



20th WEDC Conference

Colombo, Sri Lanka, 1994

AFFORDABLE WATER SUPPLY AND SANITATION



Solid waste management in Dhaka

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THE PROBLEMS OF solid waste management and consequent impact on neighborhood environment is critical in Dhaka city. The environment in part of the city bears signs of polluted environmental condition because of the accumulated uncontrolled garbage on the roads and drains filled with solid wastes and human feces in the low and middle-income areas of the city.

Now the question is what constitutes a solid waste? A material which is thrown as worthless is a waste. Solid waste includes all those wastes except wastewater discharges and atmospheric emissions. So, a solid waste may either be a semi-solid, solid or even a liquid. Moreover, a waste has been looked after as an abandoned material which has no consumer value to the person abandoning it. Further, the urban solid waste or municipal refuse has been defined by Cointreau as "material for which the urban area requires no compensation upon abandonment. In addition, it qualifies as being within the responsibilities of the municipality to collect and dispose of it". (Cointreau, 1982)

Characteristics of solid wastes in Dhaka city (Cointreau, 1982)

In Dhaka like in other developing countries, the material abandoned is usually regarded as a municipal responsibility. This includes: household garbage and rubbish, commercial refuse, cleaning and maintenance refuse, dead animals, catch-basin and drain cleaning wastes, bulky wastes and sanitation residues.

House garbage and rubbish

Also known as residential refuse or domestic wastes. This includes food preparation, sweeping, cleaning, fuel burning and gardening wastes.

Commercial refuse

Wastes of this category come from stores, offices, fuel service stations, restaurants, warehouses and hotels. The wastes usually comprise packing and container materials, used office supplies and food wastes.

Institutional refuse

In this category fall schools, offices, hospitals, police barracks and religious buildings. This category usually produces a large portion of paper.

Street sweeping

Wastes of this type always comprise dirt and litter. Household refuse, drain clearings, human fecal matter and animal manure may occur in appreciable portions of this group of wastes.

Construction and demolition debris

Construction activities where clay soil is used as construction material may produce considerable quantities of waste to the municipal refuse.

Sanitation residues

In Dhaka where sewerage is not the major means of containing human excreta and sillage, sanitation residues may occur from privies and latrines. The night soil generated in these sanitation systems awaits regular cleaning. It may get service either from the municipality or the private sector.

Industrial wastes

Processing and non-processing industries as well as utilities produce industrial wastes. This includes packaging material, food wastes, spoiled metal, plastic and textiles, fuel burning residuals, and spent processing chemicals.

Existing solid waste management system in Dhaka and its inadequacies

Dhaka Municipal Corporation is responsible for collection and disposal of garbage in Dhaka city. In Dhaka, there is no house-to-house collection of solid wastes. Wastes are generally collected from street corners, dumping grounds, concrete and street bins. Against special payments, solid wastes are directly collected from houses. Different types of vehicles starting from wheelbarrows and bullock carts to 7-ton trucks are at the service of 3585 municipal collectors. Bullock carts serve the old town, which in fact are expensive to operate, slow and difficult to maneuver. (GOB, ADB and UNDP, 1981)

An average of 1000 to 1200 tons of garbage are accumulated every day during the winter season and the quantity of garbage varies between 1300 to 1400 tons per day in the rainy season. At present about 70 percent of the collected refuse is dumped at an open dumping ground at Dhalpur, whereas the rest 31 percent is disposed off in an unregulated manner along the Buriganga river and other low-lying spaces in different parts of the city. A new site of 73

acres at Matuail has been purchased by Dhaka Municipal Corporation (DMC) and two dumping grounds near Mirpur and Rayer Bazar area are in the process of procurement to replace the present dumping grounds. As there is no control at official dumping grounds, so it has contributed in continuous pollution of the nearby canals, uncontrolled scavenging and the breeding of different disease vectors. Dumping of waste into storm water drains, culverts and inspection chambers has encountered additional problems. The result is that storm water flows are obstructed and it forms breeding grounds for flies and mosquitoes, (Siddiqui, Qadir, Alamgir and Huq, 1990)

Inadequacies

The inadequate solid waste management system has been further overloaded by increased congestion of the old town area, rapid expansion of newer areas and rise in per capita waste generation which currently is 333 grams per day (Islam, 1992). To cater for the existing garbage disposal need, the number of vehicles, sweepers and collectors is highly inadequate. Only in alternate days one third of the total garbage of the whole city area is collected. According to officers of the Dhaka Municipal Corporation (DMC), a threefold increase in the number of vehicles and workers engaged will be essential by 2000 to maintain the existing level of garbage collection. (Huq, 1987)

Proposals to improve solid waste management (Cointreau, 1982)

To overcome the problem a first hand appraisal of the disposal and management of garbage in Dhaka city is essential to establish a proper service delivery system. In the previous section, the inadequacies of the solid waste management system has been outlined. With the above drawbacks, it is essential that a proper service delivery system be evolved in Dhaka city. The various steps for a sound service delivery system is discussed below as follows:

- (1) storage at the source
- (2) discharge to a collection point
- (3) collection
- (4) transfer and haul and
- (5) disposal.

Storage at the source

Household or communal storage system determines the efficiency and effectiveness of collection. Solid waste storage types are (a) separate unit storage (i.e. household storage) and (b) communal storage.

The collection agency may fix either standardized or nonstandardized separate unit storage. Temporary container such as cardboard, plastic bags, and crates to permanent container such as plastic or metal bag consti-

tute nonstandardized containers. Whereas plastic or metal bins, with the name and address of the owner depicted in standardized format and with lids are standardized containers. The use of plastic bags is inappropriate because they are expensive and unsuitable in hot climate.

The weight and density of wastes disposed and duration of storage including frequency of collection determines the size of the container. Hot climate necessitates frequent collection. The increased collection frequency can contain odours, insect breeding and vector attraction. The densely populated area requires frequent collection. Communal storage may consist of stationary or portable units.

Discharge to a collection point

Collection system may operate in four different ways. At a number of key points communal storage containers can be placed. The house occupier will have to carry the solid waste from the house to the point where the communal storage container has been placed.

Secondly in case of street corner collection, a collection vehicle stops at certain selected places and from where the solid waste is being carried to the vehicles

Thirdly in case of roadside collection, the householder keeps the household storage container at a fixed time beside the road and the waste collection workers will empty it.

Lastly the workers will collect the waste container from the house (Cotton and Francys, 1991).

Collection (Cointreau, 1982)

Basically there are three collection methods such as human powered collection, animal powered and motorized collection.

Pushcarts, pedal tricycles, wheelbarrows and two-wheeled dollis with baskets are examples of human powered collection equipment. In narrow walkways having limited access such equipment is useful. Paved road or smooth surface lane is essential for the movement of this type of equipment. It is usual that carts are made of large wooden box. Whereas in case of World Bank project pushcarts contain bins which may be unloaded into the portable container of a truck or tractor being placed at a local transfer station.

In case of animal powered collection equipment there are several distinct advantages whether it is a horse mule or ox drawn cart then there is no fossil fuel consumption. In city like Dhaka where a large part of the city contain slow-moving traffic such as bicycle, pushcarts etc this type of collection is suitable.

Flat bed trucks with a combined system of loading equipment may be used in Dhaka, This type will include a medium-sized pay loader in concert with a number of tipping trucks. Motorized hand equipment with manual loading is also used. This lowers the vehicle's productivity. As vehicles are more expensive compared to labour so

vehicle productivity should be Optimized instead of labour.

Transfer and haul (Cointreau,1982)

The collected waste may be hauled to the site of disposal by the collection equipment or for hauling it may be taken to another type of equipment.

From its source of generation to its disposal site there may be more than one transfer taking place from where the waste is taken to a bigger transfer station and where the waste may be dumped into a roll-on container which may be drawn away by large trailer truck.

Direct haul by motorized collection equipment would exist, if the disposal site is comparatively near the collection service area, for example, it is within 15 kilometers of distance and under 45 minutes of round trip travel time. If more is required, transfer to a larger vehicle permits the collection vehicle to maximize its time on the route and the collection crew also maximizes its time providing collection. Many functions are being carried out by a transfer station. In fact, "Not only is a place where waste is passed from one form of transport to another in order to optimize productivity of the collection equipment and crew, but is a place where the waste can be compacted, processed, or sorted or recycled", (Cointreau,1982)

Disposal (Cointreau,1982)

In Dhaka city open dumping is still the prevalent system of waste disposal. Budget allocation for waste disposal is minimal in Dhaka city.

(1) Both in developing and industrialized countries, landfill with special arrangement to make disposal site sanitary and neat, and to reduce the possibility of gas and leachate generation and migration, is the most cost-effective means available for disposal. Waste processing may be undertaken only where there is a possibility of strong economic market demand or need for the by products of resource recovery. As the waste are organic moist in nature, composting, biogas conversion and methane recovery from landfills is technically possible. However, careful market demand and acceptance, is required.

(2) Appropriate technology to determine optimum level of labour vs mechanization:

Before management costs are significantly affected by existing wage rates in an urban area the wage rate also acts as a key determinant in selection of cost effective technology. It has found that solid waste collection and disposal system does not have any human of scale, the result is that costs are not based on the amount of refuse to be managed. The size of the urban area and the amount of waste to be collected and disposed does not significantly affect the selection of technology. Optimization of the level of mechanization and interest of labour are the key factors of selection of technology. The number of persons in a given equipment unit crew should be mini-

mized in cities where wage rates are relatively high compared to equipment unit cost. The more labour intensive systems are usually prove cost effective where wage rates are very low. (Cointreau,1982)

(3) Through taxation and other means the financial base of the Dhaka Municipal Corporation should be improved:

The financial condition of the Dhaka Municipality has been aptly described by M.F.Huq in the following wards, "It is imperative that to keep pace with population growth and to offset the imbalance created by inflation, an increasing amount of funds available to the DMC even to maintain, in real terms the existing level of essential services to the citizen ", (Huq,1987)

The percentage increase of income of the corporation from the available sources will not be more than 10 percent per annum in the future. To increase the income of the corporation the following proposal are put forward: (Huq,1987)

(a) If the percentage of the collection of revenue is improved, income from its own sources of Dhaka Municipal Corporation can be substantially increased. Collection of municipal dues at 100 percent level can add TK*, 450.00 to 500 million income to the corporation.

(b) The corporation should adopt legal measures to realize its outstanding dues.

(c) Holding tax along with conservancy and street light charges are the major source of revenue of the corporation at present irrespective of the location, condition, occupancy and rent structure of houses. The corporation should impose progressive rate of taxation.

(d) A tax or levy on the development value of urban land can be introduced. It should be applied in relation to other capital taxes, such as capital gains tax, so that no double taxation occurs.

(4) Legal Means should be handy to aid waste management :

Participation of the citizens in the refuse system of combined incentives and disincentives is essential. Legislation is a disincentive to poor cooperation from residents with the refuse management system. Widespread littering, refusal to use a standardized dustbin, lack of cooperation with the time schedule of collection, and illegal dumping can be deterred through laws, ordinances, regulation-coupled with inspection and enforcement.

(5) Civic sense to be improved through education, publicity and participation in the waste management system: (Ahmed,1991)

It is very essential that people should participate in garbage disposal. People should learn the detrimental consequences of throwing garbage haphazardly on the streets and drains. Extensive publicity through mass media, posters and festoons has been successful to raise peoples consciousness. In seasonal clean-up campaigns

publicity campaigns are valuable. Residents are asked to clean their yard and storage spaces of litter and stuck up garbage. School children are involved in the action programmes of Calcutta Municipal Corporation to clean the city. Modern transport system is replacing the "adopted technology" of carts in Cairo. The dustbin marked with the sign "use me" is losing its appeal day by day. For rousing public sentiment towards the proper disposal of refuse materials extensive publicity is required.

(6) Recycling and Resource Recovery should be undertaken to minimize management cost:

The miserable situation of the garbage management system of the third world countries is shown by mountains of garbage in the outskirts of Lagos, Lima, Manila, Calcutta and Karachi. In Dhaka as elsewhere in Bangladesh, it is possible to convert the city garbage into fertilizer, methane and bio-gas. By recycling usable materials collected from the garbage a number of cheaper products can also be produced in large scale. New job opportunities can be created based on industries of garbage products. Nonusable plastic materials may be pyrolyzed to obtain activated carbon for industrial use or more completely pyrolyzed for energy production in separate type of thermal station as found in West Germany and Japan (Rahman, 1991)

Lastly a comprehensive plan to tackle the waste management problem should be implemented. A comprehensive plan for waste management should include the following ingredients: (Cointreau, 1982)

- (1) Establish an acceptable standard of service delivery
- (2) Select appropriate technology
- (3) Create a phased action plan
- (4) Arrange institutions for planning, management and service delivery
- (5) Arrange financial resources and budget planning system
- (6) Develop regulatory and enforcement support system
- (7) Provide public education and participation programmes
- (8) Incorporate incentives and disincentives to aid programme success.

References

Cointreau, Sandra J, Environmental Management of Urban Solid Wastes in Developing Countries. A Project Guide: Urban Development Technical Paper Number 5, Urban Development Department, The World Bank Washington D.C. June 1982.

Cotton, A and Franceys, E, Services for Shelter, Liverpool Planning Manual 3, Series Editor: Gerald Dix, Liverpool University Press in association with Farirstead Press, 1991.

Government of Bangladesh, Asian Development Bank and United Nations Development programme (GOB, ADB and UNDP) Dhaka Metropolitan Area Integrated Urban Development Project, 1981.

Huq, M, F, "Dhaka Towards The Year 2000: The Emerging Problems of Metropolitan Management," In Bangladesh Journal of Public Administration, Vol. 1, No. 2, July, 1987.

Islam, M, N, "Solid Waste Management for Dhaka city" in The Daily Star, July 4, 5 & 6, 1992.

Rahman, Md. Abdur, "Garbage Disposal System in Dhaka City", Dhaka Past, Present and Future edited by Sharifuddin Ahmed, Asiatic Society of Bangladesh, Dhaka, 1991.

Siddique, K, Qadir, S, R, Alamgir, S, Huq, S, Social Formation in Dhaka City, The University Press Limited, Dhaka, 1990.

* Tk or Taka is the unit of Bangladesh currency. Currently Taka 40 equals one U.S. dollar.