A Proposed Operational/ Business Model for Sustainable Fecal Sludge Management (FSM) Services in Urban Areas of Bangladesh

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A Proposed Operational/Business Model for Sustainable Fecal Sludge Management (FSM) Services in Urban Areas of Bangladesh

Authors:
Dr. Md. Mujibur Rahman
Professor of Civil Engineering, BUET
and
Coordinator, K-Hub Bangladesh Center, ITN-BUET

Dr. Muhammad Ashraf Ali
Professor of Civil Engineering, BUET
and
Director, ITN-BUET
Executive Summary

In Bangladesh, lack of fecal sludge management (FSM) services is causing severe environmental pollution in cities and towns, endangering both the environment and public health. Recently a number of City Corporations and Paurashavas have initiated FSM services. However, these local government institutions (LGIs) and other stakeholders are facing significant challenges in providing and sustaining FSM services due to the absence of suitable operational/business models for delivery of FSM services.

There are significant obstacles and challenges in initiating and operating sustainable FSM services. These include funds/investment required for initiating FSM services (e.g., for purchase of vacutugs and establishment of treatment plants), lack of policy/strategy on government support and investment in FSM, lack of trained manpower at the LGIs, lack of expertise in operating fecal sludge treatment plants, lack of policy support in the marketing of compost (an important by-product at fecal sludge treatment plants), and lack of a framework and data required for scientifically estimating the cost associated with FSM services at the town and city level. In addition, globally, there is limited experience in city-wide delivery of FSM services (covering the entire service chain) and there is limited published literature on FSM business/operational models.

This document, referred to as Knowledge Product, KP-2, presents a guideline for establishing an effective FSM operational/business model in urban areas of Bangladesh. The model has been developed based on a detailed assessment of existing operations of FSM services in different urban centers of Bangladesh, a review of data/information and experience of running FSM services in other countries, and through extensive consultations involving all stakeholders.

The proposed operation/business model describes specific steps for initiation of FSM services including situation assessment, creation of awareness and demand for FSM services, and a range of activities associated with planning and design of the FSM program. It identifies the important requirements for making an FSM program operational; it also identifies the cost components associated with FSM services. It emphasizes the strong role of the Ministry of Local Government, Rural Development and Cooperatives (MLGRDC)/or Local Government Institutes (LGIs) as well as support agencies and development partners in mobilizing funds for establishment of FSM infrastructure, including collection and transport equipment and treatment plant; emphasis has also been given on reuse of treated fecal sludge, which could lead to profitable business models, making FSM service sustainable. Finally, it presents a fund flow model for sustainable delivery of FSM services. The proposed fund flow model is aimed at making the operation of FSM services including collection-transportation and treatment sustainable.
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A Proposed Operational/Business Model for Sustainable FSM Services in Urban Areas of Bangladesh

Md. Mujibur Rahman, Muhammad Ashraf Ali

1.0 CONTEXT

1.1 Background

In Bangladesh, lack of fecal sludge management (FSM) services is causing severe environmental pollution in cities and towns, endangering both the environment and public health. Despite the prevalence of on-site sanitation (OSS) systems throughout the country, the huge quantity of fecal sludge generated in these facilities is not properly managed. Disposal of fecal sludge in low-lying areas and in lakes and canals within urban areas is common, leading to serious environmental degradation. In many cases, there is also lack of interest among relevant organizations (e.g., local government institutions, utility service providers) about FSM services. Lack of awareness regarding the adverse impacts of fecal sludge, and lack of fund and trained manpower for delivery of FSM services are primarily responsible for the lack of interest.

Although there are a number of legal documents governing the water supply and sanitation sector in the country, there is no specific regulatory framework related to FSM. As a result there is confusion among relevant organizations (e.g., WASAs, City Corporations, City Development Authorities, and Paurashavas) regarding shouldering responsibility for different component of FSM services. There appears to be some differences in interests among city corporations with and without WASAs regarding providing FSM services. In the six major cities with WASAs, the WASA is responsible for development of the sewerage system. In some of these cities, particularly in Dhaka, Dhaka WASA has already prepared a “master plan” for bringing almost the entire city under a sewerage network. As a result, the city corporations with WASAs, particularly Dhaka North and Dhaka South City Corporations (DNCC and DSCC), appear to be less interested in making investments in FSM. According to the Local Government Act 2009 (and its subsequent amendments), the responsibility of sanitation (and hence FSM) in urban areas lies with the Local Government Institutions (LGIs), i.e., City Corporations and Paurashavas (i.e., Municipalities). The “institutional and regulatory framework (IRF) for FSM” has also assigned responsibility of FSM to these LGIs.

Lack of awareness regarding FSM among LGIs and people in general is a major obstacle in planning and initiating FSM services in cities and towns. This is evident by the fact that among over 300 cities and towns, FSM services have been initiated in only a handful (less than 15) by the LGIs. However, even these LGIs and other stakeholders are facing significant challenges in providing and sustaining the FSM services due to the absence of suitable operational/ business models for delivery of FSM services.

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1 Professor of Civil Engineering, BUET, and Team Leader, South Asia Urban Knowledge Hub (K-Hub), ITN-BUET, Bangladesh Center
mujib4@gmail.com, mujib@ce.buet.ac.bd

2 Professor of Civil Engineering, BUET, and Urban Specialist, South Asia Urban Knowledge Hub (K-Hub), ITN-BUET, Bangladesh Center
ashraf@ce.buet.ac.bd
1.2 Recent FSM Initiatives
Recently a number of City Corporations and Paurashavas have initiated FSM services. Out of 11 City Corporations (CCs), only two (Khulna and Chittagong), and out of 325 Paurashavas only a handful (less than 15; e.g., Shakhipur, Satkhira, Kushtia, Laksmipur, and Faridpur) have taken initiative to provide FSM services in parts of their localities with support from DPHE, development partners, and I/NGOs. A number of NGOs (e.g., DSK in Dhaka) and private organizations are also providing septic tank/pit emptying services in selected areas of major cities. The private sector is contributing to these initiatives through manufacturing and supplying vacutugs for mechanical emptying and transportation of fecal sludge and by participating in fecal sludge collection and transportation services.

1.3 Overview of Challenges in Delivery of FSM Services
The FSM services in different urban areas involve collection of fecal sludge using mechanical means (mostly using vacutugs), transportation of collected fecal sludge to a treatment facility for treatment and disposal; in some instances (e.g., Shakhipur) the treatment plants have been able to produce and market compost/soil conditioner generated at these plants.

However, these LGIs and other stakeholders are facing significant challenges in providing and sustaining the FSM services due to the absence of suitable operational/ business models for delivery of FSM services. As a result, the service coverage is not expanding, and in some places (e.g., Sirajganj and Laksmipur) the collected fecal sludge is once again being disposed into open environment due to the inability of the LGIs to run the fecal sludge treatment facility. In most of these locations, manual desludging is still the predominant means of emptying pits and septic tanks.

There appears to be significant obstacles and challenges in initiating and operating sustainable FSM services. These include funds/investment required for initiating FSM services (e.g., for purchase of vacutugs and establishment of treatment plants), lack of policy/strategy on government support and investment in FSM, lack of trained manpower at the LGIs, lack of expertise in operating fecal sludge treatment plants, lack of policy support in the marketing of compost (an important by-product at fecal sludge treatment plants), and lack of a framework and data required for scientifically estimating the cost associated with FSM services at the town and city level.

1.3.1 Initiation of FSM Services and Initial Investment
In some urban centers the initiative for starting FSM services has been led primarily by I/NGOs, and the process started with awareness building among LGI leadership (e.g., Paurashava Chairman, Councillors). Subsequently, a number of City Corporations and Paurashavas with support from I/NGOs, development partners, and DPHE have initiated FSM services. Most of the operational services are still subsidized by project funds. The “Institutional and Regulatory Framework (IRF) for FSM” is currently awaiting final approval of the Ministry of Local Government, Rural Development & Cooperatives. However, for translating the IRF into action, an “action plan” based on the IRF is needed, which will set clears goals for gradually bringing FSM services into the urban centers. Once this IRF is approved, the LGIs would feel the need to initiate FSM services.

Once an LGI decides to initiate FSM services, the first obstacle it would face is the fund required for establishing FSM services. Significant investment is needed for purchasing mechanical desludging equipment (vacutugs), securing land for establishing a fecal sludge treatment plant, and fund for construction of the treatment plant. This initial investment is a major obstacle being faced by LGIs for initiating FSM services.

1.3.2 Operation of FSM Services
Even if the initial investments required for initiating FSM services are made through external support
(e.g., GoB, development partners, I/NGOs), running effective FSM services is equally challenging. Operational costs of FSM services – e.g., labour cost associated with fecal sludge collection, fuel costs for transportation, and costs associated with O&M of treatment plants – could be quite significant. Moreover, because of lack of experience, LGIs often find it difficult to estimate actual costs associated with FSM services (e.g., collection, transportation and treatment, and depreciation of plant/equipment) (Rahman et al., 2016).

Different LGIs have introduced different models/systems for collection and transportation of fecal sludge – some are using their own employees in proving this service, while others are leasing vacutugs to private parties (primarily traditional pit emptying community groups) (Saha et al., 2017; Rahman et al., 2016). Fecal sludge collection and transportation fees are often fixed (by Paurashavas or the pit emptiers) on an ad hoc basis, and in most cases these are fixed at values close to what the traditional pit emptiers (sometimes referred to as sweepers) have been charging their customers (ITN-BUET, 2016). Lack of awareness regarding FSM among the general population is an important impediment in creating demand and generating “willingness to pay” for FSM services.

There are considerable technical challenges as well. Among different mechanical emptying devices (e.g., gulpers, vacutugs), vacutugs are the most popular in Bangladesh. A single private company manufactures these vacutugs. However, these vacutugs often cannot enter narrow roads, especially in slums and low income communities due to their size. In addition, the pumping system of vacutugs often cannot desludge the hardened fecal sludge at the bottom of pits/septic tanks (Rahman et al., 2016). There is significant scope for innovation and improvement in fecal sludge collection and transportation. More private sector involvement in these areas could result in development of appropriate technologies and reduction of costs. Government policy support is vital for the development of this sector.

Integrating traditional pit emptier communities, who are used to manual emptying and discharging fecal sludge into the open environment, into modern FSM services is also a major challenge (ITN-BUET, 2016). In Faridpur and Satkhira Paurashavas, the manual pit emptiers have been trained on the use of mechanical devices (for pit emptying) and safety rules. While this has significantly decreased health and safety risks, in some cases introduction of mechanical pit emptying has adversely affected their income levels (Saha et al., 2017; ITN-BUET, 2016).

1.3.3 Treatment of Fecal Sludge

Among the established fecal sludge treatment plants, only a few plants appear to be operating properly (Rahman et al., 2016). This is mainly due to lack of expertise and trained manpower. While a few fecal sludge treatment plants have been able to produce and market compost/soil conditioner (e.g., in Shakhipur, Tangail, Bangladesh; WaterAid, 2017), there is significant uncertainty regarding their quality, effectiveness (as soil conditioner) and marketability. Selling by-products (e.g., compost, biogas) could be an important source of earning for the fecal sludge treatment plants, and could significantly contribute to their sustainable operation.

Currently, most fecal sludge treatment facilities are fully subsidized (often from project support). But the LGIs do not usually have resources (trained personnel and funds) to run these facilities, and as a result they often become non-operational or face closure, especially after withdrawal of project support by the government/DPHHE, development partner or I/NGOs (Rahman et al., 2016). Other important issues to address include lack of standards regarding treatment of fecal sludge and quality of compost, the lengthy certification procedure for compost, and lack of policy support in the marketing of compost.

1.3.4 Experience in Other Countries

Unfortunately, there is limited experience in city-wide delivery of FSM services (covering the entire service chain) anywhere in the world, and there is limited published literature on FSM business/operational models. Anh et al. (2011) presented an analysis of business models in extraction and
transportation of fecal sludge in Vietnam. An exposure visit to a couple of fecal sludge treatment facilities in Vietnam (in Ha Long and in Hai Pong cities) in 2016\(^3\) revealed that fecal sludge treatment facilities in these cities were built entirely by the local authorities; however, the operational costs related to collection, transportation and treatment of fecal sludge are met from service charges received from the service recipients. Management at both these treatment plants reported that they would need financial support from the local authorities for any further expansion of infrastructure.

Koottatep et al. (2017) provides a financial analysis of FSM operations in Thailand; they report that the operation of FSM services still needs subsidies from local authorities, primarily due to the high cost of operation and maintenance (O&M) of treatment plants. While different business models for FSM service delivery are being implemented and considered in different cities and towns (e.g., Hawkins and Muximpua, 2015), more time is needed to draw definitive conclusions from these experiences.

1.4 Need for Operational/ Business Model

With the forthcoming approval of the institutional and regulatory framework (IRF) of fecal sludge management (FSM) by the government of Bangladesh, more and more LGIs are likely to initiate FSM services in the near future. However, there are no clear guidelines as to how these LGIs could initiate and sustain effective FSM services that require significant initial investment, trained manpower, technical expertise, as well as demand for services and willingness to pay by the service recipients. While the government is providing technical and moral support in the implementation of FSM, it has yet to come up with a clear strategy and action plan regarding its role in funding FSM infrastructure and services.

1.5 Outline of Methodology and Organization of the Report

This document (referred to as Knowledge Product, KP-2) developed under the K-Hub (South Asia Urban Knowledge Hub) presents a guideline for establishing an effective FSM operational/ business model in urban areas of Bangladesh, particularly focusing on “flow of funds” for sustainable delivery of FSM services. The guideline has been developed based on a detailed assessment of existing operations of FSM services in different urban centers of Bangladesh, carried out through a case study (Rahman et al., 2016), review of data/information and experience of running FSM services in other countries, and through extensive consultations involving all stakeholders including representatives from the Ministry of LGRDC, LGIs, I/NGOs, academic and research institutions, private sector, and the service recipients.

The Knowledge Product, KP-2 is presented in four broad sections. The first section describes the present context, challenges in the delivery of FSM services in Bangladesh and in other countries and the rationale for developing the operational model for sustainable delivery of FSM services. Section 2 describes the existing operation of FSM services and challenges in Bangladesh. It also summarizes the information gathered from the case study (Rahman et al., 2016) and consultations. Section 3 presents the proposed operational/business model for sustainable delivery of FSM services, starting with generation of demand for FSM services and planning and design of an FSM service delivery program. It also presents a “fund flow” model for sustainable operation of FSM services. Finally, Section 4 presents the concluding remarks on the operational model and suggests the way forward for implementation of the model.

\(^3\) Exposure visit to Vietnam by representatives of Government of Bangladesh, ITN-BUET, Practical Action Bangladesh, and DSK, under a project funded by the Bill and Melinda Gates Foundation (BMGF)
2.0 EXISTING OPERATION OF FSM SERVICES AND CHALLENGES

As noted above, a number of City Corporations and Paurashavas (e.g., Shakhipur in Tangail, Satkhira, Sirajganj, Kushtia, Faridpur and Laksmipur Paurashavas) have recently initiated FSM services with support from the Department of Public Health Engineering (DPHE), development partners and I/NGOs. A number of NGOs (e.g., DSK in Dhaka) and private organizations are also providing septic tank/pit emptying services in selected areas of major cities.

In an effort to better understand the situation regarding FSM services in these LGIs, a case study (Rahman et al., 2016) was conducted, which involved field visits, a survey, and interview of key individuals related to the FSM services in seven selected urban centers of Bangladesh, where FSM services are being offered (Rahman et al., 2016). These urban centers are: (1) Dhaka City Corporation; (2) Sakhipur Municipality (Tangail); (3) Khulna City Corporation; (4) Satkhira Municipality; (5) Kushtia Municipality; (6) Laxmipur Municipality; and (7) Sirajganj Municipality. In addition, a number of consultations were held to learn more about the status of FSM services and challenges being faced by LGIs in the delivery of FSM services.

The case study concluded that the LGIs are facing significant obstacles and challenges in initiating and operating FSM services, as discussed in the previous section. With respect to sustainability of FSM services, the most important challenges are the significant fund and investment required for initiating FSM services, and lack of effective business models for delivery of FSM services. This section presents a detailed assessment of these issues based on the case study, and extensive consultation with relevant stakeholders.

2.1 Investment Needed for Initiating FSM Services

An LGI needs considerable fund and investment for initiating FSM services – e.g., for purchasing mechanical desludging equipment (vacutugs), securing land for establishing a fecal sludge treatment plant, construction of the treatment plant, and so on. Currently, no Paurashava in the country has the financial means to make such investments. In the few cities and towns where FSM services have been initiated, this initial investment has been made through project support by development partners while technical assistance (e.g., in establishing the treatment plant) has been provided by the government (through DPHE) and I/NGOs.

For example, in Shakhipur Paurashava, the land for the construction of the fecal sludge treatment plant was donated by the Mayor of the Paurashava himself; a vacutug was procured and a treatment plant (co-compost plant) was constructed by WaterAid. It is currently being run with support from WaterAid andBas,a national NGO. The cost of the vacutug was BDT 2,600,000/- (USD 32,500/-, at the present rate of 1 USD = BDT 80/-), and the cost of construction of the co-compost plant was BDT 5,500,000/- (USD 68,750/-).

In Satkhira Paurashava, full scale FSM service is being provided in parts of the Paurashava with support from Practical Action Bangladesh (PAB). Here, the Paurashava provided 10 decimal of land, on which PAB constructed a treatment plant at a cost of BDT 1,000,000/- (USD 12,500/-). A vacutug was fabricated locally by PAB at a cost of BDT 410,000/- (USD 5,125/-).

In Khulna, KCC has received two vacutugs (4 m³ capacity) from ADB and four vacutugs (1 m³ capacity) from UNDP. Currently, a treatment plant of 270 m³ capacity is under construction on 1 acre land. The land was provided by KCC, which is worth BDT 30,000,000/- (USD 375,000/-). The treatment plant construction cost of BDT 15,000,000/- (USD 187,500/-) is supported by SNV, an international NGO. It is expected that this treatment plant would be able to treat 15% of total demand of the KCC population. In Faridpur, Practical Action Bangladesh (PAB) and Faridpur Paurashava have just inaugurated the first city-wide fecal sludge management initiative, covering the entire FSM service chain.
In other urban centers where some form of FSM service is in place, the story is similar where up until now LGIs have not been able to initiate FSM services with strictly their own investment. It should be noted that presently vacutugs are supplied primarily by one private organization (vendor). Based on discussions with stakeholders, it emerged that the cost of vacutugs are very high and it may be possible to bring down the cost if this apparent monopoly could be broken. Proper policy support (e.g., reduction of import duty of vacutugs, and its spare parts) is also needed in this regard. These measures could significantly bring down the initial investment needed for establishing a “fecal sludge collection and transportation” system.

It should be noted that FSM services have been initiated recently (within the last couple of years) in a few LGIs and the FSM infrastructure (e.g., vacutugs, treatment plant structures) are relatively in good condition in most of these LGIs. However, with the passage of time, the infrastructure will require replacement and renovation. This will also require significant investment.

### 2.2 O&M of FSM Infrastructure and Services

In the FSM service chain, costs associated with Operation and Maintenance (O&M) can be divided into two major headings:

1. Costs associated with collection and transportation;
2. Costs associated with operation of treatment plant.

#### 2.2.1 Collection and Transportation of Fecal Sludge

Currently, in urban centers where the entire chain of FSM services is operational (i.e., a few Paurashavas, e.g., Shakhipur, Satkhira), the cost of fecal sludge emptying from OSS systems is borne by individual households/ institutions, which receive the service. In most cases, the Paurashava facilitates the service. The Paurashava employs its own staff (e.g., vacutug truck drivers, vacutug operators) or leases out the vacutugs to private operators. These private operators are traditional pit emptiers who have been trained in mechanical desludging operation by NGOs.

In Shakhipur Paurashava, the cost associated with fecal sludge collection and transportation has been reported to be about BDT 7,59,000/- (USD 9,488/-) for a one year period, while the revenue collected by the Paurashava from service recipients stood at BDT 5,68,000/- (USD 7,100/-) for the same period. In Satkhira Paurashava, the yearly cost associated with collection, transportation and revenue collection from recipients were both estimated at BDT 4,32,000/- (USD 5,400/-), indicating a break-even scenario. It should be noted that in both cases (Satkhira and Shakhipur), the sludge collectors do not receive any incentive for delivering the collected fecal sludge to the treatment plant. The Paurashava and the NGOs facilitating the service oversee transportation of collected fecal sludge to the treatment plant.

In some urban centers, the FSM service is limited to collection of fecal sludge from onsite systems followed by disposal in some designated places without treatment. NGOs and private entrepreneurs primarily provide these services. In these cases, the cost of fecal sludge desludging is also borne by the individual household/ institutional service recipient. Based on information collected from these desludging service providers, it appears that most are making some profit through providing this desludging service. For example, Sanitation Entrepreneurs (SEs), who operate two vacutugs (leased from DWASA) and can make a maximum of 20 desludging operations per day, reported a yearly profit of about BDT 4,47,641/- (USD 5,595/-). DSK, a local NGO who also provides desludging services, reported a yearly profit of BDT 3,88,225/- (USD 4,853/-) from offering this service. Sirajganj Paurashava also reported a monthly profit of BDT 17,000/- (USD 212/-) from providing the emptying service.

As noted earlier, there is a single vendor supplying vacutugs. This vendor is also the only source for spare parts required for repair and maintenance of these vehicles. This situation can increase O&M cost of these vehicles. Increased private sector involvement in supply of FSM infrastructure including vacutugs, and government policy support could reduce costs associated with procurement and O&M of some FSM infrastructure.
It should be noted that the cost associated with fecal sludge transportation depends to a large extent on the location of the entity (household/ institution) receiving the service and the final disposal point of the fecal sludge. Available information suggests that the service fee paid by the service recipients for pit emptying varies across a wide range, from BDT 500/- (USD 6.25) for a desludged volume of about 1000 L to over BDT 2,000/- (USD 25/-). It appears that these fees have been fixed rather arbitrarily without proper estimation of costs (e.g., labour, fuel, vacutugs wear and tear, etc.) associated with the service delivery.

Nevertheless, based on available information, it appears that the “collection and transportation” element of the overall fecal sludge management (FSM) system could be run sustainably with service fees collected from the service recipients.

2.2.2 Treatment of Fecal Sludge

As noted earlier, only a few cities are offering FSM services covering the entire service chain including treatment of fecal sludge. Among these, the treatment plant in Satkhira Paurashava is based on “drying beds”, while that at Shakhipur is based on “co-composting” (with solid waste). The under-construction treatment plant in Khulna is based on the concept of “planted wetlands”. Among the few operational treatment plants, reliable information is available only for the treatment plant operating in Shakhipur, Tangail. According to available information, the yearly operation and maintenance cost of the plant is BDT 8,49,000/- (USD 10,612/-), while the yearly revenue generated from the sale of soil conditioner/compost is BDT 4,50,000/- (USD 5,625/-), indicating a net loss.

Assessments carried out by PAB also reveal that typically costs associated with running a fecal sludge treatment plant would be much higher than the revenue that could be generated from the sale of end-products (i.e., compost). In all cases, operation of the treatment plant is subsidized by the Paurashava and/or by project support.

It must be recognized that costs associated with running a fecal sludge treatment plant depend on a number of factors, including technology used, scale of operation, efficiency of operation, demand for end-products (e.g., compost) in the locality, to name a few. Nevertheless, based on available information, it is apparent that a fecal sludge treatment plant cannot be run sustainably with the revenue generated from the sale of by-products generated at these plants. The difference between costs and earnings has to be made up by providing additional funding in the form of subsidies until the users are motivated to pay the difference in the form of a sanitation/ environmental tax.

2.3 Limited Experience in the Delivery of FSM Services

Local Government Institutions (LGIs) in Bangladesh have limited experience in the delivery of FSM services. As noted earlier, among over 300 cities and towns, FSM services have been initiated in only a handful (less than 15) by the LGIs in the last couple of years, with the level of service varying among these LGIs. For example, Shakhipur Paurashava in Tangail district is providing FSM services covering the entire service chain (from collection to treatment) to about 37% of residents of the Paurashava; the service is being supported under a project supported by WaterAid Bangladesh and BASA, a national NGO. Satkhira Paurashava is also providing FSM service covering the entire service chain. In Khulna, Practical Action Bangladesh (PAB) and Khulna City Corporation (KCC) are constructing a treatment plant with support from SNV (an international NGO) for providing FSM services covering the entire service chain. SNV is also working with Kushtia Paurashava for proving full-scale FSM services.

Sirajganj and Lakshmipur Paurashavas initiated FSM services covering the entire service chain; but currently the treatment plants are not functioning. The resulting FSM service has been reduced to collection of fecal sludge followed by disposal in the open environment. DSK (an NGO) is only providing pit-emptying services in parts of Dhaka city; the collected sludge is disposed in the Dhaka WASA sewerage system. Sanitation Enterprise (SE), with support from WSUP (an international NGO) is also providing similar services in parts of Dhaka.
Thus, FSM services are currently being provided in a few urban centers of Bangladesh and in all cases the service is being provided on a small-scale, covering small portions of these urban centers. In many cases the service is limited to emptying/collection of fecal sludge followed by disposal into the open environment. As a result, there is very limited data (e.g., on performance of treatment of technology, cost of collection, transportation and treatment) on FSM service delivery, which makes it difficult to plan for FSM service delivery with confidence.

3.0 PROPOSED FSM OPERATIONAL/BUSINESS MODEL FOR BANGLADESH

3.1 Initiation of FSM Services in an Urban Area

As noted earlier, with the forthcoming approval of the institutional and regulatory framework (IRF) of fecal sludge management (FSM) by the government of Bangladesh, more and more LGIs are likely to feel the urge to initiate FSM services in their localities. But it is also clear that without external support, either from the government, INGOs, NGOs or development partners, they would most likely not be able to offer FSM services covering the entire service chain from collection to treatment and disposal. It is also clear that enough resources are not available with the government, development partners and others to support initiation of full-scale FSM services in all LGIs at the same time.

Many of the LGIs are also not ready to initiate FSM services for a number of reasons. These include lack of awareness and capacity, both in terms of manpower and finance. Therefore, it is imperative that the government (i.e., the Ministry of LGRDC) come up with an action plan, based on the IRF, to initiate FSM services in urban centers in phases, based on need, competitive advantage and capacity of the LGIs. An example can be cited in this regard. In Vietnam, the government has developed a plan to ensure treatment of up to 40 percent septage in 31 cities (out of a total of 800 cities) by 2020 based on readiness.

Once the government develops an “action plan”, it can facilitate mobilization of funds from its own resources as well as from development partners and others for delivery of full-scale FSM services (including appropriate treatment) in urban centers in phases.

3.2 FSM Operational/ Business Model

This section presents a model to initiate and operationalize FSM services in urban areas of Bangladesh. It describes specific steps for initiation of FSM services including situation assessment, and activities associated with planning and design of FSM programs. It identifies important requirements for making FSM programs operational; it also identifies the cost components associated with FSM services. Finally, it presents a fund flow model for sustainable delivery of FSM services.

3.2.1 Creating Demand for FSM Services

FSM project ideas would be conceived by inciting community demand through consultations, assessing the existing situation, analyzing options to overcome the problems of concerned stakeholders, and reviewing existing policies and strategies. All activities would be based on available information from the communities, city/municipal authorities and different development agencies.

3.2.2 Planning and Design of the FSM Program

Activities that should be included in this phase are a technological options assessment, financial analysis and economic viability, institutional and regulatory framework assessment, stakeholder analysis, stakeholder consultations, situation assessment including potential environmental and social impacts, capacity need assessment, and assumptions and risk assessments.

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4 Information gathered during exposure visit to Vietnam by representatives of Government of Bangladesh, ITN-BUET, Practical Action Bangladesh, and DSK, under a project funded by the Bill and Melinda Gates Foundation (BMGF).
Project planning and design, project implementation plan, operational modalities and monitoring and evaluation plans, would follow the above activities. Important considerations in carrying out these tasks are access to OSS facilities, FS volume estimation for determining collection, transportation and treatment requirements, identifying cost-effective FS transport routes, and identifying appropriate FS treatment sites.

While treatment technology selection is usually based on site-specific criteria only, it is however, important to consider FS treatment goals, i.e., reuse potential and quality of the receiving environment before selecting the treatment option. The MoLGRDC through its line organizations (DPHE, LGED, WASAs) would provide technical and other relevant support directly or on a project-basis in planning and implementation of FSM service infrastructure (e.g., fecal sludge treatment plant).

*Reuse of treated fecal sludge constitutes an important element in the FSM service chain which, if promoted adequately, could lead to profitable business models making FSM service sustainable.* Business promotion campaigns related to use of soil conditioner from treated fecal sludge in agriculture and ill effects of untreated or partially treated fecal sludge is to be undertaken by the concerned institution, private company or NGOs.

### 3.2.3 Making the FSM Program Operational

Securing fund and land for FS treatment are key requirements to make an FSM program operational. This must be ensured following appraisal and approval of the project feasibility, planning and design, and operational plan. Current experience of FSM services in Bangladesh suggests that in general, if initial investments required for procuring collection and transportation equipment and building of the treatment plant can be secured, FSM services, particularly collection and transportation, can immediately be made viable.

*Given the scarcity of land, present experience in Bangladesh further suggests that government and/or LGI intervention would be needed for procuring land for treatment of fecal sludge. It is also important that the external support agencies/development partners and MLGRDC/ or LGIs mobilize initial investments required for procuring collection and transportation equipment.*

### 3.2.4 Cost of FSM Services

Fecal sludge management systems involve different activities e.g. emptying, transport, treatment, and disposal and/or enduse and therefore there are costs involved at each step. Some FSM infrastructure, such as treatment plants and vacutugs require considerable investment; therefore support from the government would be required for these facilities. Other expenses, including emptying and transportation of fecal sludge, and regular operation and maintenance should be supported from fees/charges from service recipients.

*It is suggested that LGIs e.g., City Corporations/ Paurashavas collaborate with the Ministry of LGRDC for establishment of major FSM infrastructure (e.g., treatment plants, vacutugs), and develop appropriate operational mechanisms for delivery of FSM services with contribution/fees/charges from service recipients in line with the provisions of the Local Government Act 2009 and the Institutional and Regulatory Framework for FSM in Bangladesh 2017.*

### 3.2.5 A Proposition of Fund Flow for Sustainable Operation of FSM Services

Figure 1 describes the operational/business model for sustainable delivery of FSM services in urban areas of Bangladesh in the form of a flow chart. Flow of funds from one step to another should be considered carefully so that FSM services are sustainable.
Considering the existing situation of fecal sludge management in a city or a municipal town, and the level of awareness among different stakeholders on the importance of FSM, a financial flow approach for the FSM service chain can be considered as suggested below (Figure 1).

Important features of the FSM operational/business model in respect of the flow of funds are described below:

- In the above approach the fund flow starts from the household (HH)/Community/Institution (both public and private), which would be the collection points of fecal sludge. Payment by the HH/Community/Institution is divided into two channels – to Collection and Transportation service provider as septic tank/ pit emptying fee, and to the concerned LGI as sanitation tax/charge along with holding tax to cover all other expenses including at least the partial cost of FS treatment.

- The emptying fee would be determined based on volumetric pumping rate, and other considerations as determined by the LGI; sanitation tax/charge could be determined based on water use or more conveniently on a flat rate proportionate to holding tax and should be worked out through consultation by the LGI, MoLGRDC and concerned stakeholders.

- This two-channel payment mode could help support low income people in slums, as in most cases sanitation tax/charge will be subsidized or fully waived and will be covered by government funds to City Corporations/Paurashavas to cover FS treatment and other expenses.

- An important feature of the above fund flow approach is the direction of the fund transfer to the treatment facilities. Treatment facilities would pay the collection and transportation service provider a discharge incentive to dump collected sludge at the FS treatment plant. The financial incentive here would be used to encourage socially desirable behavior i.e., to encourage sludge collection and discharge at the treatment plant and reduce illegal discharge elsewhere. With this approach, the collection and transportation service provider would only have to recover a
portion of the total operating costs from the emptying fee and the remaining portion would be made up by the discharge incentive from the treatment facility. As a result, the collection service would be more affordable for poorer households, more sludge would be collected, less sludge would be discharged to the environment and the community as a whole would benefit.

- Treatment facilities would receive a part of the sanitation taxes/charges collected by the Paurashava/City Corporation to cover treatment plant operation and management expenses. The Paurashava/City Corporation would charge a fee for permits/licenses for collection and transportation. Treatment facilities could also receive profits from private enterprises or NGOs engaged in marketing and selling of the end products.

- Substantial government support would still be needed to fill the budget gaps of the Paurashavas/City Corporations, particularly to cover some of the major capital expenditures. The GoB would need to increase funding support to fill the budget gaps and provide other assistance (e.g., securing land for construction of treatment facility) for development of FSM infrastructure.

- Development partners, multilateral or bilateral, could provide funding support and/or technical assistance to the LGIs for establishing FSM services through the MoLGRDC.

4.0 CONCLUDING REMARKS

This document (referred to as Knowledge Product, KP-2) developed under the K-Hub (South Asia Urban Knowledge Hub) presents a guideline for establishing an effective FSM operational/business model in urban areas of Bangladesh, particularly focusing on “flow of funds” for sustainable delivery of FSM services. The guideline has been developed based on a detailed assessment of existing operations of FSM services in different urban centers of Bangladesh, carried out through a case study (Rahman et al., 2016), review of data/information and experience of running FSM services in other countries, and through extensive consultation involving all stakeholders including representatives from Ministry of LGRDC, LGIs, I/NGOs, academic and research institutions, private sector, and the service recipients.

The proposed operation/business model describes specific steps for initiation of FSM services including a situation assessment, and a range of activities associated with planning and design of the FSM program. It identifies the important requirements for making an FSM program operational; it also identifies the cost components associated with FSM services. Finally, it presents a fund flow model for sustainable delivery of FSM services.

It is not expected that by following the guidelines in the proposed operational/business model, FSM services could be implemented in all urban areas of Bangladesh at one time. It is rather important that the concerned ministry i.e., the Ministry of LGRDC develops a “national action plan” for implementation of FSM services and initiates implementation in urban centers in phases, based on need, competitive advantage and capacity of LGIs. This roll out, along with the existing initiatives at different places in Bangladesh, should be monitored for applicable lessons relevant to improving any future system developed.

The FSM operational/business model has been recommended based on the present FSM status including the current level of awareness of the importance of FSM services in Bangladesh and is expected to have positive changes in the future with the gaps minimized and FSM services turned out as viable businesses.
REFERENCES


ITN-BUET (2016), “Case Study:Engaging Traditional Pit Emptier Groups of Satkhira Municipality in FSM Ensuring their Health and Safety and Promoting Protection of the Environment”, Case Study prepared as a part of teaching materials for Online Course (OLC) on Fecal Sludge Management (FSM) in collaboration with UNISCO-IHE, the Netherlands.


