Kshitij 2015

Presents

SCAVENGERS

Problem Statement

Rapid industrialization and population explosion in India has led to the Migration of people from villages to cities, which generate thousands of tons of Municipal Solid Waste (MSW) daily. The MSW amount is expected to increase significantly in the near future as the country strives to attain an industrialized nation status by the year 2020. Poor collection and inadequate transportation are responsible for the accumulation of MSW at every nook and corner. The management of MSW is going through a critical phase, due to the unavailability of suitable facilities to treat and dispose of the larger amount of MSW generated daily in metropolitan cities. Unscientific disposal causes an adverse impact on all components of the environment and human health. The waste generated is consequently released into the nearby environment. Consequently, the management of the MSW needs to be revamped to accommodate the changes in the quantity and quality to ensure the longevity of the environment. Due to several legislative, environmental, economic and social constraints, the identification of most sustainable disposal route for MSW management remains an important issue in almost all industrialized countries. Generally, MSW is disposed of in low-lying areas without taking any precautions or operational controls. Therefore, MSWM is one of the major environmental problems of Indian megacities. It involves activities associated with generation, storage, collection, transfer and transport, processing and disposal of solid wastes. But, in most cities, the MSWM system comprises only four activities, i.e., waste generation, collection, transportation and disposal. The management of MSW requires proper infrastructure, maintenance and upgrade for all activities. This becomes increasingly expensive and complex due to the continuous and unplanned growth of urban centers. The difficulties in providing the desired level of public service in the urban centers are often attributed to the poor financial status of the managing municipal corporations. Agricultural application of MSW, as nutrient source for plants and as soil conditioner, is the most cost-effective MSW disposal option because of its advantages over traditional means such as landfilling or incineration. According

to Canelas et al., (2001), the use of MSW in agricultural lands can be justified by the need of finding an appropriate destination for waste recycling. However, agricultural application of MSW may present a potential threat to the environment due to the presence of pathogens and several pollutants (i.e., heavy metals or organic pollutants). An attractive alternative to recycling such wastes is composting. Composting is a stabilization process through aerobic decomposition of waste, which has been widely used for different types of wastes. During composting, through microbial action organic nutrients present in the wastes are converted into plants available forms. The process can effectively reduce the mixture volume by 40–50% and by means of the metabolic heat generated in the thermophilic phase destroy the pathogens. Composting cannot be considered a new technology, but among the MSW management strategies it is gaining interest as suitable option for chemical fertilizers with environmental profit, since this process eliminates or reduces the toxicity of MSW and leads to a final product which can be used in improving and maintaining soil quality. Application of MSW compost in agricultural soils can directly improves soil physico-chemical properties such as: soil structure, water retention capacity, buffering capacity and nutrient status. In relation to soil biological properties, numerous researchers have reported different effects of MSW compost on soil. Electricity can also be produced using MSW according to the different conditions prevailing in the locality. However, Medical wastes from hospitals and items that can be recycled are generally excluded from MSW used to generate electricity. Paper and yard wastes account for the largest share of the municipal waste stream, and much of this can be recycled directly or composted.

Aim: Participants have to design a sustainable and profitable model for a given Municipal corporation accounting for both environmental issues and cost benefit analysis

The necessary data for a selected municipality is given below

1	**Name of the Municipality**	**Shadnagar Municipality**
2	Year of establishment	2011
3	Extent (in sq. kms.)	18.64 KMS
4	Population as per 2001 census	40822
5	Population as per 2011 census	54431
6	Male population 2001 census	19983
7	Male Population as per 2011 census	27713
8	Female population 2001	20839
9	Female population as per 2011 census	26718
10	Projected population as on date (year to be specified)	54431 (10 / 2011)
11	Total Income per annum during 2013-2014 (rupees in crores)	15440130
12	Total Expenditure per annum during 2013-2014 (rupees in crores)	**16172146**

1	No. of notified slums	36
2	No. of non-notified slums	0
3	**Total slums**	**36**

1	Total Quantity of drinking water supplied	3 MLD
2	Per capita water supply per day	42.00
3	No. of House Service Connections	4682
4	No. of public taps	250
5	No. of public bore-wells	163
6	No. of sewer connections	0
7	Length of roads (in Kms) (CC + BT+WBM (Metal)+ Kutcha = Total	36.910+14.10+13+61.970 = 125.97
8	Length of drains (in Kms.) (Pucca+Kutcha)	52.30+29.95 = 82.25
8 A	Length of Storm water Drains (in Kms) (Pucca +Kutcha)	0/0
9	No. of street lights (Highmast + Poles + Central Lighting Poles+ SV Lamps +Tube Lights=Total)	40+45+0+500+1600 = 2195
10	No. of public parks	4
11	No. of play grounds	80/1
12	No. of public markets	1
13	No. of slaughter houses	0
14	Total no. of shop rooms in all shopping complexes	18
15	No. of community halls	11
16	No. of secondary schools	18
17	No. of elementary schools	70
18	No. of dispensaries	30
19	No. of auditoriums	0

- No. of Houses
    - Registered 12,275
    - Unregistered 1000 (estimate)
- Population 54,431
- Workers dedicated to waste management 89
- Tractors involved in waste management 5
- No. of trips each tractor makes a day 3-4 (avg)
- Total loads of waste each day 15-20 (avg)
- Distance of the dumping pit from the town 3.5 kms
- Salary for all the workers Rs. 8,300(monthly)
- Rent for each tractor Rs. 18,445 (monthly)
- Diesel charges for all the tractors Rs. 60,000 (monthly)
- Average tonnage of waste for each tractor 2 tons
- Miscellaneous fund Rs. 1,00,000 (monthly)

Dumping is presently done in a big dumping pit beside the National highway 44 which was dug for sand requirement in the construction of National Highway.

All the dustbins are recently removed due to different diseases caused by the waste accumulation around the dustbins. These days, waste pickers roam around the streets and collect waste from the houses around.

Assumptions regarding other data are allowed provided proper reference or a proper justification is given for the assumption.

JUDGING CRITERIA:

- Literature Review (10%)
- Concept (25%)
- Profitability of the model (15%)
- Innovative ideas & Techniques used (10%)
- Cost analysis and Fund Allocation (20%)
- Sustainability of model (10%)
- Accounting for various Environmental issues in the model (10%)