

Solid Waste Management in Chandigarh – A Case Study

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Abstract : The management of solid waste has become a major cause of concern over the past few years in both developed and developing countries. With rapid increase of population, urbanization and industrialization, there has been a marked rise in living conditions of people and this had led to the generation of varied types of solid waste that needs to be effectively managed. For the sustainable development of any nation proper management of solid waste is very essential. Quantity estimation and characteristics of Municipal Solid Waste and its forecasting over the planning period is the key to its successful management plan. Given the existing scenario, the quantum of solid waste generated especially is set to rise in major cities due to more rapid growth of population further exacerbating the issue. This will require more focus on devising appropriate and effective mechanisms for handling such huge and excessive volumes of municipal solid waste management as improper management can lead to health and environmental hazards. In India, Municipal solid waste management is one of the most neglected areas of urban development even though a substantial portion of the municipality budget is attributed for this purpose. Several literature studies have been reported for major metropolitan cities in India but very little literature is available on the detailed mechanisms for Municipal solid waste management in tier –II cities. The paper summarizes the solid waste management practices, strategies, processes and methods used to manage the Municipal solid waste in Chandigarh, a top Tier –II city in India.

1. INTRODUCTION

Due to rapid increase in the production and consumption processes, societies generate as well as reject solid materials regularly from various sectors like agricultural, commercial, domestic, industrial and institutional. The considerable amount of waste thus generated and rejected is called solid waste. Municipal solid waste includes commercial and residential wastes generated in municipal or notified areas, in either solid or semi-solid form which excludes the hazardous industrial waste but include the treated bio-medical waste (MoEF, 2000). The generation of municipal solid waste has become an increasingly important global issue over the last decade due to the escalating growth in world population and large increase in waste production. This increase in solid waste generation poses numerous questions concerning the adequacy of conventional waste management systems and

their environmental effects. As the limits of urbanization are increasing, the problem of municipal solid waste is increasing. The municipal solid waste generation in terms of kg/capita/day has shown a positive correlation with economic development at world scale. Safe and cost effective management of municipal solid waste is a significant environmental challenge for modern society. Ideally municipal solid waste management should incorporate the principles of wasteminimization, recycling, resource recovery as well as an integrated processing and disposal facility leading to an effective service delivery in sustainable manner. The quality and quantity of municipal solid waste generated by a particular community will vary according to their socio-economic status, cultural habits, urban structure, population and commercial activities being taking place. Municipal Solid waste poses threat to nature as they tend to accumulate and contaminate ground and surface waste sources and also are the breeding ground for many insects and flies which in turn are the sources for several diseases. Management of municipal solid waste reduces or eliminates the unfavorable impacts on public health and environment and helps in economic development and improved quality of life. In developing countries like India, disposal of waste creates problem yet it also denotes a abundant treasure for millions of people who are underprivileged as waste to them signifies a major means of survival and secures the livelihoods of a sizeable part of population. Municipal solid waste management in India has been somehow often being neglected and accounted for several health related issues in past as well as present situations. More than 90% of the total municipal waste generated in disposed off in an unsatisfactory manner (Das et al., 1998). All these consequences have resulted in governments at central, state and city levels, non-governmental organizations and even individuals paying more efforts and to the continuously annoying problem of waste by initiating various municipal waste management strategies and special cleaning drives. Management of

municipal solid waste is associated with the control of generation, storage, collection, transfer and transport, processing and disposal of waste in such a manner which in accord with the best principles of public health and environmental considerations.

Chandigarh derives its name from the temple of the Goddess “chandi”, the Goddess of power located in the area and a fort or “garh” lying below the temple. Chandigarh is the only planned city in India with the population of 10.54 lakh in the year 2011. It is one of the fastest growing cities. The city covers the area of 114 sqkm and falls under the jurisdiction of union territory. The city Chandigarh was declared a union territory in the year 1966 with joint capitals of both the states of Punjab and Haryana. Since, the formation of Union Territory in the year 1966, all the functions such as water supply, sewerage, storm water drainage, city roads, solid waste management and fire wing etc. are look after by respective departments of Chandigarh Administration. With the formation of Municipal Corporation in the year 1994 (with 20 wards) with its jurisdictional area of 79.34sq.kms; the functions of solid waste management were transferred to Municipal Corporation Chandigarh. The Chandigarh city is also called as “city beautiful” due to its unique concept. It is one of the greenest city of India with its 1400 no’s green belts/parks/ gardens.

2. MUNICIPAL SOLID WASTE

Municipal solid waste is a complex waste stream. It is a classic example where many different types of waste aggregate from domestic, commercial and industrial sources within a single waste stream. Generally only residential, household waste are referred to as municipal solid waste while sources such as from construction and demolition, industrial and mining are excluded (World Bank, 2000. Comparison of waste generation and waste quantity based on weight, volume and composition for various countries vary as it depends upon socio-economic, population, cultural traditions, consumption behavior, degree of industrialization and climate. Municipal solid waste includes refuse and trash. Refuse includes garbage and rubbish. Former includes the decomposable materials and the latter non-putrecible matter like paper, glass, metal, cans etc. Trash includes bulky materials which require special handling.

3. WASTE GENERATION CHARACTERISTICS

The composition and quantity of municipal waste generated will help in deciding the management plan for designing the operations for the efficient management of municipal solid

waste. The various composition of waste is given in the table below.

Source of waste	Percentage (%)
Paper	4.0
Textile	2.0
Leather	-
Plastic	6.5
Metal	-
Glass	4.9
Compostable stable matter	30.0

Table .1

From the above table we can see that the composition of paper varies from 1.0% to 6.0%. The maximum quantity of paper is picked up the people for the use of packaging or fuel purposes so a less amount goes to dumping site. The leather, rubber and plastic contents are also less. These values are less due to recycling of these constituents.

A. Waste Storage and Collection

Waste collection and storage are inter related and most important functional elements of municipal solid waste management. Every city has their own collection and storage points and Chandigarh city has no exception to this. Earlier the bins were placed at different places in sectors but the residents used to throw waste outside those bind instead of inside which created havoc and unsanitary conditions. Although it was thought by the corporation that this method will help in keeping the city cleaner. To cater to this problem, an experiment was carried by the Municipal Corporation of Chandigarh and it was called as “Bin Free Collection”. For this purpose the Municipal Corporation of Chandigarh allotted about 1/5 of the area of the city to the private company for providing proper sanitation services. It also engaged 373 safaiwalas. In this experiment, instead of placing many bins at different places, the bins were placed at two or three earmarked places and the residents were asked to arrange the collection of their household waste through the various sehajsafaiKendra by door-to-door collection of waste. Another option was that the dust bins of sehajsafaiKendra were placed in sectors itself where door-to-

door collectors dumped the waste after segregation. Different sized containers were kept.

Positive results were attained from this experiment and later this experiment was converted into a big project by Central Pollution Control Board when they came to visit the city and analyze the results. A detailed pilot project report was prepared and finally the project was sanctioned and Municipal Corporation of Chandigarh got 3.14 cores for this project. Till now the project is getting positive response from this scheme and is also getting extended.

B. Waste Transportation

The municipal solid waste collected from the dustbins and collection points is transported to the processing and disposal sites using a variety of vehicles. In Chandigarh the waste from the sehajsafai Kendra is transported to the dumping site by high speed vehicles. They are called as dumper placers. These are closed vehicles so that waste does not fall during transportation.

C. Waste Recovery and recycling

Recovery and recycling of waste is an important component of integrated solid waste management as it decreases the load of waste going to the dumping site or for incineration. In Chandigarh there is no provision for recycling or recovery of the municipal solid waste till date.

D. Waste Processing

Best possible benefits can be achieved with a proper waste processing unit. In Chandigarh many efforts have been made in this direction too. There has been a public-private partnership venture between the municipal corporation of Chandigarh and Jaypee Group of New Delhi and the processing plant is called Green Tech fuel processing plant. It is set up at the outskirts of the city at the cost of 35 crores. The plant was set up in May, 2008. The municipal corporation has granted possession of 10 acres of land in DaduMajra for installation of the plant. The municipal waste produced by the city is 370 metric tonnes daily and the plant has the capacity to process approx 500 tonnes of garbage on daily basis. The state-of-the-art European technology customized to Indian MSW (of high moisture content and varying calorific value) involves conversion of waste (mainly horticulture) into densely packed fluff/pallets free from any harmful by-products and effluents.

E. Waste Disposal

The ultimate fate of the waste is to be dumped at appropriate dumping site. In Chandigarh, all the municipal solid waste generated has been dumped onto the landfill which is 24 years old and is situated at DaduMajra. It is a 45 acre open land disposal site. The three basic steps being followed are:

1. Dumping

Dumping is the major and final step of municipal solid waste management. Everyday approximately 300 vehicles fully loaded with the waste are brought to the site for disposal of waste. These vehicles include tractors trolleys, open trucks, dumper placers etc.

2. EM Solution

The Corporation has started the treatment of city garbage at the dumping ground with Effective Micro Organism Solution (E.M Solution) with effect from March 2005. The Main Constituents of this Solution are actinomycetes (Photo Synthetic Bacteria) and Yeast. A 1000L spraying solution contains 20L EM solution with 30L Molasses and the rest 950 L is water. It takes 3-4 days for the preparation of the Solution. The said treatment is helpful in the acceleration of decomposition process of the garbage, reduction in the volume of gas discharge with the result that foul smell has substantially minimized minimization of larva of flies & mosquitoes, reduction in suspended dust particles, reduction in the volume of waste and fermentation period.

3. Leveling

For leveling of the waste bulldozers or heavy vehicles are used which helps to compact the waste. After compaction, oil and grease is sprayed on the land. The waste is then covered with the construction and demolition waste of 2 feet depth.

4. Current Practices

The Municipal Corporation of Chandigarh is taking steps to convert the open dumping site into the sanitary landfill with specifications given in schedule 3 of Municipal Solid Waste Management and Handling Rules, 2000. Steps have already been taken by capping 30 acre area of the landfill. Apart from this the leachate treatment and gas extraction plants and monitoring wells are also planted.

5. CONCLUSION

Over the next two decades, growing urbanization in India will result in massive increase of waste. By the year 2021, urban population is set to increase 41% of the overall population. The informal policy of encouraging the public to separate municipal solid waste and market it directly to the informal network appears to be better option. To tackle the waste generated urban local bodies should invest 35-50% of its funds on solid waste management. Waste management should not merely include the collection, transportation and processing of waste in fact need of the hour is to reduce the generation of waste. Our responsibility is to make people aware about the problem society is facing. It is very essential to keep streets and public places clean all the time. This is possible only if there is proper municipal solid waste management system and waste disposal is done in proper manner without hampering the natural resources. In India, the product goes to the user and the user generates waste, is the basic model. The municipality then collects that waste and dispose of it to the disposal site or either it is recycled or sometimes burned. For all this, cooperation of the producers of waste is also needed. If people keep on throwing waste, the city corporation cannot keep the city clean. One should follow the extended producer responsibility strategy which promotes the integration of environmental costs associated with the goods throughout their life cycles. In EPR, the implication shifts from government and user back to producer i.e. here only the manufacturing companies are responsible. These implications encourage pollution prevention, reduce resource and energy in product lifecycle and change the design and processes of the product. Without the framework of EPR, recycling is not possible and now our main concern is with zero waste generation. The understanding of technological benefits, which we enjoy by efficient handling of solid waste, can offset all the resentment and problems related to this wonderful method of disposal.

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