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A Comprehensive Study on Municipal Waste Management of Dhaka City

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Abstract: Municipal Solid Waste Management (MSWM) is governing environmental and financial problem in developing countries. Dhaka also faces difficulties in managing solid waste. Almost no sorting is done while dealing with the wastes, that bound the Solid Waste Management System (SWM) to cripple and to be unproductive and makes any kind of recycling impossible. Age old waste transportation system running with inadequate number of vehicles, among which most of these are open to environment causing serious environmental pollution. There is no composting system for organic. In this paper the problems associated with existing SWM of Dhaka is critically discussed and accordingly, some remedies have been proposed. A very simple but efficient sorting system is proposed where Solid Waste (SW) will be sorted in two groups. The first one is categorized as organic waste which will be transported to composting site and the other type inorganic waste will be sent to proper recycling industry. Barrel type composting can be a suitable option for the composting system of organic waste. This type of composting is proposed for its low cost. The Dhaka City is almost encircled by the river Buriganga and all the existing Landfill sites in Dhaka are besides different rivers. Water transportation system also has been proposed for transporting the waste to the landfill.

Keywords: Solid waste management, Dhaka.

Introduction

In present day's problems regarding with the waste management have become one of the top concerning issues, basically in developing countries because of their rapid and imbalanced urbanization and industrialization. Though the municipal and industrial waste produced in developed countries are enormous in compared to that of developing countries but advanced management and recycling system keep the problem in tolerable limit. In

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developing countries due to their less budget and many other sensitive problems waste management system is left neglected causing serious environmental and health hazard. Bangladesh a third world country, situated in south east area is facing its greatest threat of environmental pollution because of its poor waste management system. This country is solely trying to attain economic stability but in the trail of development it is undertaking uncontrolled and unplanned urbanization. Peoples are migrating to the cities tremendously for an improved life style.

Dhaka is the capital city of Bangladesh. It's a city of 1464 sq. km supporting an unthinkable amount of 1.5 crore people, so it is easily imaginable how much municipal waste is produced daily in Dhaka city. But the matter of concern is that the age old waste management system followed by Dhaka City Corporation (DCC) and the amount of equipment and workforce are totally in adequate to support this huge population. Furthermore the illiteracy and ignorance of people is making the condition much more severe.

This paper mainly focuses on the existing municipal solid waste management system followed by Dhaka City Corporation (DCC) and the problems associated with it. An improved and simple Municipal Solid Waste Management system also proposed for a clean Dhaka city.

Location of Study Area

Dhaka city is located at the center of Bangladesh. The city is between 23° 43' 23" North latitude and 90° 24' 31" East latitude. The city is located along the rivers the Buriganga and the Shitalakhha. Figure 1 represents the location of the study area.

Present Solid waste management system followed by DCC:

Solid waste management system of DCC is accomplished in following phase

- Collection
- Transportation
- Final disposal
- Recycling

Collection

DCC basically collects the wastes from on site storage. On-site storage is the Secondary Disposal Sites (SDS), transfer station and handover points, which receives wastes from primary source and transferred to the designated location for processing/recycling/treatment and mostly for ultimate disposal. SDS is the facilities where large amount of wastes are accumulated and finally transferred to the desired sites by large vehicles such as open or closed Trucks, Demountable haul container truck, etc. SDS may be an open space or roadside demountable large steel haul containers, roadside spaces and unused open low-lying areas. In Bangladesh, city authority is solely responsible for providing SDS, collection of wastes from SDS and transfers them for final disposal as per existing City Corporation Act. These sites are located in the selected places based on population, space availability, accessibility and other local factors such as desire of influential city dwellers or public representatives.

Transportation

City authority collects wastes from SDS and transfers them to Ultimate Disposal Sites (UDS). Only motorized vehicles are used for collection of Municipal Solid Waste (MSW) from SDS. Non-motorized vehicles are used for transfer wastes from community bins to SDS. The functional element of collection includes not only the gathering of solid wastes and recyclable materials but also the transportation of these materials after collection, to the location vehicle is emptied. Only respective city authority is responsible for collecting wastes from secondary points and transported it by motorized vehicles/trucks and finally disposed in the designated UDS owned by the city authority.

Final Disposal

Garbage Trucks & Carriers bring the collected Solid Wastes to the selected Dumping Sites. City Wastes are only being used for filling low-lying lands. Some heavy equipment like Bull-Dodger, Tire Dodger, and Pay-Loader Excavators are being used for dressing & compaction of the dumping site. The waste is presently being disposed off mainly on a lowland (Matuail) about 3 kilometer from the corporation area and a number of minor sites

which are operated as uncontrolled manner without any proper earth cover and compaction. The uncollected wastes are dumped in open spaces, streets, clogs drainage system creating serious environmental degradation & health risks.

Recycling

Firstly, Newspapers/papers, broken glasses, metals, plastic etc. are purchased from house-to-house by a class of mobile purchasers. Secondly, a section of the poor peoples collects re-useable and re-cycle able waste materials form the dustbins/containers and as well as from the streets and dumping sites. Recycling of paper, plastic, glass, metal etc. plays a very important role in the economic sphere and a large number of poor people are depends on these petty commercial activities. Thirdly, a few numbers of entrepreneurs are producing "Compost" kind of organic Manure from the organic Solid Wastes. The major component of municipal waste organic food waste is totally ignored even though it has a potential value and can be converted into organic compost. (Alamgir and Ahsan , 2007)

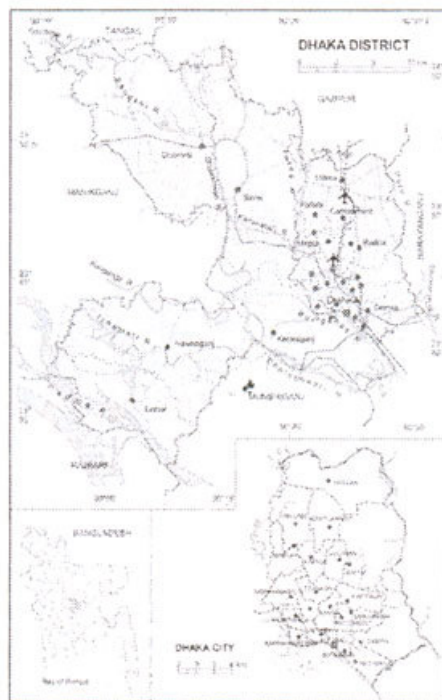


Figure 1: Map of Dhaka City

Ward Based Solid Waste Management Program involving NGOs (Non-government Organizations)

Private Solid Waste Management in Dhaka City is a new approach. Recently Dhaka City Corporation fully privatizes its conservancy works all over the city. The private organizations basically perform the primary collection system and accumulation. The private parties are handling this works very smoothly. Two NGOs and two private contractors are responsible to run the project properly. The Urban Planning Department introduced this project for the first time. Then the project was handed over to the Conservancy Department of DCC. The Private parties do the street sweeping, Drain cleaning, Door-to-door waste collection, dustbin cleaning and waste transportation and final disposal of the wards No.1,17,18,19,20,21,37,and 38. In Figure 2 shows the percentages of different types of solid wastes collected by DCC. (Mohit, 2000).

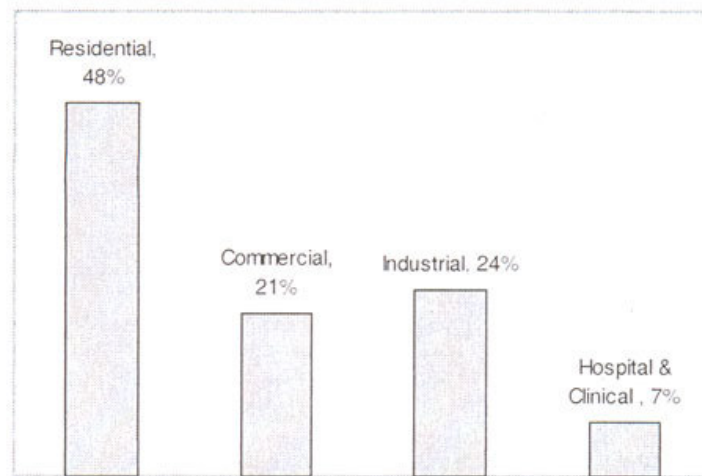


Figure 2: Percentage of total solid waste generation per day (Menon, 2002)

Existing Problems

The main problems and limitation of present solid waste management system of DCC are

- Lack of institutional arrangement.
- Insufficient financial resources

- Inefficient management of existing manpower, equipment, other resources, unscientific and inefficient collection practices, inefficient management of landfill.
- Absence of by-laws and standards
- Waste generation rapidly increasing
- City authority cannot cope with the situation
- Lack of source separation
- Inadequate waste collection
- Shortage Of land for waste disposal
- Polluting surface and ground water
- Organic waste is left unutilized
- Lack of awareness among citizens
- Lack of partnership between stakeholders
- Emission of green house gas

Associated problems of Private Organizations:

Despite achieving noticeable success in waste collection by door-to-door collection system from generation sources, NGOs & CBOs (Community Based Organizations) are facing many multi-dimensional problems, which can be summarized as:

- As the van puller and helpers engaged in door-to-door collection system get tinny salary there is lack of encouragement to perform the duty properly.
- Service charge collection is a common problem for all NGOs and CBOs. On average 20% of households is not paying or delaying the payment of collection fees as per the agreements.
- In the secondary disposal points due to technical problems such as size, shape location and design aspects of bin, the spreading of waste creates serious pollution.
- Marketing of compost product in a great concern of NGOs, as the market of compost yet to be established.
- Non-motorized rickshaw vans required frequent repairing and needs to be changed after 4 to 5 years. So continuous financial support is required for its operation and maintenance.

- Most of the NGOs & CBOs are facing many financial problems, so desired and required attempts cannot be adopted.
- Some times irregular and weak participation of city/ward authority with NGOs and CBOs create unwanted situation.
- Due to lack of awareness, motivation and commitment, people do not cooperate as desired. Even the co-operation from some ward commissioners is not encouraging.

Existing Municipal solid waste management system

In Figure 3 the existing municipal solid waste management system is shown:

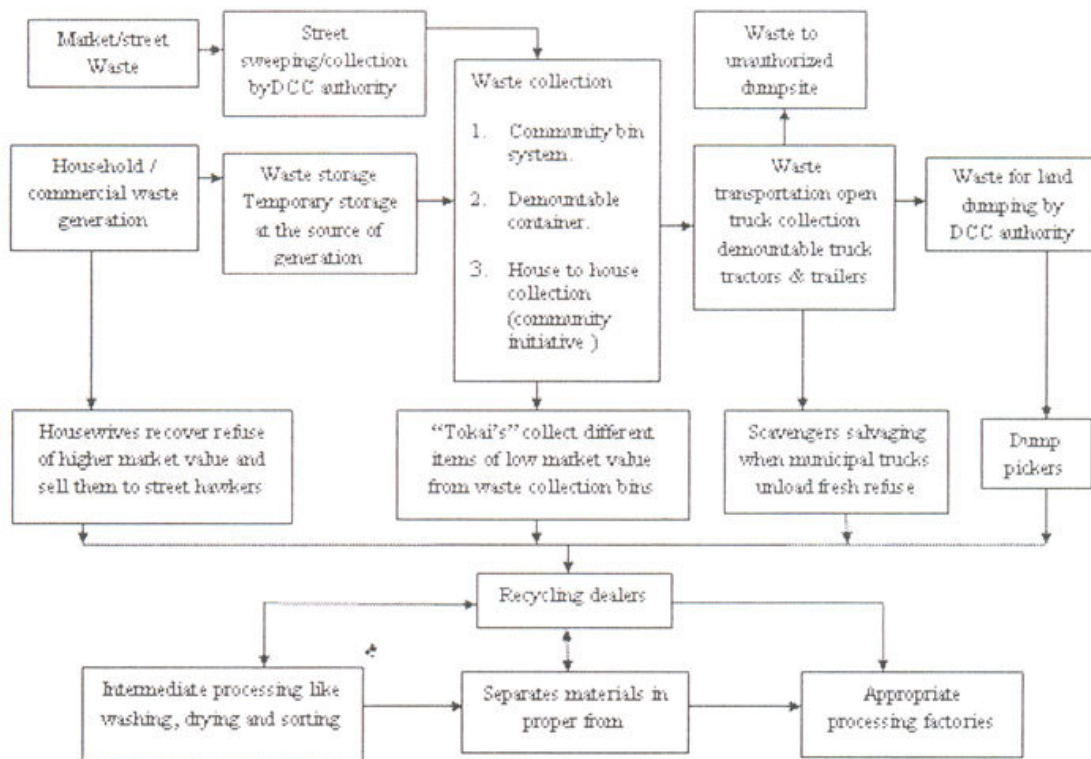


Figure 3: Existing Municipal solid waste management system

Proposal for sustainable Solid waste management system

According to the existing problems here a proposal has been made out for feasible management system. In figure 2 we observed that nearly 50% of

waste in Dhaka City is Residential waste. So here we provide some proposals to develop a better efficient and economic Municipal Solid waste management system following steps should be under taken.

Proposal on sorting system

Sorting means classify and accumulating wastes based on their recyclability and type. Sorting is very prime important thing for good waste management. If a good sorting system can't be done in a management system can not be fruitful. As a clean country in Asia we choose Japan for doing some system recommendation about sorting in Bangladesh. Japan has a great reputation in the whole world for their good waste management and their affection to perfectness. A numerous study was done on the waste management especially on sorting system of Toshima City, Bunkyo City and two well known cities of Japan. They have built up a unique, highly cost effective and environmental friendly system of solid waste management. As brief discussion of their system is given below: First of all the Citizens shall take Plastic Containers and Wrapping, Combustible Waste, Incombustible Waste and Recyclable Paper to the Recyclables and Waste Collection Point.

Proposal on Composting

Barrel composting: It is proposed that barrel composting may be followed by DCC for alternative of recycling of solid waste. Composting technology seems to be a good treating alternative. With composting the organic portion of wastes will be converted into stable end product of compost. As a result, the volume, weight and moisture content will be reduced, the potential odor and the pathogens will be minimized, and nutrients will be available for agricultural application. By composting technology, the spread of diseases will be minimized because of the destruction of some pathogens and parasites at elevated temperature. In tropical and subtropical regions, there are lots of rains and considerable sunlight and heats all the year. To maintain the moisture content is very important for effective composting operation. If the moisture content becomes more than 65 %, it will lead to anaerobic condition and produce bad odors as well as kill the aerobic bacteria. If it becomes less than 40%, it will reduce the bacterial activity for decomposition. As a result, it is necessary to design a special type of composting unit for these regions with effective way. Examinations were

amended for the sustainability of barrel type composting and therefore, it is found that this type of composting might be a suitable option for treating organ waste of Bangladesh. Change in physical parameters during composting, and the chemical and biological properties of compost produced by the barrel composting are presented in this paper. (Al-Muyeed, 2005)

Proposal on Transportation system: Water transportation system

To run a system smoothly it is must to run all of its subsystem smoothly. So it is quite obvious that to make a solid waste management system successful all of its subordinate system like collection, sorting, transportation, landfill etc has to be quite efficient. Transportation is a key subsystem of the whole solid waste management system which if it fails or don't run properly it is sure that the whole system will collapse. This is because if waste is not collected timely from the road side dustbins or they are not transported to the landfill or recycling unit timely from the road side dustbins or they are not transported to the landfill or recycling unit timely and effectively all the garbage will be accumulated here and there and will cause a severe environmental pollution. If transportation system does work properly and the rest systems don't waste management system will cripple but it will bring down the whole system to the ground.

After an enormous study on presented transportation system of DCC (as mentioned earlier) it is found that waste transportation system in Dhaka city is inefficient and inadequate.

To make the Transportation more efficient it is proposed to use water transportation system. Since in Figure 4 we observed that Dhaka city is almost encircled by the river Buriganga and all the landfills are situated beside rivers.

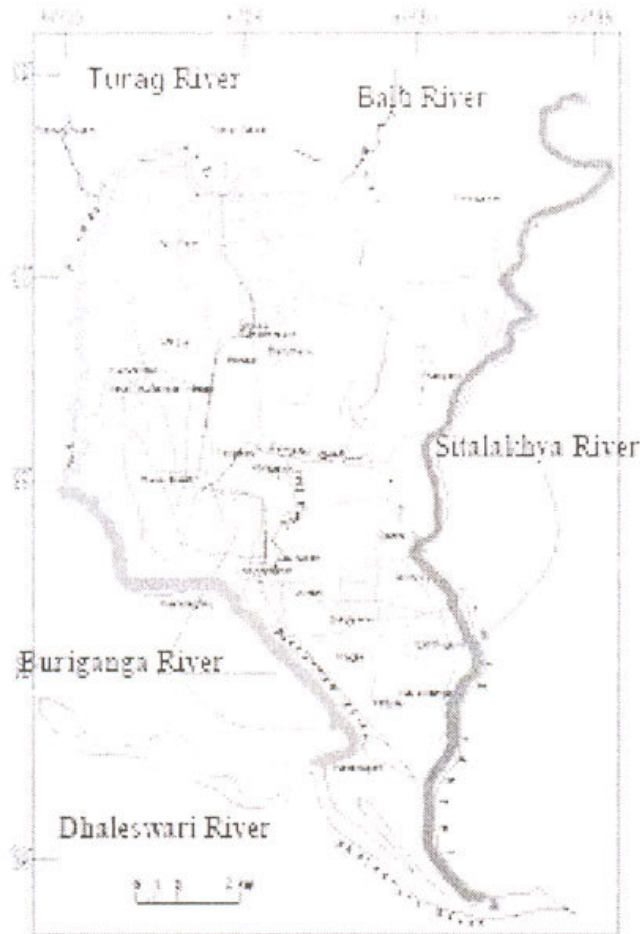


Figure 4: Rivers around the Dhaka City

Proposed flow chart of Municipal Solid Waste Management System:

In Figure 5 we have propose a new feasible flowchart of municipal waste management system:

Water transportation system can be proven to be an efficient, less costly and environment friendly system.

- Waste will be collected from the road side dustbin and then be transported to the nearest river side station using covered van. This decrease the pressure on traffic system in the city
- Using water vehicle the garbage will then be transported to the landfill site. This will reduce the cost of transportation and will make the system efficient.

- To make a water transportation system efficient river ride station has to be built up under proper planning. The initial cost may be high but in the long run it will be highly economic.
- Proper draizing needs to be done to keep the continuous navigation on water body.

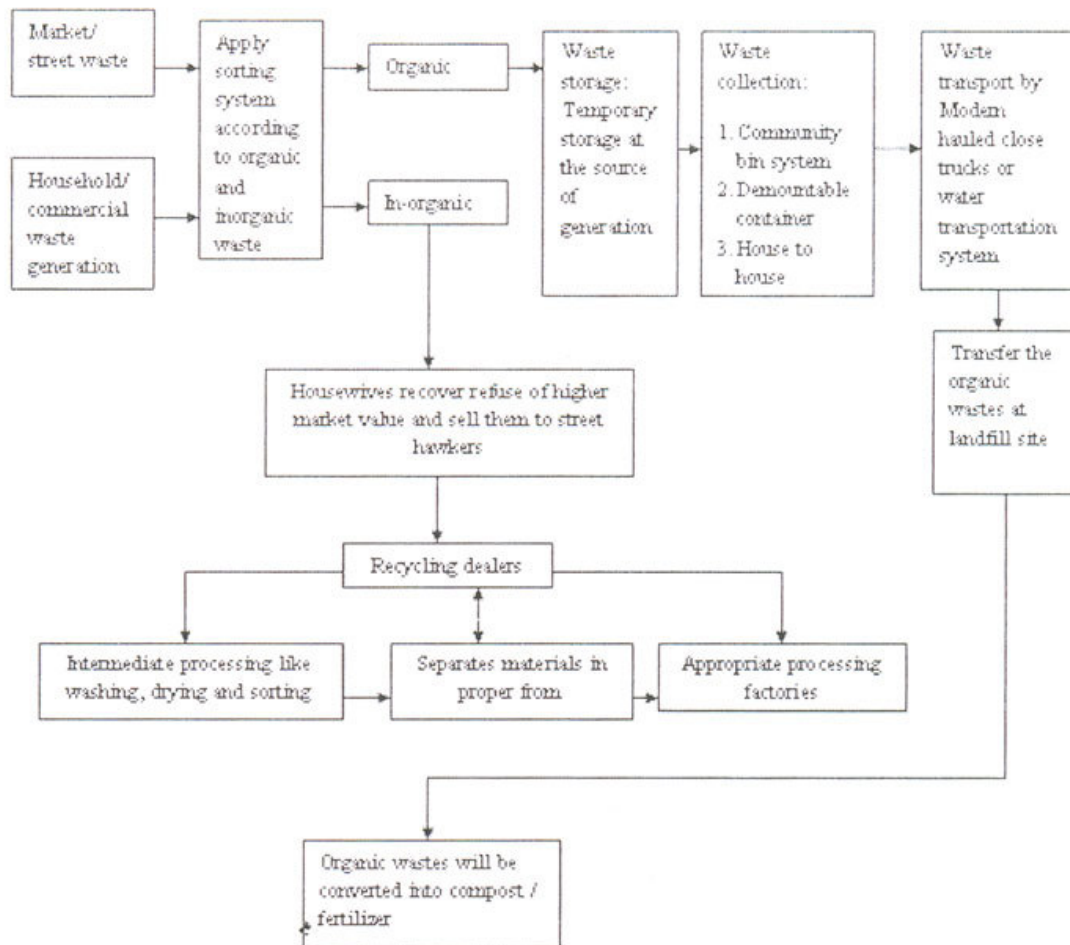


Figure 5: Proposed Municipal solid waste management system

Conclusion

The increasing quantity of solid wastes is a growing environmental problem in developing countries. Compared to cities and towns of industrialized countries, those of developing countries generate less solid wastes per capita because, in developing countries, people have less purchasing power and

therefore consume less, there is less industrial activity and there is a very high rate of refuse of solid wastes by the poorer sections of the community. Despite this, large volumes of solid wastes are produced and constitute an enormous public health and environmental problem in most developing countries. Unplanned and inadequate collections of solid wastes contribute greatly to an unhealthy environment. Due to the inorganic and unconsciousness of the common people this simple sorting system is proposed which is also very cost friendly. The main problem for recycling the waste will be reduced to minimum. Green fertilizer from recycling the organic waste can be a boost in this agro based country. Water will reduce the pressure on the traffic system. Since water transportation is comparatively cheap so this will be economic and it will reduce the problem of pollution by the open truck mostly used by DCC. This type of composting is proposed for its compactness low cost, suitability in our country ease of instability etc. green fertilizer may be produced by Barrel type composting can be great thrust in our village economy.

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