

A Proposal on Segregation of Road Side Wastes during Collection Period by Introducing an Innovative System

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Abstract

The importance of waste management is increasing as it is an asset for producing energy, clearing environment, maintaining balance of ecosystem which is already adopted in developed countries globally, the estimated quantity of solid wastes expected to be generated annually by the year 2025 is about 19 billion tons [1]. The research stands for managing wastes on roadside for convenient use. The waste bins will be used to segregate the wastes into four core category such as HDPE (High density polyethylene), Papers, Domestic wastes and Surface water on road. As all the wastes carried out from the households to the roadside bins so it is very important to channelize the road side waste bins. The waste collection points will be fixed and four different types of reservoir will be kept under each bin so that after a certain period cleaning operation will be done without moving the stations.

Keywords: Waste management, Environment, Segregation.

1. Introduction

Urban solid waste management is considered as one of the most immediate and serious environmental problems confronting municipal authorities in developing Asian Countries [2]. Waste is an unavoidable by product of human activities Economic development, urbanization and improving living standards in cities, have led to an increase in the quantity and complexity of generated waste. The importance of solid waste management is increasing day by day as it is an asset for producing energy, clearing environment, maintaining balance ecosystem which is already adopted in developed countries Globally, the estimated quantity of solid wastes expected to be generated annually by the year 2025 is about 19 billion tons [3].

In Khulna City, piles of garbage accumulated everyday cause enormous public health and environmental hazards. The rapid growth of Khulna City and increased migration of rural and coastal population affected by natural calamities are the driving forces behind unplanned expansion of city and deteriorating environmental condition. The results of unplanned expansion of city in the form of slums have further stretched the problems of MSW (Municipal Solid Waste) management. Composting of organic wastes and medical waste management in Khulna City were studied [1] [4].

The ecological footprint (0.088 ha/capita) was calculated to develop a sustainable waste management system by considering its existing solid waste characteristics [5]. This paper describes the way that how to collect the wastes in a useful manner which may help the segregation of wastes in prescribed categories. This may help to save a huge amount of resources and wealth of Bangladesh. Three R's are the main consideration for this research that will help to promote the environmental strength. Waste management or waste disposal are all the activities and actions required to manage waste from its inception to its final disposal. This includes amongst other things collection, transport, treatment and disposal of waste together with monitoring and regulation. It also encompasses the legal and regulatory framework that relates to waste management encompassing guidance on recycling. The term normally relates to all kinds of waste, whether generated during the extraction of raw materials, the processing of raw materials into intermediate and final products, the consumption of final products, or other human activities [6].

There is no practical implementation of the project may be considered as the major limitation. This is due to lack of adequate funding. The researcher are interested to implement this poroject in practical field.

2. Literature review

2.1 Negative impacts of poor waste management

One of the most adverse impacts of poor waste management, especially municipal waste, is the incidence and prevalence of diseases such as malaria and respiratory problems, as well as other illnesses through the contamination of ground water. Biomedical wastes pose great danger in Bangladesh too as a report estimated that 20% of the biomedical waste is "highly infectious" and is a hazard since it is often disposed of into the sewage system or drains [6]. Such poor sanitation has serious consequences for the health of the residents and a report suggests that "most of the child mortality could be related with this problem [7] With regards to the living standards, solid waste leads to blockage in the drainage system which leads to flooding in the streets. Consequently, mosquitoes and bad odors are among the negative impacts resulted [7]. The following problems are created for poor waste management:

- Open air dumping creates unhygienic and poses enormous threat to the people.
- Causes aesthetic problem and nuisance due to nauseating pungent odor.
- Promotes spreading of diseases.
- The situation further aggravated by the indiscriminate disposal of Hospital and Clinical Waste.
- Presence of extremely high level of Total and Facial coliform.
- Pollute water bodies.
- Carbon dioxide and Methane produced from solid waste are extremely harmful to the environment.
- Gases are produced in the landfills through aerobic and anaerobic decomposition of organic compounds, which are threat to the environment.

2.2 Problems in waste management in Bangladesh [8]

By almost any form of evaluation, solid waste management is a growing environmental and financial problem in developing countries. Despite significant efforts in the last decades, the majority of municipalities in the developing countries cannot manage the growing volume of waste produced in their cities. This inability to manage urban solid waste consists of failures in the following areas: Inadequate services, Inadequate financing, inadequate environmental controls, Poor institutional structure, Inadequate understanding of complex systems, inadequate sanitation etc.

Table 1. Nature of waste composition in Bangladesh. [9]

Waste Composition	Bangladesh (Dhaka) (% by weight)
Food & Vegetable waste	70
Paper products	4
Plastics	5
Metals	0.13
Glass and Ceramics	0.25
Wood	0.16
Garden Waste	11
Other (Stone, dirt etc.)	5

3. Implementing strategy

3.1 Description

The project stands for designing waste bin on roadside for convenient use. The waste bins will be used to segregate the wastes into four core category such as HDPE (High density polyethylene), Papers, Domestic wastes and Surface water on road. As all the wastes carried out from the households to the roadside bins so it is very important to channelize the road side waste bins. The waste collection points will be fixed and four different types of reservoir will keep under each bin so that after a certain period cleaning operation will be done without moving the stations. For HDPE and Papers the waste bin will be (2x2)feet square shape, , for Domestic wastes such as vegetables it should like tomato shape having radius of 1 feet ,for surface water it will have a diameter of 3 feet

with a depth of 4 feet. All types of bins will be made of plastic materials. The different waste bins will stand with four different colors and shapes to clearly identify that for which particular purpose they will be used. All of the reservoirs will have sliding facilities that the wastes reserved in to the hole can easily be extracted from there and the destination of the waste water will be soak pit lying beside the bin for removing water logging on road. This bin(Soak Pit) will pass the surface water to the existing ground level having different infiltrating layers such as sand ,coal ,lime stones and bricks chips at the top to cover it(layer of 1 feet) . Reinforced concrete structure should be used for the base of the waste bins.

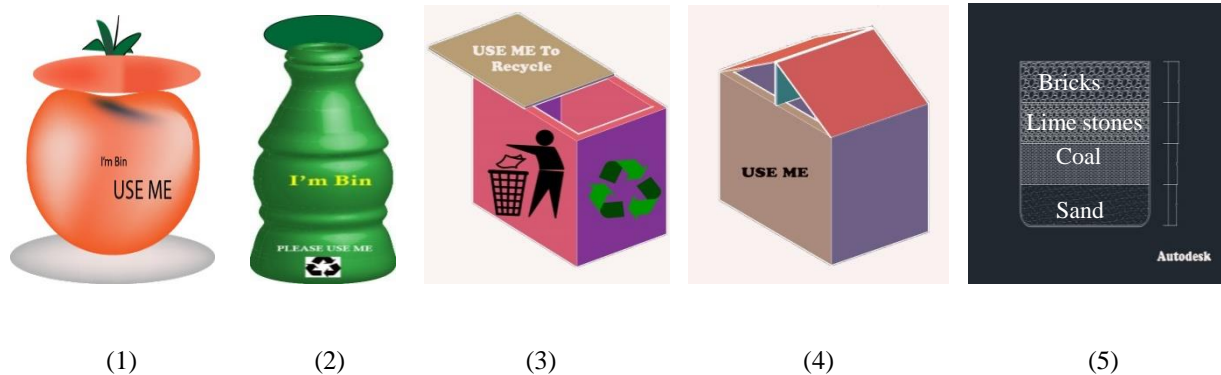


Fig. 1. Waste bin for domestic waste (1), plastic materials (2), papers (3), daily waste (4) and surface water (Soak pit) (5)

3.2 Significance of the project

➤ Fixed location

In our country one of the most vital cause of mismanagement of waste recycling is that there is no specific fixed location for categorized waste bins beside the roadside. It will help the general people to accumulate there wastes in a fixed location.

➤ Eye catching

The different relevant shape of the waste bins will attract people to use efficiently. If the bottle shape wastes bins used to collect plastics or HDPE related waste the illiterate people of rural area will easily maintain the bins.

➤ Reduce environmental Pollution

As the waste bins will keep reservoirs, top cover as well as sliding facilities so it will reduce the odor and the poisonous elements of the wastes. The soak pit is used to control the water logging and contribute to the development of environment.

➤ Easy to recycle

The movable reservoirs and the soak pit through ground surface to the water level will play a vital role in recycling. Manually the process will be done.

➤ Cost effective

Comparatively it will be very cost effective as local materials will used and the recycling process will generate a huge amount of energy.

3.3 How to operate

Here will be four different types of bin for various purpose .Waste bins for Plastic materials (HDPE), used papers, domestic wastes, wastes from daily life and road side flowing water (due to rain or construction work) fixed in a specific place with the dimension .There will be four reservoir beneath the bins and one soak pit (as water waste bin) beside the reservoirs. The reservoir will be made of plastic materials so that it will be easy to slide them up

to the corner of the channel hole as there should be two man hole for picking up the reservoir and recycle the process. The soak pit situated besides the channel hole will reserve the water after passing efficient amount to aquifer for recharging ground water table.

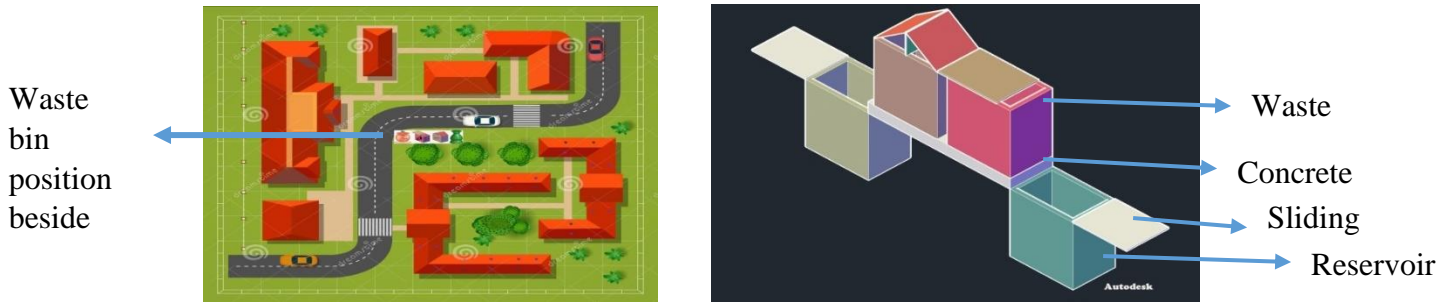


Fig. 2. Layout of position of waste bins in roadside locality (Left) and Sliding process of reservoir with man hole (Right)

4. Calculation for waste storage

4.1 Calculation of volume

- The amount (Volume of waste bin) of waste that can be reserved in bins for HDPE waste $(2 \times 2 \times 2) \text{ft} = 8 \text{ cft}$
- The amount (Volume of waste bin) of waste that can be reserved in bins for domestic waste $(\frac{4}{3} \times \pi \times r^3) = 4.2 \text{ cft}$
- The amount (Volume of waste bin) of waste that can be reserved in bins for surface water $(\pi \times r^2 \times h) = 28.3 \text{ cft}$

4.2 Calculation of waste consumption

As TWG (Total waste generation) is 0.41 kg/capita/day [6]

Capacity of HDPE will be $= (8 \times 28.32) \text{ kg} = 226.56 \text{ kg}$; 1 cft = 28.32 kg. Other calculations in the same manner.

Table 2. Basic information of the proposed waste bins

Waste bin type	Volume (cft)	Capacity of waste bin (kg)	People to be served
HDPE	8	226.56	552
domestic waste	4.2	118.94	290
Surface water	28.3	801.46	1954

Source: Author's calculation

From the table 1 first type of waste bin HDPE which is 8 cft and can reserve 226.56 kg of waste, generated from 552 people. So it will be beneficial to hold the waste generated from five hundred people and keep the environment clean and sustainable. Second bin for domestic wastes it can reserve 118.94 kg waste generated from 290 people. So that if this type of bin once introduced, environment can greatly influenced by minimizing the adverse effect of household wastes. During the rain, roads are greatly damaged because water stands on the road for a while. If this waste bins are available beside the road it will reserve 801.46 kg of water and infiltrate the water into the ground water. So the ultimate place of the rain water will be infiltrate zone. Around 1954 people will be safe from the adverse effect of the extra amount of water.

5. Conclusion

Despite the various new technologies that are emerging for solid waste separation, using waste collection been still remains the most common solution. The establishment and closure of waste disposal points could pose a potential hazard to ground water, due to leachate seepage, and air quality due to gases released. Unless proper maintenance and management is sustained for a fairly long time (30 years), public health may be compromised as a result. Such management is costly and potentially dangerous if faulty. If this idea id followed by the Authority, huge number of possible wastes can be recovered.

6. References

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