident from the earlier literature that although efforts are undertaken by the Government to reduce the solid waste generation from the Municipalities. However, at the same time, the Governing bodies and the State have not been able to make the designing of the waste disposal; methods in an eco-friendly, cost effective and sustainable manner. This is because there is a huge deficiency in the overall classification of the wastes. Efforts have to be made in order to increase the knowledge of people and also help them to work in a sufficient and proper manner. More awareness on the part of the residents in different parts of India have to be developed so that they can work for the overall conservation of the ecosystem.

IV. Conclusion:

Despite its potential, India's towns still see garbage as an issue. If garbage is not separated at the source, this becomes more difficult with a large population density. Due to a lack of adequate evaluation of the amount and quality of SW and infrastructure. India, being a developing nation, is confronted with significant MSWM difficulties. The social taboo around solid waste management and citizens' attitudes toward it needed to be addressed (how? are there any national or international best practises to help us?). Many municipal city case studies have shown a favourable intention to establish a good system for their solid waste by using adequate composting and biogas producing facilities at the decentralised level. However, it was discovered that the majority of the other municipalities are still in the early stages of development. Municipalities should strive for good solid waste management as a long-term aim. Because the composition of Indian trash differs from that of other industrialised nations, alternative techniques may be required. It is evident from the study that there are some of the methods that have been undertaken by the Government to solve the



issues of solid municipal waste management. However, it is for this reason that the study has opened many paths for the future researchers so that they can work for finding out the methods through which the total land cover area will be developed that will not hamper the overall generation of the waste.

V. IMPLICATIONS OF THE STUDY:

ENVIRONMENTAL SCIENCE PRACTICE: - Environmental science professionals will be able to identify ways to educate and develop the knowledge and attitude of environmental science students on life skills.

ENVIRONMENTAL SCIENCE EDUCATION: - As an environmental science instructor, there are several possibilities to teach environmental science students about life skills that will help them to adopt good behavior and adjust to their circumstances.

ENVIRONMENTAL SCIENCE RESEARCH: -The study's results contribute to the scientific body of information, which may be used to undertake additional research.

VI. RECOMMENDATIONS:

- Recycling and processing of the waste required to be incorporated more efficiently. Therefore, the resourceful solid waste segregated at the respective sources such as wet waste for compost/biogas generation and dry waste to energy plants, RDFs, recycling, reuse. Hence to ensures that minimal waste reaches to dumpsites or engineered landfill sites. Other advanced treatment processes like gasification and pyrolysis need to assess economically, and environmentally with the scale before implementation.
- It is recommended that regular campaigns are developed on environmental education and protection of the natural resources so that the work can be done in a proper and effective manner.

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