EXECUTIVE SUMMARY

The rapid expansion of household sanitation facilities in the secondary town of Faridpur in Bangladesh has created a ‘second-generation’ problem of how to manage fecal sludge. This case study provides preliminary insights from the operation of an innovative business model that creates new relationships between the municipality, informal pit emptiers (organized into cooperatives), and a treatment plant operator (TPO). The business model means pit emptiers are paid by their clients for emptying services, and also by the TPO when they deliver sludge to the newly constructed treatment and composting plant. Viability of the TPO is supported by cross-subsidies from the municipality, using income from the lease of machinery to the pit emptiers. An early insight is the importance of demand creation activities to help kick-start the new FSM system, with early indications that pit emptiers are seeing an increase in demand for more flexible and responsive services, and are regularly disposing of fecal waste safely at the treatment plant. The long-term potential of the compost business will take longer to establish.

BACKGROUND AND CONTEXT: BANGLADESH AND FARIDPUR

Bangladesh has made remarkable progress towards achieving the MDG target on access to adequate water and sanitation, with 38 percent of the population gaining access to water and sanitation since 1990. But the country’s urban areas face enormous challenges in terms of providing basic infrastructure and services when the urban population (34 percent in 2015) is growing at 3.5 percent a year. Despite overall progress in terms of human development, the absolute number of people living below the poverty line remains a significant issue for the WHO/UNICEF Joint Management Program (JMP) for Water and Sanitation.

Although Bangladesh has achieved the South Asia MDG target by providing 61 percent of the population with access to improved sanitation, more than 62.5 million people in Bangladesh still lack access to improved sources of water and sanitation services. After years of campaigning and sanitation interventions in Bangladesh, open defecation is down from 34 percent in 1990 to one percent in 2015. This was achieved largely by a growth in onsite sanitation systems (OSS), such as septic tanks, and improved or unimproved pit latrines. However, this success has created a new problem of how to safely manage on-site facilities, especially in towns with no sewers and where residents rely entirely on unimproved or poorly designed facilities. Toilets overflow or are manually emptied into nearby drains and water bodies, creating exposure to human waste and the problems associated with open defecation.

Bangladesh is now facing a ‘second-generation’ or ‘post-ODF’ challenge: despite the progress made in the provision of improved sanitation, the questions of public health, environmental protection, and social recognition of those providing FSM services have yet to be addressed. In Faridpur, 90 percent of fecal sludge is not safely managed.

A major impediment to improving access to safely managed sanitation in Bangladesh lies in the absence of a national framework for sanitation, with a clear assignment of responsibilities between service providers, city corporations and municipalities. The Dhaka Declaration (SacoSan VI 2016) re-emphasized the need to implement a regulatory framework as an enabler to ensure dignity, health and income of informal sanitation workers in South Asia. Practical Action and its partner the International Training Network Centre of Bangladesh University of Engineering and Technology (ITN-BUET) support the participatory design of an institutional and
regulatory framework that is expected to enable more systematic FSM and clarify roles and responsibilities across the sector.

The progress towards ending open defecation has created a missing strand in the wider sanitation systems around the emptying of the new sanitation facilities. This has contributed to an increase existing sewerage. These practices have negative externalities (water-borne diseases and high pollution of surface and underground water) that cannot be addressed by the construction of improved treatment facilities. They also point to a need for service operation models that create incentives for the marginalized fecal sludge emitters to contribute to a more sustainable FSM system. Market-based solutions were proposed in Faridpur to create opportunities to increase the revenue and recognition of these workers.

**EXISTING FSM SERVICES IN FARIDPUR**

In Faridpur (130,000 people), the Public Private Partnerships for Sustainable Sludge Management Services in Faridpur, Bangladesh project is being jointly carried out by Practical Action and the municipality, building on a decade-long partnership. The initial situation analysis identified four key problems that are at the heart of why the sludge management system was neither effective nor sustainable:

**Unsafe containment**

Despite a slum-dweller population of around 10,600, 94 percent of residents had access to toilets. There is no piped sewerage network, and before this intervention, no treatment facility. Most toilets were either single pit latrines (61 percent) or connected to a septic tank (32 percent). Seven percent used double pits. The municipality estimated that a quarter of all septic tanks have no soak pit to manage the effluents. Effluent and some fecal sludge discharged directly to open drains. Since containment storage capacity was limited and without consistent and affordable emptying services, the pits and tanks often overflowed into the surrounding environment. Households also connected their toilets directly to drains or water bodies. In 2014 in total, 66 percent of the sludge in Faridpur was found to overflow or be abandoned.

**Lack of capacity in collection and transportation**

Given the common practices of by-passing containment and households emptying their own pits, manual pit emptying services in Faridpur were used by only 55 percent of individuals and 81 percent of institutions. The municipality’s conservancy department and two informal sweeper groups performing manual scavenging emptied just 30 percent of pits. Therefore, the capacity of these two services was substantially below that necessary for an effective city-wide system. Manual emptying provided by the municipality was seen by customers as slow, unreliable and costly. Highly centralized and heavily subsidized (at 25 percent), the service was used almost exclusively by influential groups and institutions and struggled to meet demand from households.

Historically, informal manual pit emptiers have provided sanitation services in South Asia, but they are highly vulnerable to poor health and social stigma. In Faridpur, they filled the gap in service provision in an unregulated manner, causing considerable negative externalities. Some were in fact also casual laborers of the Conservancy Department. Of those who use an emptying service, 72 percent of households and 52 percent of institutions preferred to use informal services, which were seen as better value for money. Their charges used to range between USD 6.00 and USD 10.00 to empty a tank or pit. The service fee applied by the municipality was estimated at USD 8.25 for a pit latrine and between USD10 and USD20 for a septic tank. The final price depends on the volume of sludge, distance to a disposal site, ease-to-access, condition of the containment facility and the sludge, and the socio-economic status of the customer. The service fees charged by the municipality varied, from USD 9.00 per emptying in underprivileged areas, to USD 22.00 in formal housing areas and non-profit institutions, and USD 28.50 for profitable institutions.

**Unsafe disposal**

With limited transportation equipment and no incentive to safely dispose of sludge, the workers typically looked for the fastest disposal route. 66 percent of the sludge contained in OSS was left to overflow. Of the sludge that was emptied, the four percent collected by the municipality and 14 percent collected by the informal sweeper groups, was illegally dumped in the environment. Overall, the most optimistic estimate is that 10 percent of sludge is safely buried, but without any consideration for the health & safety of the pit emptiers.

**Gaps in national regulation and co-ordination of responsibilities**

The national water supply and sanitation strategy pays scant attention to FSM, and this is focused on big cities. As a result, local municipalities receive little guidance on establishing new systems; nor is there any strategy for significant investment in non-sewer systems. The Ministry of Local Government, Rural Development and Cooperatives (LGR&C),
which is currently responsible for overseeing access to basic services, and the local governments [and municipalities] share the responsibility of funding and implementing the infrastructure. In practice however, the decentralized system makes it difficult for local governments to provide adequate sanitation. OSS systems are considered temporary solutions until sewers can be put in place. Yet in reality, OSS systems are here to stay, either as an intermediate or permanent standalone solution.

Following a market analysis looking at the (conflicting) incentives of all actors and the business environment, a proposed public-private partnership (PPP) was structured to build on the strengths in the system. A business model was developed, using cost and revenue calculation tools to come up with three different scenarios. Finally, a flexible and adaptive scenario, modelling a progressive operation of the service within the first year was designed to guide the implementation of the service-based agreements. The pilot project was initiated in two wards of the city (26,000 people) with the intention of a city-wide rollout. The project is structured around four objectives: i) improving containment standards in the city; ii) facilitating the PPP to provide collection and transportation with existing sweeper groups; iii) developing a sludge treatment plant; and iv) facilitating the creation of regulation committees to attract private businesses to supply FSM services.

Preliminary operationalization of the business model and performance-based contracts

The solution that was built in collaboration with all stakeholders was to replace the inefficient dual system of services provided by the municipality and sweeper groups. To reach the largest number of customers at an affordable price, a business-oriented approach was adopted, forming a PPP between the municipality, the sweepers and a treatment plant operator (TPO), which laid out service-level agreements for pit emptying and for the operation of a new treatment plant. Under the agreement, the two existing sweeper groups provide the pit emptying services, while the municipality monitors progress through quarterly targets to ensure a better quality service and safe disposal of the sludge. A multi-stakeholder steering committee (MSSC) at the municipality oversees the service level agreements and incentives, through a set of key performance indicators that ensure the responsiveness of the system.

A performance-based contract including equipment leasing was signed in December 2015 between the municipality and the Muslim sweepers formalized
as the Khutibari Cleaners Cooperative, who received training in business management and an online emptying demand system. The municipality has recently appointed a TPO. The pilot operation of the plant began in August 2016 and it can currently treat 18m$^3$ of sludge per day (its design capacity is 24m$^3$ per day).

Ongoing service demand generation and awareness raising campaigns are central drivers of a progressive increase in revenue from emptying. The campaigns, which include street drama, cycling events, cleanliness drives, quiz contests and cycle rallies, aim to stop illegal connections to drains. Engagement with local media is also generating a local awareness of the importance of proper FSM to avoid environmental and public health hazards. Increased demand for a trustworthy service demonstrates good potential for uptake of the model.

**Creation of a national institutional and regulatory framework for FSM**

Another strategic pillar of the project lies in the creation of a national institutional framework and a FSM sector coordination network to build a solid enabling environment for scaling up FSM. The FSM business model has been presented at the National Forum for Water Supply and Sanitation, and is now incorporated into the framework for the approval by the Ministry of LGRD&C.

The municipal or paurashava framework describes effective roles in the overall planning, implementation, and monitoring and evaluation of FSM. The ministry will endorse this framework, secure funding and initiate inclusive planning and execution of FSM. With the support of the government, the local authorities will be responsible for implementing the entire FSM system. The framework also includes a strong capacity building component. Technical assistance and research will be provided by ministries, research organizations, I/NGOs and the private sector. These will also ensure an awareness building component that includes campaigning, promoting private sector participation, demonstrating FSM business models, performance monitoring, and R&D support and funding.

**FINANCIAL AND ECONOMIC ASPECTS OF THE BUSINESS MODEL**

In this model, piloting the business model with one cooperative, the cumulative quantity of sludge emptied by the end of the first year was 324m$^3$. Calculations now show that it is realistic to expect an annual total of 3,360m$^3$ delivered to the TPO each year from the second year. A challenging exercise was to estimate the revenues from emptying services and compost sales.

**The modelled revenues from emptying services** ($P1$ in Figure 2) varied considerably between the most favorable to the least favorable scenarios. Revenues in the first year for the Khutibari Cleaners Cooperative were an estimated USD 4,120 from emptying services ($P1$) and USD 210 from disposing sludge at the treatment plant ($P5$). The cooperative currently charges USD 22.00 per emptying. The experimental disposal of the collected sludge at the treatment plant began when the cooperative received equipment (Vacutug and protective equipment) in August 2016. They earned USD 3,087 in emptying fees, for a total of 149 trips to the treatment plant between August and
November 2016. In the early months of the pilot the cleaners earned USD 70.00/person/month, compared with around USD 50.00/person/month before this model was in place. To kick-start the businesses, the cooperative was given a six-month exemption on payments for leasing mechanical and transportation equipment from the municipality ($P3). From March 2017, the Khutibari cooperative will pay a monthly leasing fee of USD 210.00. Total revenue is expected to increase to USD 38,450 from emptying services ($P1) and USD 2,150 from disposing sludge at the treatment plant ($P5) from the second year of operation, when the Harijan pit-emptying group will register as the Bandhaob Palli Cooperative and sign a performance-based contract.

The “safe transfer incentive” ($P5) is a payment made to the cooperatives each time they dispose safely of the sludge, which helps making the cooperatives’ business model profitable. This payment is made to the registered cooperatives at the treatment plant as soon as the agreement with the selected TPO is signed off.

Revenue from sale of compost produced at the plant from dried sludge ($P2) is expected to be low in the first year (USD 1,600) because only one group is currently contracted, and because of challenges in the marketing, certification and cultural acceptance of human waste as a fertilizer. This is why the business model relies on a “cross-subsidy” system, whereby the revenue for the cooperative from emptying services ($P1, expected to be USD 4,100 in the first year of service) subsidizes the low revenue expected from compost sales for the TPO ($P2, expected to be USD 1,603). The low revenue will be compensated by a subsidy to the TPO ($P4) from the municipality, covered by revenue from the leasing contract ($P5). This cross-subsidy will be in place once the FSM system is operational to help cover the plant’s operating costs ($C2), which will be an estimated USD 15,000 per year until 2018. It is in the interest of the municipality to reduce this subsidy over time, to incentivize the TPO to maximize its revenue from compost sales to cover these costs. Initially a large subsidy will be needed to cover the shortfall in the TPO budget (USD 8,950 in 2016, covered by a cross-subsidy from the project budget). From the third year of operation, the TPO is expected to be more profitable and have a net cashflow of more than USD 50,000. This business model is transforming informal emptiers into formal businesses and improving their health and livelihoods.

DRIVERS OF CHANGE

One of the key drivers triggering systemic change was the municipality’s strong commitment to facilitating delivery of city-wide FSM as part of a long relationship with Practical Action. The introduction of an improved FSM service in the 30-year City Master Plan, and the allocation of a large, three-acre plot of municipality-owned land for a treatment plant illustrate this commitment. Its experience of working with informal solid waste pickers allowed the municipality to see the value in working with existing (albeit informal) service providers.

The national FSM institutional and regulatory framework will provide uniform regulation for all municipalities to ensure the proper design and construction of sanitation facilities and disposal of fecal sludge and solid waste. It provides guidance on (i) social sustainability (i.e. social discrimination, rights and safety of pit emptiers), (ii) environmental sustainability, and (iii) economic sustainability (i.e. sustainable business models, including cross-subsidies for pro-poor customers, and “safe sludge
transfer” incentives. The creation of this national framework provides a very strong enabler that was previously missing. The value of the partnership with recognized knowledge and training center ITN BUET to develop this framework was significant.

The political unrest in 2015 delayed the initial implementation of the model. The application of the performance-based contract was intrinsically linked to the construction of the treatment plant, which was also delayed until 2016 due to heavy rainfalls, floods and excessive heat. The remaining works necessary for full operation are expected to be completed by April 2017.

The most difficult part of the design of the business model was to estimate the revenues of the existing service providers. The absence of a formal service structure or any track record of income generation was a challenge. Using a series of comprehensive emptying, transportation and disposal-treatment costing tools developed by the University of Leeds enabled the team to obtain transparent baseline information to design the business model.

Finally, challenges engaging with the private sector in the first year were overcome. A different level of buy-in was observed between the Muslim and Harijan sweeper groups, but the registration of the latter as a formal cooperative is about to be finalized. Despite difficulties finding a viable company to run the treatment plant due to lack of interest in and awareness of FSM locally, an operator was eventually selected after a competitive process.

LESSONS LEARNED

Bringing informal pit emptying into a more regularized arrangement with the municipality through a binding agreement, and creating cooperatives among the sweepers required time and patience. Trust is hard-won but there is evidence the investment of time and resources is worthwhile. Ensuring buy-in and ownership of the cooperatives has delayed the full operation of the business model, but this is certainly what will ensure its sustainability beyond the end of the project, thanks to their flexibility and understanding of customers’ needs. The main lessons we learnt are:

Awareness raising and demand generation campaigns are stronger driver of FSM business models than expected. The evidence of their impact on service demand led us to prioritize and accelerate these activities. Residents also need to be made aware of the changes to how they can access these services.

Facilitation is at the heart of this initiative’s success. The creation of a steering committee as a permanent actor in the municipality to pro-actively regulate the system transparently is a strategic asset. Pro-active
facilitation of the PPP and business model by the MSSC and simultaneous demand generation activities are vital to increase demand for sludge emptying.

**A cross-subsidized tariff structure is required to attain a responsive service in the city.** Yet, this is a complex and new concept for the FSM sector in Bangladesh. Awareness raising among decision makers and the private sector was needed to design the model in a participatory way.

**Engaging the private sector in human waste treatment and compost marketing** is new in Bangladesh and has been difficult. An assessment of the compost market indicated strong cultural barriers, which need to be overcome. The influencing and advocacy role of the national FSM network will support this nexus initiative between farming and urban sanitation, helping to alleviate fears about the safety of using fecal compost in agriculture.

**OUTSTANDING CHALLENGES, AND ACTION PLANS TO SCALE UP THE MODEL**

The treatment facility is one of low-cost systems of planted and unplanted bed drying beds with a total capacity of 24m$^3$. This can be adapted for upscaling of the service beyond the initial pilot in two wards of the city (13 percent of households). This model is being tested for a year, and may take up to three years to break even and bring worthwhile lessons for an appropriate city-wide scale-up and profitable uptake.

The cost-revenue modelling results will be regularly updated to orientate the review of the PPP towards more optimal cross-subsidies. Scaling up the model currently developed would require a deeper analysis of containment conditions, using existing costing tools. Setting up the TPO as a viable business appears to be the keystone for sustainability. The marketing potential of safe, dried sludge co-composted with kitchen waste lies in the simplification of its certification process and in generating greater interest from farmers.

The creation of a national FSM network as a platform for innovation, knowledge and policy influencing will be strategic to overcome this. The network of 60 stakeholders from national and local level government agencies, development partners, academia, I/NGO, and private companies will be engaged in regional and international programs. Its first multi-stakeholder convention involved sweepers participating in workshops on rights and dignity for septic tank emptiers, indicating a strong momentum emerging around not only the business potential of FSM, but also the rights of both service users and providers to healthier lives. Discussions to extend funding to support the sustainability of the partnerships and services are taking place.

**NOTES**

1. WHO/UNICEF, JMP 2015
3. This is despite the 2010 UN General Assembly recognition of the human right to safe drinking water and sanitation and its advice that the manual emptying of pit latrines is “unacceptable from a human rights perspective” (De Albuquerque 2014).
4. Funded by the Bill & Melinda Gates and the UK Department for International Development (DFID), 2014–2017, USD1.6million
5. Practical Action Bangladesh 2014
6. Exchange rate: USD 1 = BDT 78.8

**REFERENCES**


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