

# Key challenge and Deficiencies in the present Solid Waste Management System for Indian Cities

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**Abstract:**-- Waste management has become one of the major areas of focus in India after GOI's Swachh Bharat Abhiyan Initiative. India's urban populace is increasing at alarming rate and it is predicted that our waste production per capita will increase manifold along with rise in urban population from 377 Million in 2011 to 577 in 2030. An increase in population will further grapple Municipal waste management which still remains neglected at the current population levels. Civil Bodies are facing difficulties in the Solid waste management which is still one of the bottlenecks of urban development. This paper explores what are the inadequacies, inefficiencies, technological gaps and other allied issues posing challenges for the growth of solid waste management. Present in the municipal corporation SWM actions. Finally, we have attempted to provide a brief synopsis of SWM in context of Indian cities and various strategy that are being implemented to overcome prevalent deficiencies and play a seminal role in influencing the growth of this field.

**Index Terms**— Solid Waste management; Deficiency; Urban Development; waste collection.

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## I. INTRODUCTION

One of the most essential services for maintaining the quality of life in the urban areas and for ensuring better standards of health and sanitation is Solid Waste Management. With the boom in industrialization and population, there has been a mass exodus from rural areas to urban areas. This directly correlates with the per capita waste production which has increased manifold. In the coming decade India's GDP is expected to grow at an average 7.5%-8% per annum which will predicate the need for better and more stringent policies for waste management. As of 2012 India produced 1,27,486 tons of municipal solid waste per day (CPCB, 2012) which is still less than overall municipal solid waste production per day in United States of America, still India ranks behind USA in terms of solid waste management dissatisfaction index (Nationmaster, 2018), which is because of the inadequacies and inefficiency that are persisting in SWM (Solid Waste Management) throughout the country. These inadequacies involve lack of planning, education and improper allocation of resources as there is unplanned growth of urban areas, all these along with lack of seriousness among the authorities leads poor waste disposal habits. This study aims at highlighting major challenges that are being faced for SWM, along with a brief study of SWM system in context of major Indian cities.

## II. CURRENT SCENARIO FOR SOLID WASTE MANAGEMENT

Current SWM practice in India can be loosely categorized into 5 steps, where the first step is Segregation.

1. Segregation is still very unorganized, and sorting takes place under perilous conditions, also only those things are segregated which can offer higher returns on investment (Kaushal, Varghese, & Chabukdhara, 2012).
2. Next step is Collection, same vessels are used for collecting all the types of waste, including industrial and household waste (Kumar et al., 2009).
3. After collection comes Recycling, an unregulated segregation and collection leads to minimal possibility of recycling, Pondicherry however is an exception where rag-pickers absorb all the recyclable material, which finally finds its way into the market (Pattnaik & Reddy, 2010).
4. Transportation is one of the major step in the process, bull carts, mini trucks are often used for transporting. The problem that inhibit the transportation is that their maintenance is done by ULB's workshops which can only do minor repairing, so in case of a major overhaul the transportation system is crippled (Joseph, 2002).
5. The final step in the process is Disposal of the waste. The waste disposal raises major concerns because of the way

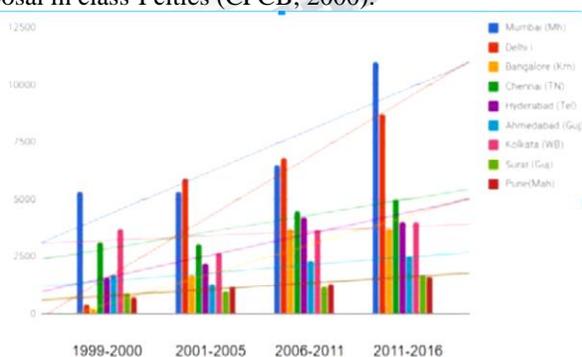
waste is disposed. In many places open dumping is practiced, in few cities disposing ground lies near river or pond thereby infecting the water bodies. Landfilling is the major way of dumping; however, the major cities are running out of land for dumping waste (Sharholly, Ahmad, Mahmood, & Trivedi, 2008).

**TABLE I.**

**City wise waste generation over given period**

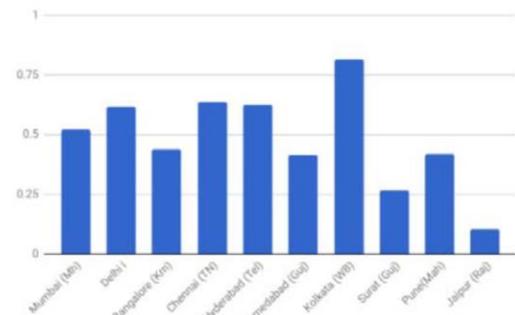
Sr.no	City	Population (2011)[3]	Waste Generation (TPD)			
			1999-2000	2004-05	2010-11	2015-16
1	Mumbai (Mh)	124,42,373	5355	5320	6500	11,000
2	Delhi i	110,34,555	400	5922	6800	8700
3	Bangalore (Km)	84,43,675	200	1669	3700	3700
4	Chennai (TN)	70,88,000	3124	3036	4500	5000
5	Hyderabad (Tel)	67,31,790	1566	2187	4200	4000
6	Ahmedabad (Guj)	55,77,940	1683	1302	2300	2500
7	Kolkata (WB)	44,96,694	3692	2653	3670	4000
8	Surat (Guj)	44,67,797	900	1000	1200	1680
9	Pune(Mah)	31,24,458	700	1175	1300	1600
10	Jaipur (Raj)	30,46,163	580	904	310	1000
11	Luck now (UP)	28,17,105	1010	475	1200	1200
12	Kanpur (UP)	27,65,348	1200	1100	1600	1500
13	Nagpur (Mh)	24,05,665	443	504	650	1000
14	Visakhapatnam (AP)	20,35,922	300	584	334	350
15	Indore (MP)	19,60,631	350	557	720	850
16	Thane (Mh)	18,18,872	--	-	-	700
17	Bhopal (MP)	17,98,218	546	574	350	700
18	Pimpri-chinchwad (Mh)	17,29,359	-	-	-	700
19	Patna (Bhr)	16,83,200	330	511	220	450
20	Vadodara (Guj)	16,66,703	400	357	600	700

Source: Status of MSW generation, collection, treatment and disposal in class-I cities (CPCB, 2000).



**Fig.1 Municipal Solid Waste generation in the given period for major Indian cities**

As shown in figure 1, it can be seen how waste production has been increasing continuously over the years. It can be clearly seen that Bigger cities like Mumbai and Delhi are the worst hit by waste management and production (~100% increase from year 2011-2016) issues compared to cities like Pune and Surat. Surat and Pune have managed to keep a track of SWM issues, but challenges still exist for them as they are among the fastest growing cities in India. They not only need to design a system which meets today's needs but also the one which can easily be scaled to meet increased demands.



**Fig. 2. Waste Generated(kg)/per capita/per day in major Indian cities**

It can be noted that smaller cities have a lower per capita waste generation then bigger city (refer fig 2). This can be attributed to the fact that larger cities have slew of industries, and more consumption of resources. Also, the larger the cities, the more difficult it becomes for the municipal corporation to manage waste which thus leads to more waste generation.

**III. DRAWBACKS IN THE PREVALENT SYSTEM**

The quality and quantity of MSW(Municipal Solid Waste) produced by a community differs corresponding to their socioeconomic status, culture, population, and commercial activities. A MSW system can be based on composition of waste generated as well as the quantity it is generated in. A majority of Indian waste is constituted as organic waste which is comparatively less hazardous than western countries. Managing municipal solid waste is becoming an arduous task due to its varying quality and increasing quantity ULBs are responsible for segregated waste collection, transporting waste in covered vehicle, processing, recyclables, separating domestic hazardous waste and disposing inert material in sanitary landfills. Urban Local bodies (ULBs) are responsible for the collection, processing, transportation and disposal of solid waste management in India. But, Efficient waste management services are lacking due to various drawbacks in

the system. Some of the reasons causing these drawbacks are technological setbacks, low funding, lack of awareness lack of adequate manpower, low redressal of complains, waste collection efficiency, waste processing methods, lack of knowledge, low implementation of rules, management of the institutional bodies responsible for sanitation works, government policies

The key drawbacks are described as below:

#### **A. Participation by the Community**

Presently, citizens throw their waste without any kind of segregation from their side to the streets, open area or local water bodies leading to improper collection points. Also, the Waste generated is not segregated at the source because of which at a later stage it becomes difficult to process the disposal of the wastage and finally also involve affecting the health and hygiene condition of the community. Long term Sustainability can be attained in the system by the community themselves taking responsibility and playing their role.

#### **B. Irregular Street Sweeping**

Inadequate planning for sweeping the areas, also the fact that no benchmarks are set are leading to inefficient street sweeping. Also lack of resources for sweeping like staff and tools are also reasons responsible for the same. Traditional methods are still used leading to ergonomic issues to the sweepers by which their efficiency decrease. Also, often the work distribution among sweepers is also irregular, making some overworked and some underworked.

#### **C. Unavailability of Storage at Source and Segregation**

There is no availability of storage at the source location in a segregated manner. Segregation of waste as per their degrading capacity is important and also segregation of hazardous waste. In such a situation, citizens tend to throw the garbage in the surrounding or in an unsegregated way.

#### **D. No primary waste collection system**

The waste is collected from littering, street sweeping and similar other places. The waste generation point should be ideally the primary point for collection of waste. Lack of coordination among the residents and unavailability of collection systems affect the environment and public health in a negative way. There is no door to door service for collection of waste for the source to avoid such situation.

#### **E. Unavailability of secondary storages for waste**

The Waste collection depots shall be an ideal way for secondary storage. Instead of this usually a concrete, masonry or other similar structures are built for collection without appropriate capacity in which the waste spills

making it unaesthetic for the city as well as creating unhygienic conditions for the citizens living in the surroundings.

#### **F. Traditional transportation systems**

Waste is transported by many different means around India at different places open carts, three wheels, tractors, trucks even hydraulic vehicles are also available with lifting facilities to avoid manual handling. The fleet of vehicles needs maintenance and have a service life. Most of them have crossed their service life. Also, these are inadequate in numbers causing overloading. The old methods create pollution and spread bad odor and unhygienic conditions around the public places it passes through.

#### **G. Methods of Processing of Waste**

No method of processing the waste is seen majorly before disposal. Only few cities are practicing some limited amount of processing that to at small scales and not very high efficiency. Some methods seen for processing in cities are vermicomposting, aerobic compost plants up to 700MT and also some unsegregated waste pits.

#### **H. Disposal of Waste**

Disposal of waste in generally done by dumping the waste in the dumping ground in city to suburbs extending to the city limits. This area becomes center for bad odors and mosquitoes and rodents leading to diseases among citizens nearby. Also, landfill sites cause to produces methane gas. Such methane gases has highly potential gas for causing global warming and fires. A case of Ahmedabad can be seen here at Pirana landfill site, where the landfill is located outside the city by it causes frequent fires due to amount of methane.

### **IV. STATERGIES TO OVERCOME THE CHALLENGES IN THE SWM SYSTEM**

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#### **A. Training & Public Awareness**

Training may be provided at different level of operations with the help of NGOs and private sector organizations. One

of the most effective ways to curb open disposal is to introduce stringent penalties for erring citizens.

#### ***B. Scientific approach for Sweeping***

Sweeping staff should be judiciously deployed by assessing the geography, street condition and area population. This kind of effective management would ensure distributed network of staff. Cleaning staff should be incentivized for their work and trained in effective ways to collect and dispose waste. They are the first point contact at the source and hence should be used as a medium of disseminating awareness.

#### ***C. Waste Segregation and Reuse***

Source segregation of waste should be encouraged and removal of waste at source by households, shops and establishments in two bins be insisted.

#### ***D. Provision of Adequate Collection Facilities***

All open waste storage sites should be discouraged and done away. They should be replaced with large containers of 4.5 to 7 cu.meters over some regular distance in the city. Municipal corporations should also encourage segregation by placing small litter bins at strategic places based on the occupancy.

#### ***E. Developing Strong Transportation Facilities***

All the areas should be provided with enough number of vehicles for transporting waste. The vehicles should be well equipped to make sure that there is no leakage of any waste material and proper compartment should be made inside the vehicle to make sure that segregated waste material does not end up mixing together. Vehicles can also be fitted with speakers to spread awareness among the population.

#### ***F. Setting up Transfer Stations***

City should be divided into smaller areas based on geography and each area should have transfer station, to which all the transport vehicles in that area would be reporting to and unloading the solid waste. Each intermediate transfer station will have bigger vehicles for efficient and cost-effective transfer of waste material.

### **V. CONCLUSION**

The aim of the study is to present an overview of Solid waste management system in India and highlight the important challenges that it is facing. There is a struggle to provide efficient waste management services, due to government policies, lack of funds, lack of infrastructure, technology and involvement of private sector. In a developing country like India a robust mechanism of SWM is must to bring about any change. Some methods of treatment

and disposal methods can be used at large scales and revenues can be generated. Challenges like lack of awareness, haphazard planning, underutilization of resources and lack of accountability cripples the system. A planned and proper SWM is must for sustainable development and can only be implemented by introducing adequate financial support, better use of data driven approach, disseminating awareness and proper utilization of resources along with scientific justification. All these challenges and solution calls for a major overhaul in the current SWM system which will lead us on the path of development and make us a robust economy.

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