

WASTE MANAGEMENT IN DHAKA CITY-A THEORETICAL MARKETING MODEL

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ABSTRACT

An escalating quality of life and high rates of resources consumption patterns have had an unintended and negative impact on the urban environment generation of wastes far beyond the handling capacities of urban govt. and agencies. Cities are now grappling with the problems of high volumes of waste, the cost involved, the disposal technology and the impact of wastes on the local and government environment. Therefore, at this moment it is very much needed to make a proper plan for waste management and disposal system it has also been observed that waste can be another source for earning money. So, keeping this objective in mind, this study attempts to develop a proposed marketing model for waste management system in Dhaka city. It can also be considered as a preventive waste management approach, which is focused on changes in lifestyles and in production and consumption patterns. This article also tries to find out the commercial value of waste. Last but not least it is a proposal rather than a conclusive study. It needs a more pragmatic test for its reliability study.

Key words: Community participation, Waste management, Recycling, Waste Minimization, Waste Marketing, Marketing Mix of waste.

Introduction: Environmentally sound waste management must go beyond the mere safe disposal or recovery of wastes that are generated and seek to address the root cause of the problem by attempting to change unsustainable patterns of production and consumption. This implies the application of the integrated life cycle management concept, which presents a unique opportunity to reconcile development with environmental protection.

Each day Dhaka city is producing over 3000 tons of household waste. On the other hand Dhaka City Corporation collects almost less than half of it. The rest remains on roadsides, open areas. So, most of the urban bodies are finding it very difficult to keep pace with the demand for adequate solid waste management. It will become very difficult to find

sites to bury the waste as the city expands, and transport costs to transfer the waste will increase. The volume of waste needs to be reduced to a sustainable level.

This need have also provided a window of opportunity for cities to find solutions. -

1. Involving the community and the private sector.
2. Involving innovate technologies and disposal methods.
3. Involving behavior changes & awareness rising.

There is a need for a complete rethinking of "waste" to analyze if waste is indeed waste. Some

private and community based organizations prove it that “trash can be cash”. So, all it needs to be rethinking, organizing and planning about handling waste. It is obvious that the current approach for waste disposal that is focused on municipalities and uses high technology, to move more towards waste processing and waste recycling, & minimization. All these things involve public-private partnerships, community level awareness and participation, and using low energy /low technology resources.

Solid waste is any garbage, refuse, sludge, or other discarded material, including solid, liquid, semi-solid or contained gaseous material resulting from industrial, commercial mining, or agriculture operations or from community activities. (DU Journal, Office of land quality-2000).

Waste management is a methodology used to waste collection primarily from different sources, including recycling and re-use of materials.

Waste marketing is an advanced concept that depicts how the wastes can be better collected, assorted, re-modified, packaged, and sold into the market by promotional campaigns. In general some tasks of the waste marketing are included in the waste management process like collection of wastes.

Cities are now grappling with the problems of high volumes waste, the costs involved, the disposal technologies, and the impact of wastes on the local and global environment. But, these problems have also provided a window of opportunity for cities to find solutions.-involving the community and the private sector, involving innovative technologies and disposal methods, and involving behaviors changes and awareness rising. So, the concerned people are again thinking of waste- to analyze if waste is indeed a waste.

A well structured waste management and marketing process will not only help to ensure a cleaner environment but also will go further for economic security of the unemployed people.

How waste marketing be beneficial for the society as a whole can be better understood with an example. At the Green Road Government Colony in downtown Dhaka, five Waste Concern

employees go door to door collecting refuse from 800 households, hauling it by rickshaw vans to a nearby shed. There they sort out any inorganic material before placing the trash into five brick bins. Each month, the plant produces 3 tons of bio-fertilizer, which sells for about \$0.04 per kilogram. The revenue is enough to make the operation self-sustaining, covering production costs and providing well-paying jobs to employees.

The key activities and role for managing solid wastes of Dhaka City are performed by several groups of people. The four main types of actors in this process are:

- a. The Municipal Government (DCC).
- b. The Formal Private (Commercial) sector, in their role as potential solid waste function contractors like, Waste Concern, Bangladesh.
- c. The informal private sector, including individuals, small entrepreneurs, and micro entrepreneurs, already working with waste materials or having the potential to do so. Like Tokai, Vangari shops (Waste retailers).
- d. Community based organizations, (CBO's) either idealistically motivated or working for social welfare like, Bangladesh Poribeshbadi Andolan (BAPA) and
- e. Non-paid (From Government) non-governmental organizations (NGO's) usually in pursuit of their own idealistic goals.

Comprehensive waste characterization studies have not been conducted in Bangladesh. In addition none of waste disposal sites in the country is equipped with weighbridge. However, recently Dhaka City Corporation (DCC) at its waste disposal site has installed a weighbridge to measure the amount of waste being disposed. Consequently, there is limited reliable information related to quantity of wastes generated in the urban areas of Bangladesh. Due to lack of information, estimates were made of the amount of waste generated. The estimates were based on the information available from other countries and cities having similar socio-economic condition to those prevalent in Bangladesh. Solid waste generation in Bangladesh is growing proportionately with the growth of urban population. Table 1 shows the growth in solid waste generation over the years.

Table-1: Growth in solid waste generation in urban cities of Bangladesh.

Year	Total Urban Population	Urban Population (% Total)	Waste Generation rate (KG/cap/day)	Total Waste Generation (Tone/day)
1991	20872204	20.15	0.49**	98,73.5
2001	28808477	23.39	0.5***	11,695
2004	32765152	25.08	0.5***	16,382
2025	78440000	40.0	0.6**	47,064

** Source: ADBI and ADB 2000.

*** Source: Zurbrugg 2002.

It is evident from the above Table that solid waste generation in urban areas in Bangladesh is growing with the growth of population as well as per capita GNP. In 1991 the per capita GNP was US \$ 213 (World Bank, 1997) while the GNP in 2001 was US \$ 351 per capita and in 2003 it was US \$ 370 (Zurbrugg, 2002).

The composition and resulting character of municipal solid waste are always dependent on the source of its generation. Each city has a unique blend of activities and resulting waste characteristics. Experience shows that approximately 60% of waste is generated by residential areas of Bangladesh. In urban areas of Bangladesh solid waste has a very high organic content that varies from 70- 85%. Table 3 shows that solid waste of Dhaka City has also similar amount of organic matters. This places additional burden on already over-strained system. Solid waste, at the point of collection, has a high density. Density will increase as the waste is handled, through loading, transport in carts and vehicles, and eventually by compaction with landfill equipment at a disposal site. Density of waste at the pick-up point ranges from 390 to 540-kg/cubic meter. Composition of solid waste shown in the table clearly demonstrates that a major portion of waste of Dhaka city is organic with high moisture content, which is suitable for the production of compost fertilizer.

Problems in waste management in Dhaka city

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-2: Nature of waste composition in Bangladesh.

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
Moisture	65

** Source: Ahmed, M.F. & Rahman, M.M. 2000

This part considers the key constraints in terms of the development of integrated, sustainable, partnership-based solid waste management systems in developing countries, and the issues that underlie these constraints.

Financial Constraints

Finances of the Municipal Governments

- While people are willing to pay for water and other services that are essential to their survival, solid waste removal does not always fall into this category.

- Even if residents and businesses are willing to pay for waste removal, the municipal government is unlikely to know what its true costs are.
- When solid waste fees are calculated based on real estate assessments, there is no link between quantity generated and amount paid, and therefore no incentive to reduce the amount.
- The structure of donor financing makes it generally easier to secure financing for capital expenditures than for ongoing operations and maintenance.
- Financing from multilateral institutions usually has to have a clear goal, such as the purchase of equipment. Bilateral aid often requires the purchase of goods or services from the donor nation.

Finances of the Formal Private Sector

The finances of the formal private sector present fewer although significant barriers to the setting up of partnerships. These barriers fall into the following categories:

- Capital formation barriers: private businesses, unlike municipal governments, may have difficulty raising capital for equipment and/or land purchase.
- Problems with the collection of fees: either unwillingness to pay for waste disposal or too few subscribers to enable a reasonable economy of scale for cost-effective collection.
- Cash flow: the tendency of municipal governments to pay their bills very slowly can cause financial hardship for contractors.

General Institutional Constraints

The general lack of critical thinking in relation to solid waste systems is often a barrier to innovative solutions. Even in developed countries, the intellectual framework for understanding the relationships between consumption, disposal, and recycling, Industrial activity and natural resource exploitation is seldom complete or adequate.

Confusing and fragmented divisions of labor and responsibility may mean that activities which could be contracted out are administratively inseparable from each other, making it effectively impossible to split them off for a contractor.

Staff incompetence and lack of interest often plays a role. Solid waste is frequently a 'dumping-ground' for political patronage, which can lead to the appointment of supervisory or management personnel who lack the necessary skills to manage the department that is responsible for the environmental health of the city population. These departments often are overstaffed with workers with low qualifications, and lack middle management (or the recognition that it is necessary). Their education has not been oriented towards informal enterprises or community groups. Finally, public officials may receive attractive fringe benefits, ranging from free service to their own homes to profitable contacts with equipment suppliers, from the status quo.

Legislation and regulations are set up for particular purposes, and are often difficult to adapt to new circumstances. In particular, the legislative and regulatory context for solid waste management is dispersed, fragmented, and incomplete, and so does not tend to facilitate the formation of cross-sectoral partnerships. If such partnerships nevertheless come into being, existing legislation normally provides few tools for coordinating or managing them. Which ultimately reflects in our current waste management Situations.

Institutional Arrangement & Existing Practice for Solid Waste Management in Bangladesh

Presently, the solid waste management system in Bangladesh is not well organized. However, efforts are under way to improve the organizational structure for solid waste management in different cities/towns. For instance, Dhaka City Corporation has recently established a Solid Waste Management Cell to improve the waste management services in the city. Solid waste management is organized and run by conservancy section of the urban local bodies, whose prime responsibility is maintenance of the sanitation system. The organizational structure of conservancy

Is shown in figure-1 of the appendix. The number of staff for conservancy varies from city to town depending upon the size of the city and the workload. Some of the cleaners and sweepers are hired on temporary basis. Although, the organizational structure presented in Figure deals with the collection and storage of waste as well as

street sweeping, separate department in the city corporations and municipalities does transportation of waste. The chief conservancy officer or the conservancy officer in the pourasahavs has to coordinate with the transport department to get the waste transferred from collection points to designated waste disposal sites. In addition to the shortage of personnel, the staffs are handicapped with relatively small amount of resources available to them for management of solid waste in their particular area of operation.

Approximately 16,380 tons of waste is generated in the urban areas of Bangladesh in the year 2004. The waste is generated from different source (domestic, commercial, industrial, street sweeping, health care facilities etc.). 3 (three) 'systems' of waste management are coexisting side by side in Bangladesh. One is the '**Formal System**', where municipalities/city corporations are responsible for Solid Waste Management (SWM). 'Formal system' is based on the conventional system of collection transportation- disposal of waste carried out by the local authorities. In this system the concept of transfer stations, resource recovery, minimization and recycling are absent.

Next is the '**Community Initiative**' that is based on primary solid waste collection by CBOs and NGOs, 'Community Initiatives' of house-to-house waste collection in neighborhood started due to lack of satisfaction with solid waste management service. Finally, '**Informal System**' represented by the large informal labor force involved in the solid waste recycling trade chain. (Figure 2 in appendix) shows the existing system of solid waste management in the urban areas of Bangladesh. Partnership between these three systems is needed to promote effective solid waste management system in the country.

Waste disposal is an emerging problem in almost all urban areas of Bangladesh. The magnitude of the problem is relatively small and manageable in rural areas. Among the major environmental concerns confronted today in the urban areas of Bangladesh are problems relating to proper management of solid waste. There is no single solution to improve solid waste management system in any city. It must be based on integrated systems with a combination of different methods. There should not be any contradiction between different methods; instead they should be complimenting each other. Sophisticated

technologies are beyond the capacity of small and medium towns of Bangladesh. The local authorities spend 5-20% of their total annual budget to collect, transport and dispose waste. Approximately 50% of this budget is being collected as revenue and the rest comes as grant from the national government. Presently, a number of commendable steps have been taken by the government to promote low cost, appropriate decentralized community based composting technology based on socioeconomic and climatic condition of the country, which includes:

Waste Collection: as per traditional method of waste collections Rickshaw vans are modified to collect waste from each house., and city corporation has their own vehicles for collecting wastes. **Recycling and Composting:** Approximately 1,20,000 people are involved with the recycling occupation in Dhaka city. Similar recycling activities are also prevailing in other cities and towns of the country. The poor socially disadvantaged people informal sector are primarily involved with waste recovery and recycling practice in the country. Their recycling activity is reducing a significant volume of waste which otherwise would have to be collected by the local authorities. Almost 15 percent (i.e., more than 467.65 tons) inorganic fraction of the waste is recycled in Dhaka city (Sinha, 1993). Waste pickers mostly women, children of slums popularly known as *Tokai*, collect waste of low market values from waste bins. These items include broken glass, tin cans cardboard, waste papers, rags, plastics, metals and miscellaneous commercial waste discarded by households. Another group of waste pickers collects recyclable from the unloaded municipal trucks at the final disposal sites.. Although *Tokais* extract most of the readily available material from the waste stream, still there remains considerable value in what they leave behind. This value lies in the organic portion of the solid waste, which constitute about 70-80% of the total generated waste, having considerable potential value, if converted into compost through composting. From the perspective of municipality, organic waste recycling through composting not only reduces disposal costs and prolongs the life span of disposal sites, but it also reduces adverse environmental impacts caused by landfill sites. as the organics are mainly responsible for leachate contamination and methane problems.

Marketing: There is a good market for compost in Bangladesh. Waste concern helps the communities sell their compost to a number of business, such as fertilizer companies, and plant nurseries. Each 50 kg bag of compost sells for US\$ 2.50- US\$ 4.50. Waste concern has been asked to install more community-based compost plans to meet the growing demand for enriched compost. This program has significantly cleaned up communities, created jobs for poor people, reduced the Dhaka city Corporation's waste management cost and created business opportunities. Composting all organic waste in Dhaka would create new jobs for about 16,000 poor people, especially women. It has become a model, which several city governments and NGO's are trying to copy. (figure 3 in appendix).

Objective of the study:

Broad objective: The general objective of this paper is to developing and implementing “**integrated waste management and safe disposal system/model as sustainable commercial solutions**” to the waste problems in the metropolitan cities in Bangladesh, with special respect to the inherent socio-economic aspects, technological capability and the present needs of this country.

The study has been conducted keeping the following specific objectives in mind:

1. To discuss about the origin of solid waste and its composition.
2. Evaluating the current strategic model to determine the real picture of the generated solid wastes in urban areas, their composition and characteristics and the resulting environmental hazards posed to nature and society.
3. Identify the drawbacks in all levels of existing urban waste management system.
4. Study the applicability of advanced waste management systems in terms of Disposal collection and temporary storage, reuse, recycling, and treatment and eventually, disposal of residual wastes in engineered landfills.
5. Finally, as a concrete outcome of this feasibility study, a model has been proposed for the integrated management with

commercial aspect (marketing side approach) and safe disposal of municipal solid wastes in Dhaka city.

Methodology:

The study uses both primary and secondary data. Primary data were collected from “Tokai”, cleaner, Community service providers, waste resellers (Vangari shops) of Dhaka City. Secondary data were also used to prepare this report. These were mainly collected from different journals, dailies, official reports, NGO publications etc.

Waste marketing: We have developed a model for waste management and waste marketing that is attached in the next page of this article, This model is an aggregate and integrated model for waste management and marketing. In this model we have shown the sources of wastes, the collection process, the participatory groups, waste recognition and assortment system for marketing them and moreover the total marketing process is shown too. In addition we have shown the integrated waste marketing process that includes not only assortment but also grading, bagging and selling mechanism of different categories of wastes. To help the customers and sellers we have added the use of the wastes or the types of the wastes we will be dealing with R concept (reduce, reuse, recycle, refuse, regulate, reconsider etc) of waste management. This concept provides an idea about the category of waste a company can sell to the market either directly or in a modified version. This model can also help to create some new scope for starting enterprise related waste recycling in a proper structured way that will lead to a sustainable solution for the economy.

A simple marketing mix analysis of the wastes and recommendations for waste marketing can explain the uncovered prospect for sustainable solution by using waste. This covered categorizing the waste as product, pricing them as per their commercial value, make the proper distribution channel, and lastly promotional activities include to create the awareness of the commercial value of the wastes among the community, NGO's and different sectors involve with it to participate in their own way to make this process successful.

Probable marketing mix of wastes: Let us see how one can develop the 4 P's of wastes.

A. Product: These are tangible products

- Available in different categories like organic (Raw waste), recyclable, composted etc
- Sold without modification if recyclable or according to the demand
- Available in raw form or in slightly modified form to use directly as input Grading of the wastes for differentiation by the experts
- Bagging in authorized plastic pack or in jute bags.
- Expiry date and modification date will be labeled over the pack
- Price tag, ingredient list, direction to use will be provided

B. Pricing policy:

- Cost-based and competition based pricing will be followed
- Different price for different sized pack.
- Discount for the bulk consumption of wastes
- 2/10 N 30 policy for the traders
- Allowance will be given to the brokers to sell the products to the businesses.

C. Distribution side approach:

- It includes collection of the wastes from the sources too
- Assortment by Tokai for further processing
- Initially distribution from the central inventory
- Setting at least 20, 000 small bins in different areas of the Dhaka city to collect wastes.
- Trucks will be used to collect raw wastes twice daily.
- In addition Tokai or other small collectors can sell the raw waste to the company
- Own transportation to ship the products from warehouse

D. Promotional activities:

- Encourage people to segregate the wastes at their home before sending to dustbins
- Posters can be used to create awareness about the waste disposal system
- Leaflets will be provided after Holy Jummah (to target male citizens) and in front of English medium schools (to target female citizens)
- Personal selling in the forward linkage organizations
- Mail and sample marketing to the businesses
- Seminar on waste management in TV or in educational institutions as public relation
- Sponsoring the special interest groups like BAPA.

- NGO-based public campaigns for awareness of waste problems.
(the model in next page is for detail understand of the probable waste marketing mix)

This model also clarifies that first it needs to separate the source for collection of waste. It can involve municipal govt. formal or informal private sector, community based organizations or NGO's for collecting waste . Then it needs to separate the waste into hazardous and non-hazardous category. If it's found to be extremely hazardous then it should be rejected or can be transferred to dumpsite for reuse, regulate or resolve.

If the waste is recyclable or organic type then it should be prepared for further use for commercial values. Then the waste can be sold to the local market. Here the proposed model suggests that if we can add grading to the waste as per their commercial value then it can be a better way to earn money as well as our purpose towards a sustainable solution for waste management can be satisfied. It can be started from the household. If organic waste and recyclable waste are managed separately the task is much more easier for the next stage that is grading and sorting. This model also Classify the probable use of R's that is not only reuse, refuse or recycle, but also regulate, renounce, reconsider, replace, restore etc.

Recommendations Towards Sustainable Solid Waste Management Systems: Strengthening inter-sectoral partnerships support a long-term vision of the goals of waste management in developing countries. This goal is to achieve sustainable solid waste management systems which are stable over time, and which are beneficial to the society, the economy and the environment. The point here is that it is possible, given the state of the art in both developed and developing countries, to bypass intermediate motivations, and to seek to create and implement sustainable waste management systems from the outset. This action plan is set up to pursue this goal. This paragraph defines the different elements of sustainability listed below:

- Sustainability will only be attainable if the current concept of refuse disposal, which imposes great burdens on the environment and resources, is transformed into a closed-cycle system, restoring various natural cycles, thus preventing the loss of raw materials, energy and nutrients.

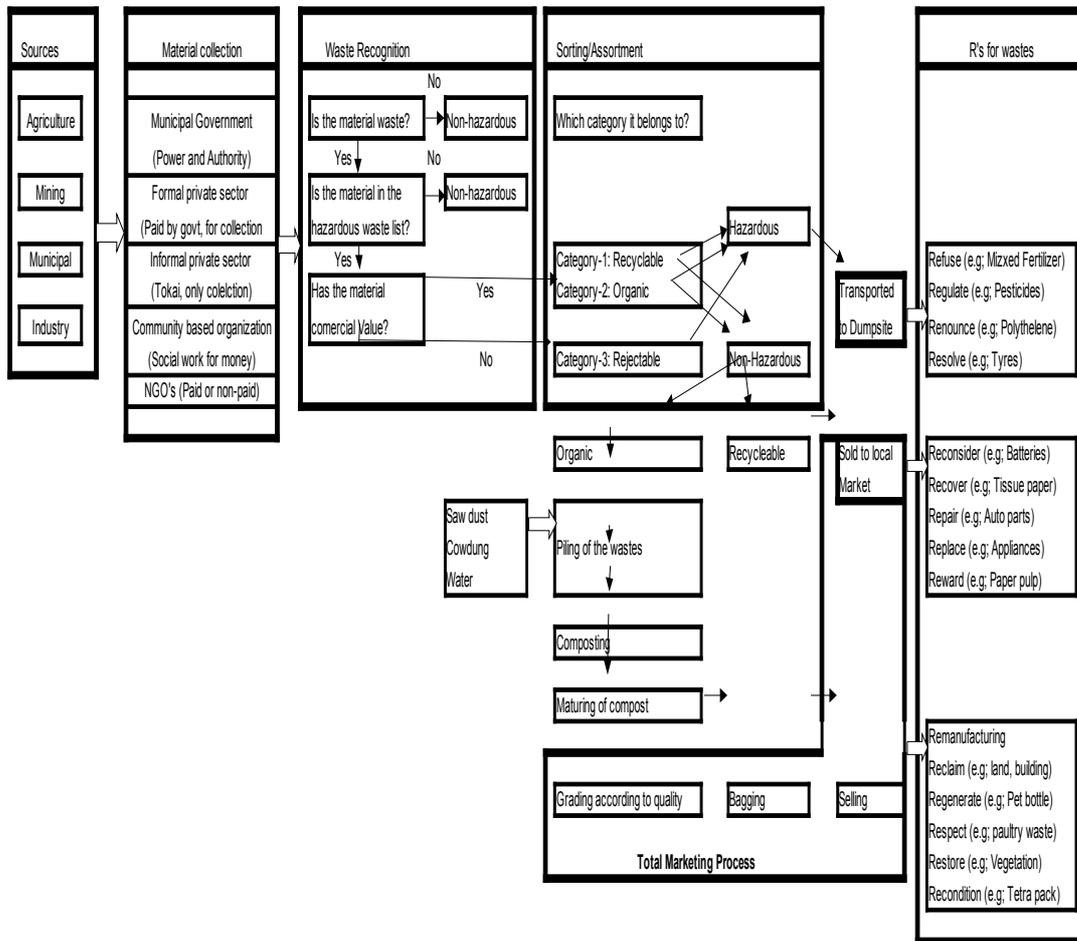


Figure: Model of Waste Management and Waste Marketing

Created by:
 Tamzid Ahmed Chowdhury
 Syed Rownak Afza

9.1. Proposed model for waste management and

- The principles of sustainable waste management draw also on the idea of local self-sufficiency, leading to a preference for processing waste and recyclables as close to the source of generation as possible.
- The democratically managed spending of taxpayers' money in relation to the

performance of actors in the solid waste management system

- Decentralization of tasks within government bodies should be accompanied by a decentralization of powers and resources.
- An adequate legislative and regulatory framework, with appropriate compliance and enforcement mechanisms, is essential

- to ensure adequate performance of private enterprises.
 - Waste management should be consistent within the concept of Sustainable Cities.
 - Full-cost analysis is essential to gain a clear picture of the true costs and benefits of all waste-related activities. Full-cost accounting, combined with the implementation of cost-based fee collection systems is a more sustainable approach than reliance on donor financing
 - Fee systems, which aim to achieve full-cost recovery from those who receive high levels of service, usually the wealthier citizens and the commercial sector, should be introduced.
 - There should ultimately be a relationship between the costs of waste management and the revenue streams associated with waste management activities
 - Waste management plans and services should be provided to all strata of society, regardless of income, ethnic group, or social status.
 - Informal waste collection and handling is often driven by poverty. Broader issues such as poverty alleviation, improvement of the local economic situation, and the like should be considered as well.
 - The action agenda described below is designed to facilitate the formation of sustainable cross-sectoral partnerships in the context of integrated solid waste management in developing countries.
 - Investigation, research, documentation, and analysis of the existing solid waste system in operation in the city, with an emphasis on: economy, institutional set-up, organizational capacity, roles and impact of all actors, regulatory framework, industrial and commercial infrastructure, municipal and national policy goals, et cetera.
 - Creation of infrastructure, preconditions, instruments, and an institutional context in which all actors can perform their partnership functions in relation to the development of new models for sustainable solid waste management in an optimal manner.
 - **Monitor waste activities in your community.** Community organizations could monitor their country's policy of selling waste relocation permits to industries from other countries. I
 - **Notify the media of stories of environmental importance.** Develop a rapport with journalists in your area, and let them know of any and all issues you know of concerning abuse of waste.
 - **Promote** educational campaigns for (a) environmental and societal benefits of waste reduction and recycling (especially as individual economic incentives weaken), (b) composting options c) reducing the stigma attaching to waste work;
 - **Support** source separation, recovery and trading networks, Including NGO projects, with information-sharing (especially of market data) and engagement of important stakeholders;
 - **Facilitate** small enterprises and private-public partnerships by: new or amended regulations for co-operatives, loans to businesses, amendment of counter-productive zoning and tax regulations, enable space for sorting and trading depots, etc.;
 - **Reduce** harassment of itinerant buyers, pickers and waste dealers by police; assist waste pickers to move out of manual picking through retraining programs or subsidization of sorting/redemption centers;
 - **After** consulting the major stakeholders, advocate, if feasible, selective waste minimization legislation: pressure national levels for packaging reduction, product redesign, and coding of plastics;
 - **Encourage** export of recyclables if there is an economic demand in nearby countries and non-toxicity is assured; remove tax barriers to such trading;
- Other actions that can be taken to improve the situations are:
- Land should be provided free of cost or at a nominal rate to the interested entrepreneurs
 - Training and technical advice
 - Assistance in marketing of compost
 - Households are asked to separate dry reusable and recyclables and sell or send this to traders
 - Assistance to waste dealers and recycling industries to access more recyclables

- Institutional research and promotion of waste reduction, source separation and recycling
- NGO-based public campaigns for awareness of waste problems
- Extending waste collection services to upper, middle and especially low income areas
- Micro financing by the banks at a lower interest rate
- Municipality may provide instruments to the entrepreneurs in lease basis.

Conclusion

There is a whole culture of waste management that needs to be put in place-from the micro level of household and neighborhood to the macro levels of city, state and nation. The general assumption is that Solid waste management should be done at the city level first and as a result; solutions tried out have been essentially end-of pipe. But we should keep this mind that rather than making a long-term holistic approach, we can start it within our community and can create an example for the whole country.

If we can start our waste management process at the micro level, like as community based system then it can be easily manageable as well as it can create examples for others. Most of the developed countries now a days are trying to rethinking about their waste disposal system and developing a wide range of system and approach to minimize the environmental hazard as well as reaching a profitable solutions using this wastes.

In our country, we can also dream for a better future, where our environment will be protected as well as We can reach a sustainable solution by using waste, and develop our entrepreneurial activities. Further this study tried only to develop a theoretical model for better waste management in Dhaka city. It needs a complete empirical study to examine the feasibility of this model. This model will also provide. The platform for further study and exploration of the waste management and practices in Dhaka city.

Appendix

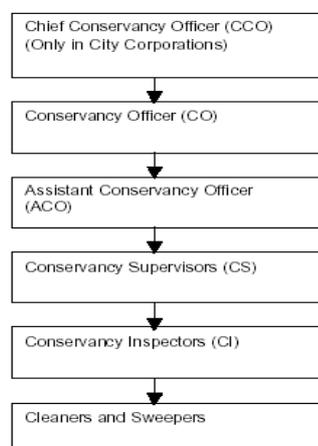


Figure 1: Organizational Structure of Conservancy Section in Urban Local Bodies in Bangladesh

** Source: SAARC workshop on solid waste management: Oct 10-12-2004
 Available on: [www.wasteconcern.org/publication](http://wasteconcern.org/publication)
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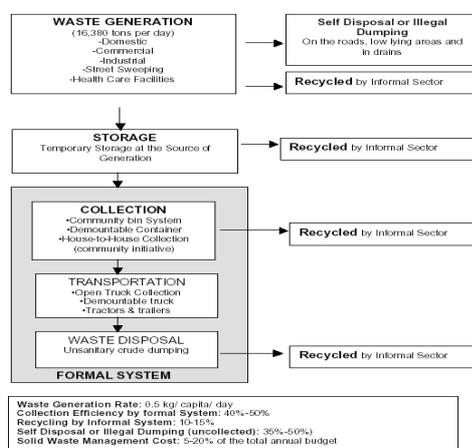


Figure 2: Existing Pattern of Solid Waste Management Process in Bangladesh

Figure-2: Existing pattern of solid waste management in Bangladesh

**Source: SAARC workshop on solid waste management: Oct 10-12-2004
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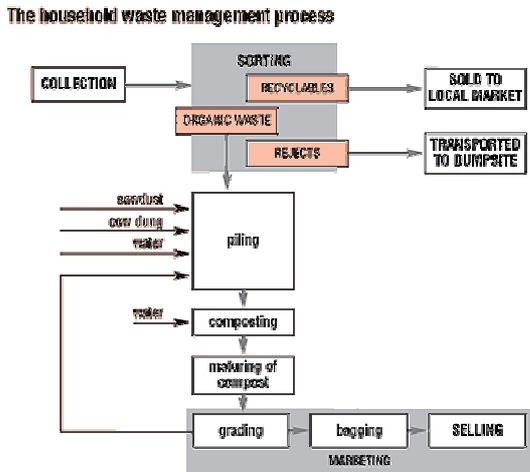


Figure 3: The household waste management process.

**Source: Enayetullah, Ifterkhar, “Household waste management in Dhaka, Bangladesh.

Available on: <http://wasteconcern.org/publication>

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