

Investigation of Management Technique of Market Waste and its improvement: a Case Study

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Abstract. Solid Waste is massively produced now-a-days in the market sides. These generations of wastes are severely responsible for the pollution of environment. Markets in Khulna city also produce a lot of Solid & Liquid waste. These wastes are not managed properly & the current management process is not suitable to remedy this. For this reason climates changes frequently & environment being polluted. It is now a matter of concern & if the wastes will managed technically then it would be suitable for the environment. This paper indicates a new management process improving the existing one that would be very efficient. The proposed Technique is based on the human resources, financial support, and technical support. From the proposed technique it is found that the wastes are managed in a step by step systematic way. The breakdown of the proposed scheme is very simple & efficient. Wastes are collected in different pattern by the proposed technique & will not hamper the environmental balance. This scheme will give a better alternative of management of market waste management. Wastes are not always burden for the human being & environment. A good management technique will introduce a new era for the solid waste management. Regarding this concept this paper provides some crucial & adaptable technique for solid waste management as well as its adaption.

Keywords: Solid Waste, climates changes, environmental balance, management technique.

1 INTRODUCTION

Management of wastes is always being a challenge especially for an underdeveloped country like Bangladesh. And it is always a great challenge for achieving institutional sustainability (Danielle et al., 2010). Wastes are the undesirable part of our day to day company. With the increase of population this wastes are also increasing because of the increase of production, demand and consumption. If these wastes can't be managed properly it will be a great threat for pollution of our surroundings above our entire environment. This present study is concerned about the market solid wastes which are generated in the market of Khulna metropolitan city. This study is focused on the management of market solid wastes because this huge hostage is mainly responsible for local area pollution. And in this sector for the management of these wastes there are lakes of people concern, awareness, care of local government, funding above all new management scheme, research and technology (Rahman et al., 2013). Khulna is the third largest metropolitan city in Bangladesh. The geographical location of this city is 22°49'0"N, 89°33'0"E and nearly 1.39million people(BBS 2009) of

different cast and occupation struggle here (Joarder et al., 2013). Many markets exist here. For this study some selected markets have been observed from different location of the metropolitan city. And for this purpose physical survey have been performed for data collection. As well as data have been collected from some market workers such as tokay, shopkeepers and existing market committee.

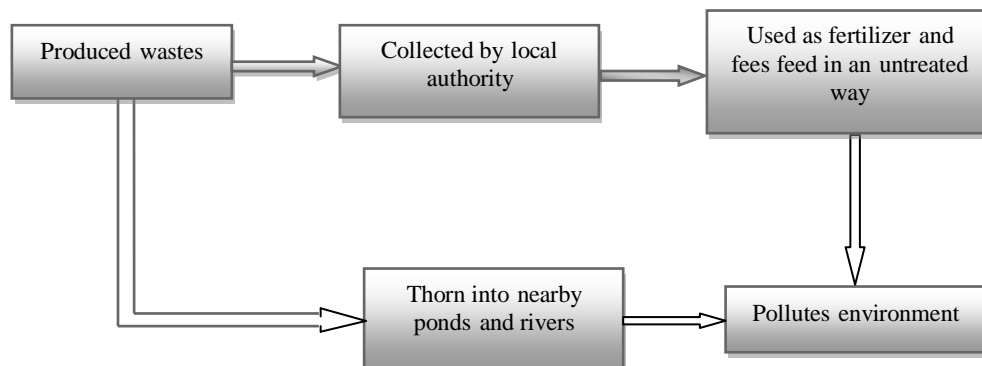
For the maintenance of these wastes Khulna City Corporation (KCC) is responsible according to the ordinance of 1984 (Murtaza, 2002). But investigation shows that nearly two third of the generated market wastes have been collected by KCC (as a whole). In some markets there providing level of service is undesirable. The total amount of wastes generated Khulna metropolitan city is nearly about 440 to 460 metric tons per day (<http://www.khulnacity.org>) and the amount of market solid wastes occupy a lion shear of this. These wastes are disposed in two dumping sites Rajbandh and Joykhali. The environmental condition of these sites is not so good and also responsible for further pollution (Bhuiyan et al., 2013). However some the generated market wastes are used as fertilizer and fees feed by the local authority in an non environmental way. The direct study and analyses of wastes and there characterization study is effective as well as gives opportunity for the reduction, recycling, composting and reuse (Thompson and Wilson, 1994; Thompson and van Bakel, 1995). And focusing on this the study covers the objectives:

- The existing management and the effect of environment.
- Determination of the parameters of landfills soil and its effect.
- Sustainable alternative wastes management system which will be essential to reduce the amount of wastes as well as overburden of landfill.
- Comparison of new developed model with existing management.

2 EXISTING MANAGEMENT AND IMPACT ON ENVIRONMENT:

For the management of produced market wastes there are mainly two existing scenario have been observed.

Scenario 1



Scenario 2

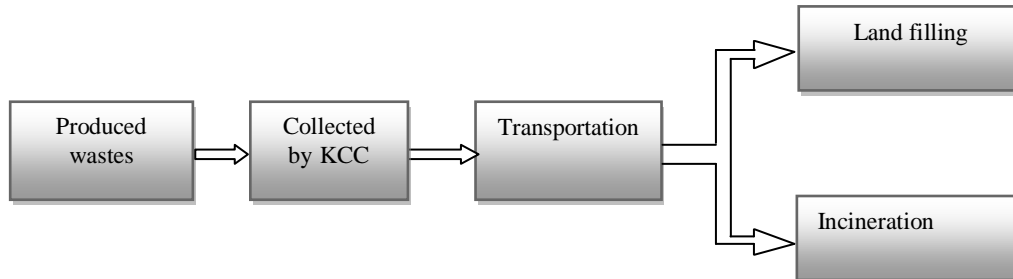


Fig 1. Existing management scenario of market solid wastes.

Local people collect wastes and used as a fertilizer of their crops, these wastes are untreated and responsible for environmental pollution. Some wastes are used as feed and some parts are thrown nearby ponds and rivers without a single treatment all those occurred in an unplanned and untreated way which is harmful for environment. In another scenario produced wastes have been collected by KCC and transported on dumping sites. Rajbandh is the largest dumping site in Khulna city stands by the side of Khulna-Shatkira highway under Batiaghata thana under the district of Khulna. Joykhali is another dumping site under Rajbandh union. A lot of study indicates the parameters of the land fill site are very much higher. For the progress of this study an investigated typical value can be represented as below:

Table 1: Amounts of various parameters of landfill soil (Joarder et al., 2013).

Parameters	Land filling soil sample
pH	7.88
Na (%)	0.18
N (%)	0.13
P (%)	0.29
K (%)	0.59
S (%)	0.22
Fe (%)	2.32
As (mg/kg)	2.78
Pb (mg/kg)	436.30
Cd (mg/kg)	1.66
Zn (mg/kg)	668.86
Mn (mg/kg)	28.82

This soil contains high amount of parameters than natural soil. Also here Pb, Mn, Zn concentrations are very high. Higher amount of heavy metals exists here. Such a land fill site there is strong possibility of surface water, ground water contamination. The possibility of soil and air pollution, risks of human health can't be ignored. Again the rodents, pests, erosion, slope failure are some problems in this sector. If there is no any alternative improved management technique pollution takes place more and more in near future.

3 IMPROVEMENT MANAGEMENT TECHNIQUES:

Improvement management will be attainable and the burden of disposal can be minimized if the generation of wastes, collection, transportation, restoring and processing can be transferred into a cycling way. For this purpose main markets of Khulna metropolitan city namely Nirala katcha bazaar, Gallamary bazaar, Newmarket bazaar, Fulbarigate bazaar, Thukra bazaar, Rupsha bazaar, Baro bazaar have been observed by physical survey. For the purpose of the reduction of wastes and for ensuring the maximum collection as well as to definite a life cycle assessment of total wastes, the wastes are divided into three types. The quantities of market solid wastes are presented below:

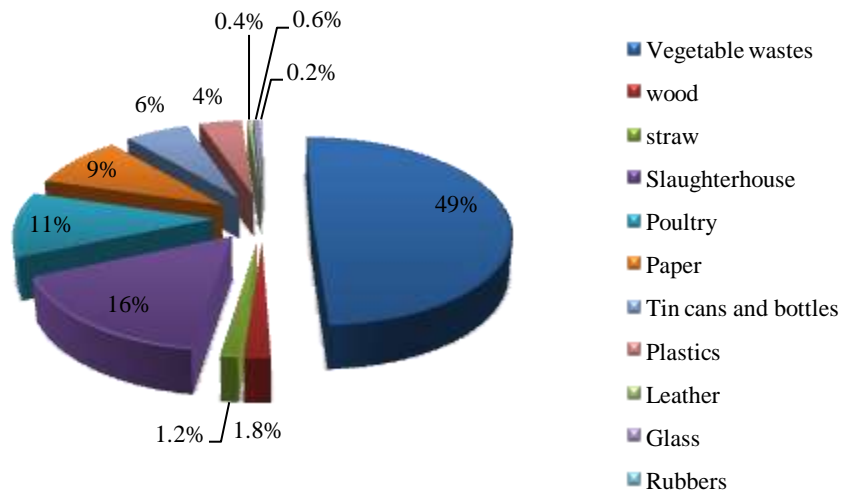


Fig 2. Percentage of different types market solid wastes.

Vegetable wastes, Wood, Straw can be collected by considered category 1. The slaughterhouse and poultry wastes are considered as category 2. The wastes which are under consideration of Material Recovery Facility (MRF) such as glass, tin cans, bottles, paper, plastics, leather, rubbers and cardboards can be collected by considering another category say as category 3.

Table 2: Amount of wastes produced in markets under different category

Bazaar	Wastes(kg) per day		
	Category 1	Category 2	Category 3
Nirala katcha bazaar	850	90	32
Gallamary bazaar	360	160	220
Newmarket bazaar	395	320	292
Fulbarigate bazaar	145	210	96
Thukra bazaar	610	175	110
Rupsha bazaar	415	245	196
Baro bazaar	260	117	432

Category 3 type wastes after recycling and reuse it will again produce solid wastes and the residues are subjected to land fill. This will occur in a cyclic order. This type contains more recyclable and reusable materials. Category 2 is easily biodegradable and can be used for composting and feed after treatment. Again in this category slaughterhouse wastes are important recyclable material for household product. Though the selection of appropriate method for composting and processing of slaughterhouse wastes depends on its type and quantity, biomethanation and rendering system may be suggested. Incineration gives an option for the treatment of this type of wastes but is responsible for the high emission of greenhouse gases. On the other hand composting and incineration is also shows a management process for category 1. Category 1 type is more easily biodegradable and also can be used as fertilizer in garden and lawn. But most important is that the collection and transportation facilities should be ensure to improve proposed management scheme.

4 DISCUSSIONS AND CONCLUSION:

Current rates of solid wastes generation in huge quantity and the impact on environment now globally a growing concern. Day to day actually it becomes more complex and unsustainable in an under developing country like Bangladesh because they exceeds the rates at which resources can be regenerated and wastes can be assimilated by natural system of environment. In this study it is tried to evaluate the potential impacts associated with the present management or present practice of management of market solid wastes. In this study, focusing on present management scenario a theoretical model has been developed. The most important benefit of this scheme is that it will help to reduce wastes. In addition, to reduce the overburden of landfill it will be helpful. It is estimated according to Nielsen and Hauschild that 0.65kg H_2S is emitted from 1 ton of waste. Again it is also estimated total potential methane (CH_4) generation is 29kg from 1 ton waste (UNFCC, 2008) also the effect of Nitrogen and CO_2 is still. And when for wastes disposal, land filling is an only option study shows that 1871136 tons of wastes exceeds per year. In above circumstance to increase sustainability this model is developed that will eco-friendly and eliminate wastes generation. Also as a source of raw materials for various purposes it will be helpful. The massive use of organic fertilizer not only pollutes environment but also decrease the natural growing capacity of soil. This scheme will be a solution in this case also. However in this study a theoretical model is developed for better solid waste management by comparing other existing scenario. A close empirical study will be helpful to prepare a platform of additional study exploration of market solid waste management by the same time also investigates the possibility of this model.

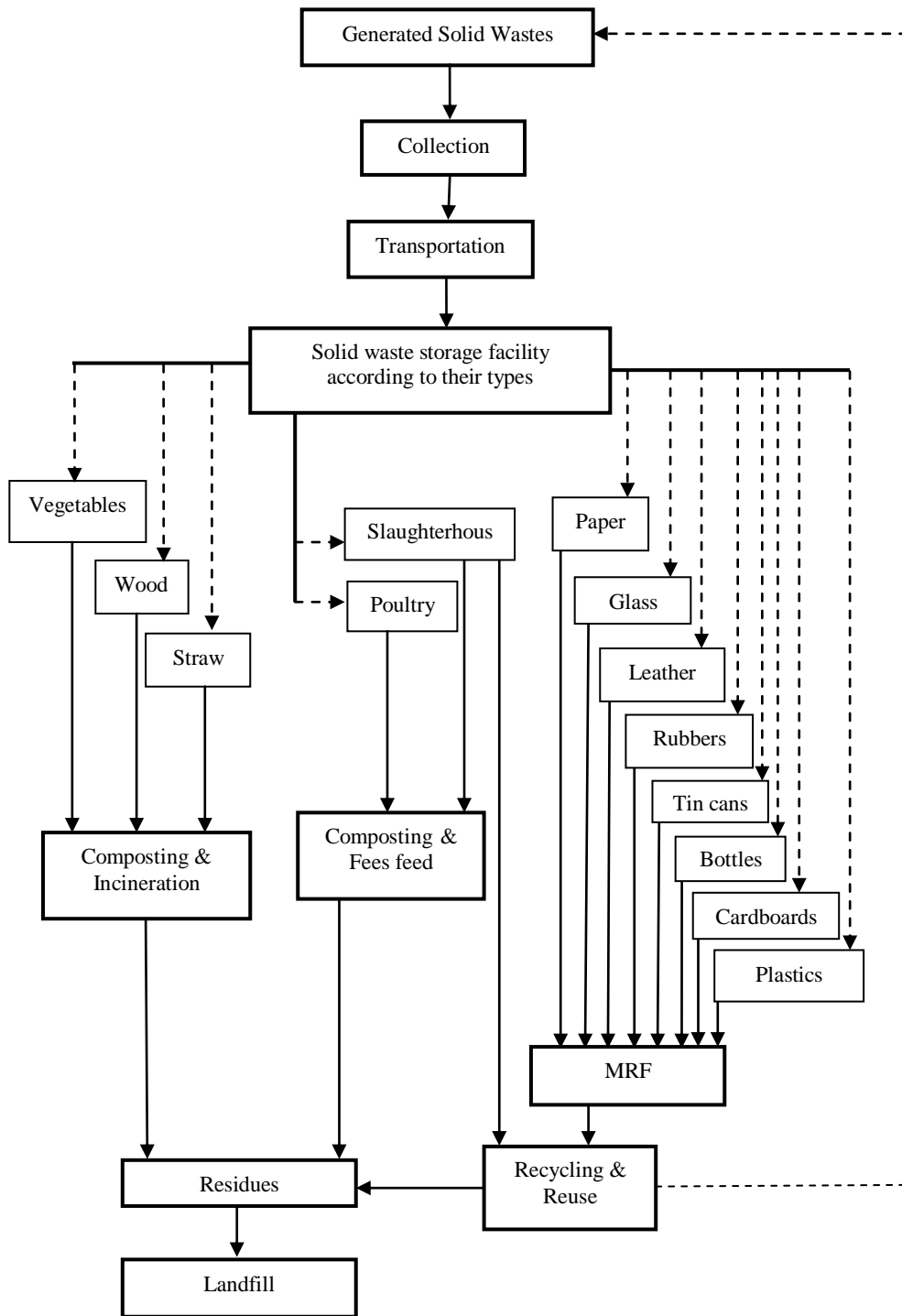


Fig 3. Proposed management scenario.

References

- Danielle P. Smyth, Arthur L. Fredeen, Annie L. 2010. Booth Reducing solid waste in higher education: The first step towards 'greening' a university campus.
http://www.unbc.ca/assets/annie_booth/recycl2255.pdf
- Thompson D, Wilson M. 1994. Environmental auditing: theory and applications. *Environ Manage* 18(4), 605–615. <http://link.springer.com/article/10.1007%2F002400863#>
- Prof. C. Visvanathan., "Solid Waste Management in Asian Perspectives," Environmental Engineering and Management Program School of Environment, Resources and Development Asian Institute of Technology.<http://www.swlf.ait.ac.th/UpdData/Reports/SWMup.pdf>.
- Adewole., A. Taiwo., "Waste management towards sustainable development in Nigeria. A case study of Lagos state," *International NGO Journal* Vol. 4 (4), pp. 173-179, April 2009. <http://academicjournals.org/ingoj/PDF/Pdf2009/Apr/Adewole.pdf>.
- Rahman, Md. Atiqur., Hassan, Dr. Khondoker, Mahbub., " Scenario of Market Waste Management and Environmental Degradation: A Case Study in Khulna City Area," *Proceedings of the WasteSafe 2013 – 3rd International Conference on Solid Waste Management in the Developing Countries* 10-12 February 2013, Khulna, Bangladesh.
- Joardar, Jagadish, Chandra., Halder, Milton., "Chemical Characterization of Khulna City Waste and Its Effects on Surrounding Soils through Lateral Movement," *Proceedings of the WasteSafe 2013 – 3rd International Conference on Solid Waste Management in the Developing Countries* 10-12 February 2013, Khulna, Bangladesh.
- Bhuiyan, Md. Imran, Hossain., Molla, Dr. Md. Keramat, Ali., "Geo-environmental Aspects of Liner in Municipal Solid Waste Landfills," *Proceedings of the WasteSafe 2013 – 3rd International Conference on Solid Waste Management in the Developing Countries* 10-12 February 2013, Khulna, Bangladesh.
- Ashraf, Syeda, Nishat., Alamgir, Muhammed., Akhter, Jhumana., " Sustainability of Waste Management System in Developing Countries: A Case Study," *Proceedings of the WasteSafe 2013 – 3rd International Conference on Solid Waste Management in the Developing Countries* 10-12 February 2013, Khulna, Bangladesh.
- MoushumiZahur., SuehiroOtoma., "Informal Solid Waste Recovery and Recycling in Dhaka City: Context of Environmental and Socio-Economic Aspects," *Proceedings of the WasteSafe 2013 – 3rd International Conference on Solid Waste Management in the Developing Countries* 10-12 February 2013, Khulna, Bangladesh.
- Shumon, Ahmed, Md. Faisal ., Bari, Hamidul, Quazi., Islam, Md. Atikul., " Study on Solid Waste Recycling and Reuse in Jessore Town," *Proceedings of the WasteSafe 2013 – 3rd International Conference on Solid Waste Management in the Developing Countries* 10-12 February 2013, Khulna, Bangladesh.
- Faruq, Al, S.M.Abdullah., Kader, Md. Abdul., Alamin, Md., Hasan, Md. Rokon., Alam, Salma., " Life Cycle Assessment (Lca) Of Municipal Solid Waste Management System In Dhaka Metropolitan City," *International Journal of Scientific & Engineering Research*, Volume 4, Issue 5, May-2013 291 ISSN 2229-5518.
<http://www.ijser.org/onlineResearchPaperViewer.aspx?LIFE-CYCLE-ASSESSMENT-LCA-OF-MUNICIPAL-SOLID-WASTE-MANAGENENT-SYSTEM-IN-DHAKA-METROPOLITAN-CITY.pdf>.

- “Solid Waste Management, Principles and Terminologies,” Prakriti, Centre for Management Studies, Dibrugarh University, National Environment Awareness Campaign, 2006 – 07 for distribution through its website .
http://cmsdu.org/organs/solid_waste_management.pdf.
- Sharholly, Mufeed., Ahmad, Kafeel., Mahmood, Gauhara., Trivedi, R.C. ., “Municipal solid waste management in Indian cities – A review,” Available online 12 April 2007, Waste Management 28 (2008) 459–467.
<http://www.unc.edu/courses/2009spring/envr/890/002/readings/SolidWasteIndiaReview2008.pdf>.
- Peavy, Howard S., Rowe, Donald R., Tchobanoglous, George., “Environmental Engineering” ISBN 0-07-100231-6.
- Prof. Gidde, M. R., Todkar, Prof. Dr. V. V., Kokate, Prof.K K., “Municipal Solid Waste Management in Emerging Mega Cities:A case study of Pune City,” GCE 2008: Indo Italian Confarence on Green and Clean Environment March 20-21, MAEERS’s MIT college of engineering,pune.http://www.bvucoepune.edu.in/pdf%27s/Research%20and%20Publication/Research%20Publications_2007-08/International%20Conference_2007-08/Municipal%20solid%20Prof%20MR%20Gidde.pdf.
- CPCB, 2000. Status of Municipal Solid waste Generation, Collection, Treatment and Disposal in Class I Cities, Series: ADSORBS/31/1999–2000.
- Ahmed, M. Feroze., Rahman, Md. Mujibur., “Water Supply And Sanitation Rural And Low Income Urban Communities,” Itn-Bangladesh, Fourth Edition.
- ISO 14040:2006 .Environmental management -- Life cycle assessment -- Principles and framework. http://www.iso.org/iso/catalogue_detail.htm?csnumber=37456.
- ISO 14040, 1997. Environmental Management- Life Cycle Assessment- Principles and Framework. International Organization for Standardization, Geneva, Switzerland. http://www.iso.org/iso/catalogue_detail.htm?csnumber=23151.

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