

Unbundling of Technologies: Sanitation Options for Bangladesh

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ABSTRACT

The paper deals with different technology options for excreta disposal, drainage and solid waste management. It describes the technology options and examines their advantages and disadvantages in application to Bangladesh. Linking technology to Strategic Sanitation Approach the paper introduces the concept of unbundling of technologies with communities deciding on the technology options, level of services and their willingness to commit resources.

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1. INTRODUCTION

In the context of urban sanitation, **unbundling of technologies** means different technologies for different geographical locations within an urban boundary. While some areas of the city may enjoy the benefits of high cost conventional waterborne sewerage system, other areas may be served by on-site waste disposal methods suiting local conditions. Inherent in the concept is that the various technologies should be sufficiently flexible to accommodate future changes. An important reason why sanitation coverage is low compared to water supply is that whenever the designers think of urban sanitation they mostly think of the costly conventional sewerage system which is usually not affordable by majority of the city dwellers.

Although it is recognised that a shift from supply to demand drive approaches is needed for sanitation services to be sustainable, the choice of sanitation option is likely to be influenced by the availability of different technologies to suit different socio-economic conditions. The choice may again be influenced by vertical sharing of responsibilities. It is therefore, important that people know clearly about the responsibilities shared at different levels and see many options around them to choose from. This would lead to a situation whereby people would be able to identify the most cost effective solution for them.

2. SANITATION OPTIONS:

Excreta Disposal

The commonly used options for urban sanitation in Bangladesh are the conventional pit latrines, single and twin pit pour flush latrines, septic tanks and conventional sewerage which are however, outnumbered by unsanitary practice of open defecation and use of hanging latrines discharging directly on ponds or other water bodies. Urban sanitation is also characterised by a large percentage of bucket or service latrines. The municipalities however, discontinued serving these latrines. Individual households employ private sweepers who do not dispose of the excreta properly and dumping indiscriminately in open fields, ditches, drains or other water bodies is common.

The urban sanitation situation, particularly in low income communities e.g., in slums and squatters, is deplorable. The primary reason may be poor understanding by people of the linkage of good health to proper sanitation. However, sanitation options that are available for urban situation are also very limited.

Unbundling of technologies

designers think sanitation in terms of costly sewerage system

urban situation are also very limited

Table 1 gives a list of technologies with a variety of options to choose from. Each option has its merits and demerits but people can find the most appropriate one to solve their problems considering technical, social and economic factors. Table 2 indicates suitability of different technological options under different settings.

The technologies can be classified as on-site or off-site depending on whether the excreta is disposed of at the point of generation or transported and disposed of some where else; as wet/dry systems depending on whether the system needs supply of water or not; and permeable/confined depending on whether the system allows infiltration. It is not necessarily that one single technology has to be selected in its entirety rather, it is possible that components from different technologies can be identified and integrated to obtain the most cost-effective solution. Figure 1 illustrates typical sanitation technologies with varying options.

Drainage and Solid Waste Management

Storm water and sullage drainage and solid waste management (SWM) are essential components of integrated program of environmental sanitation. Until recently, however, attention has focused primarily on community water supply and excreta disposal with drainage and SWM enjoying a very low priority. Awareness of drainage and proper SWM must be increased at all levels. National administrative and political leaders must realise the importance in order to establish appropriate policies and strategies, local officials and technical staff must understand the problems in order to formulate and co-ordinate various solutions and most importantly the community must understand the problems, in order to participate effectively in their solutions and create demand for required services.

Similar to excreta disposal, storm water and sullage drainage as well as solid waste disposal requires a variety of options that can offer cost-effective solutions for different conditions. Figure 2 shows profiles of alternative drainage systems and various options for solid waste management.

Systems carrying storm water can be divided into two categories- separate storm water system carrying only storm water and combined systems carrying both domestic waste water and storm water.

Combined systems are usually cheaper than the separate system however, they have shortcomings regarding treatment of storm water and occasional pollution from overflows.

Open drains offer a cost-effective means of conveying storm water and/or sullage but are often subject to odour nuisance and health risks.

drainage and solid waste management have a very low priority

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There are also major and minor systems in urban drainage. The minor systems are the networks of secondary and tertiary drains collecting sullage and storm water from individual sub-catchments while the major system typically converting of large open canals convey discharges from minor systems to the receiving water.

Improving effective solid waste management is inter linked with effective urban drainage system. An efficient system for collection and disposal of solid waste is a fundamental requirement in any community. Generally, the demands on the system increase with the rise and per capita income of the society. The major components and activities involved in solid waste handling and treatment options are shown in Figure 2.

3. CONCLUDING REMARKS:

Enlarging people's choices is the key to development. Sanitation is no exception to his. Better understanding of the linkage of good health to proper sanitation would lead to higher demand for sanitation services. However, a variety of products must be available in the market to meet the varying demands of people depending on variations in socio-economic conditions. Cost-effective products can be marketed through certain strategic actions such as-

- setting design criteria depending on the price which the purchasers are willing to pay rather than considering cost as a function of the design criteria;
- offering modifications to existing practice or technology by changing or replacing components rather than offering a completely new package of technology
- assessing the acceptability of the product or the sanitation technology by consulting potential purchasers or users at every stage of its development
- continuously monitoring user's response to the product through direct contact with consumers in the field.

This actions will help generate demand for sanitation services and at the same time improve the products (technologies) by accommodating variations thereby enlarging people's choices.

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Table 1 : Classification of Typical Sanitation Systems

TECHNOLOGY	FLUSH	SULL-AGE	USER DISPO-SAL	COMM-UNAL TRANS-PORT	COMM-UNAL DISPO-SAL
Simple Pit Latrine	no	no	yes	no	no
VIP Latrine	no	no	yes	no	no
ROEC Latrine	no	no	yes	no	no
Compost Toilet	no	no	yes	no	no
Bucket Latrine	no	no	no	yes	yes
Vault Latrine	no	no/yes	no	yes	yes
Pour Flush: Single	yes	no	yes	no	no
Pour Flush: Twin	yes	no/yes	yes/no	no	no/yes
Pour Flush: Com.	yes	no	yes/no	no/yes	no/yes
Aqua Privy	yes	yes	no	yes	yes
Septic Tank	yes	yes	no	yes	yes
SBS System	yes	yes	no	yes	yes
Conv. Sewerage	yes	yes	no	yes	yes

Table 2 : Comparison of Several Types of Sanitation System

Sanitation System	Rural Application	Urban Application	Construction Cost	Operating Cost	Ease of Construction	Water Requirement	Soil Conditions Required
Pit latrines	Suitable	Not in high-density areas	Low	Low	Very easy except in wet or rocky ground	None	Stable permeable soil; water table > 1 m deep
Pour-flush toilets	Suitable	Not in high-density areas	Low to medium	Low	Users/requires builder	Water near toilet	Permeable soil; water table > 1 m deep
Sewered pour-flush toilets	Not suitable	Suitable	High	Medium	Requires engineer	Water piped to house	Permeable soil; water table > 1 m deep
Bucket latrine	Not suitable	Suitable if appropriately maintained	Medium	Medium	Requires builder	None	None
Vault toilets and vacuum trucks	Not suitable	Suitable where vehicle access and maintenance available	Medium	Very high	Requires builder	None	None
Septic tanks and soakaways	Suitable	Suitable in low-density areas	High	High	Requires builder	Water piped to toilet or Yard tap supply	Permeable soil; water table > 1 m deep
Small bore sewerage	Not Suitable	Suitable in medium to high density area	Medium to high	Medium compared to Conv. Sewerage	Requires engineer	Water piped to toilet or Yard tap supply	Preferably stable soil; no rock
Conventional sewerage	Not Suitable	Suitable where affordable	Very high	High	Requires engineer	Water piped to toilet	Preferably stable soil; no rock

7. INNOVATIVE APPROACHES IN SOLID WASTE IN MUNICIPALITIES

The municipalities are age old local self-government institutes rendering municipal services in water supply, sanitation and health, waste disposal etc. But ever increasing migration of rural population to urban areas coupled with inadequate resources in men and material have rendered them inefficient. Conventional arrangements are not enough and there is urgent need for alternative strategies to cope with the situation. Municipal service is essentially a people oriented function. Community participation is a necessity for a sustained system. NGOs have been doing a good job with the support and cooperation of the communities in their development efforts. With this in mind, LGED decided to undertake an experiment with the help of a public-private partnership with an NGO in Mymensingh, Kushtia and Sylhet municipalities to develop and enforce a sustainable municipal service by restoring, developing, operating and maintaining the drainage network and the solid waste disposal (SWD) from the drains, roads and garbage bins (commonly called dustbins). The main objective is to foster an alliance among the three actors, the Municipality, the NGO and the Community to provide sustained services. It was agreed that the necessary manpower from existing staff (sweepers) and materials of the municipalities would be used by the NGO on payment.

to foster an alliance among Municipality, NGO and Community

Institutional arrangement

LGED as the Project executing agency, have overall responsibility for the project implementation and co-ordination. In addition, the pourashavas are responsible for implementation component of the project and assist in implementation of the institutional-development component of the project.

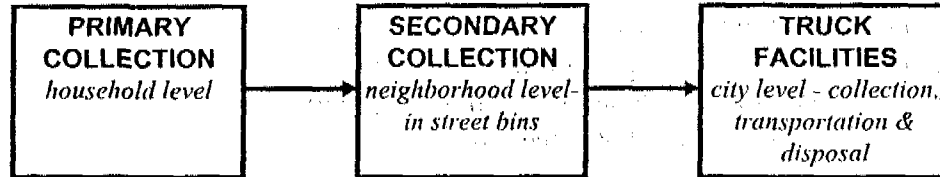
An Inter-ministerial Steering Committee (ISC) chaired by the Secretary of LGD has been established at the national level to oversee policy matters and general planning as well as implementation and management of the project and shall meet at least once every quarter. Members include representatives from the relevant ministries/ agencies.

A Project Management Unit (PMU) established within LGED coordinates and implements the project in conjunction with the pourashavas. The PMU, under the supervision of the ISC, responsible for day to day planning, coordination, implementation and management of the project, including Benefit Monitoring and Evaluation (BME). The PMU is headed by a full time Project Director with two Deputy Project Directors.

A Project Implementation Unit (PIU) headed by the Pourashava Chairperson has been established in each pourashava. The PIU under the supervision of the PMU is responsible for implementation of intervention.

Unbundling of Responsibilities for Solid Waste Management in Khulna City

The municipal solid waste collection and disposal can be divided into 3 stages based on the physical handling characteristics.



The present general practice is that only a portion of the garbage generated is disposed in the street bins. The rest is disposed in plastic bags in the nearest convenient location -- open drains, sewers, open land and where not! Municipality collects garbage only from street bins. The result is a dirty neighborhood and blocked drains. In rainy season the situation becomes intolerable in many low-income community areas.

There are a number of community based innovative initiatives for waste collection in Dhaka city. Based on these experiences a pilot project is initiated in March 1997 by Prodiplan (an NGO) in Khulna city. RWSG-SA provides strategic supervision and the project is funded by SDC.

The project approach is *Unbundling of Responsibilities* into three levels in accordance to the physical handling characteristics as shown in the above Figure.

UNBUNDLING OF RESPONSIBILITIES	
Actors	Unbundled Responsibilities
HOUSEHOLD	Households collect garbage and keeps it in a fixed place
INTERMEDIATOR (Prodiplan, an NGO)	Collects the garbage from individual households two times a day and disposes to the street bins where municipal pick-up trucks can easily reach
MUNICIPALITY	Collects garbage from selected street bins, transports them to disposal site

Today, *the difference is clear* between the project areas and other areas. The project areas are clean and drains flowing. The communities are fulfilling their responsibilities. Moreover they are contributing financially to the service that is being provided by the intermediary NGO.

The experiment in question was under taken by the pourashavas. they performed all formalities, allotted the tasks, supervised the work and made payments as per project procedure through the PIU.

Achievements

A 20% to 25% reduction was achieved during two year operation (1995 and 1996) in 3 municipalities from the allotted amount in the budget. More importantly, there was marked improvement in the services and the residents found the drains flowing, wastes taken away and an environmentally clean healthy town. The beneficiaries revealed positive reactions about the work. They praised for the cleanliness as there was no foul odor around the bins and area. The labourers were paid higher wages at Tk. 800 per month for 4 hours of work per day in place of Tk. 600 paid by the municipalities for the same job. This improved their output and service satisfaction.

residents found the drains flowing, wastes taken away

Lessons learnt

The experiment is an unique example of transforming 'social needs' to 'economic demands' through public-private initiatives responding to the demands. It conforms some of the issues in the situation analysis on Water and Sanitation Sector in Bangladesh. It reinforces the contention that institutional, policy and operational changes are necessary to bring about efficiency in service provision for the people. There is a need to re-orient and transform existing institutions to create an enabling environment to foster community/private alliances; create Government-NGO partnerships; and promote the private sector. The municipalities agreeing to rent out the garbage trucks and sweepers is an indirect support and constitutes a collection system involving public and NGO partnership that benefited both the municipality and the community. The residents of the localities pay conservancy taxes to the municipalities despite the fact that service has evaded them. A garbage collection system based on incentives, freedom and accountability has a better chance of success than systems imposed on the beneficiaries by statutory organizations as demonstrated in the experiment.

transforming social needs to economic demands

A garbage collection system based on incentives, freedom and accountability has a better chance of success

From the activities, the following parameters of design in planning, implementation and management of the work can be deduced from technical and socio-economic realities of Bangladesh.

- Total cleaning and restoration of the drainage net-work is a necessary pre-condition
- Continuous and regular cleaning of all dustbins and areas of stacked wastes is must
- Dumping site be properly located and should not pose environmental pollution problems.
- Awareness programs through social mobilization are necessary pre-condition for community
- participation and sustenance
- A good management system is essential

8. CONCLUSIONS:

The privatization experiment shows that if and when committed and sincere efforts are made to unbundle the responsibilities, cost effective and sustainable improvements can be made in the municipal service sector. In this case of solid waste disposal from roads, drains and dustbins, the *pourashavas* agreed to unbundle the present arrangement of getting the work done by the *pourashavas* themselves. They allowed an NGO to help them give better service to the city dwellers within the resource constraints and without displacing the workers. The NGO used almost all the existing manpower engaged by the *pourashavas* and also hired the equipment from the *Pourashavas*.

The experiment demonstrated that the bundles with loose, old and unusable strings should be retied and the strings rearranged in such a manner that the knots are tidy and simple. The *pourashavas* can contract out the service using the same procedure they have been practicing for construction of roads or installation of dustbins. There is no need to maintain any under utilized manpower and create undue financial burden to the public. LGED acted as a facilitator so that *pourashavas* come forward to try the better options. The effective extension of the work in several other *pourashavas* and city corporation is a testimony of its success.

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