

From pilot project to emerging sanitation service

Scaling up an innovative Public Private Partnership for citywide faecal waste collection in Dhaka

Topic Brief | May 2017



Executive summary

Dhaka is one of the world's megacities, with a population of around 16 million. The clear majority of residents (80%) are dependent on on-site sanitation systems, yet until recently, no private operator existed to provide mechanical emptying services to this vast and largely untapped market.



Image: Street in Dhaka, Bangladesh
Credit: WSUP

What is FSM?

Faecal sludge management, or FSM, is the safe collection, transportation, and treatment of faecal sludge (also known as septage) from on-site sanitation systems - such as pit latrines or septic tanks - which are commonly used in low-income urban areas.

In 2015, a Public Private Partnership (PPP) was established between Dhaka Water Supply and Sewerage Authority (DWASA) and a local small and medium enterprise (SME), based on a lease agreement for two DWASA-owned vacuum tankers. The partnership aimed at bridging the service gap through the operation of a new faecal sludge emptying service, marketed under the brand name SWEEP.

SWEEP has been operational for nearly two years. During the first 18 months of operation alone (to October 2016), SWEEP reached 102,408 people and emptied 3,898m³ of sludge. Significantly, it has also established itself as a viable business, becoming profitable five months after its launch, and generating a profit of BDT 691,837 (US \$8,788) to October 2016.

Key challenges include sustained demand creation, and adapting the service to reach out more effectively to low-income customers. SWEEP's current profit levels are the result of an initial focus on middle- and high-income customers, including

institutional customers such as hotels. The SWEEP experience suggests a combination of institutional and household customers can be highly beneficial to a faecal sludge management (FSM) service in the start-up phase. SWEEP is now positioned to extend the service to customers in low-income areas of the city, who are charged a lower tariff. However, incentives are needed to ensure this transition in focus is consolidated.

Having established SWEEP as an innovative PPP that meets the needs of multiple stakeholders, WSUP is now focused on supporting continued scale-up in Dhaka, including more effective targeting of low-income customers, and on replicating the model in Chittagong in partnership with Chittagong City Corporation, as the next step towards the objective of rolling out similar arrangements in cities across Bangladesh. Another focus is contributing to sector-wide efforts to improve the enabling environment for sanitation in Bangladesh, as a pre-requisite to achieving change at scale.

National context

Bangladesh experienced high rates of urbanisation from the mid-1960s to the mid-1990s, as rural migration to towns and cities exploded and urban population growth far outstripped national population growth.

Bangladesh is one of the most densely populated countries in the world, with a current annual urbanisation rate of change of 3.4% (World Bank 2015). Urban areas occupy less than 8% of the total land mass but house one third of the population. This trend will only increase as cities continue to attract new migrants from Bangladesh's rural hinterlands, and more than half of the country's population is projected to live in urban centres by 2050 (UN DESA 2014).

Bangladesh is one of the world's poorest countries, but its economy is dynamic: over the last decade, gross domestic product (GDP) has grown by an average of 6.2% per annum (WSP 2016). By 2015, GDP per capita had reached US \$1,212, a substantial increase from US \$486 in 2005. This progress notwithstanding, in 2010, 21% of

Bangladesh's urban population lived in poverty (Riaz & Rahman 2016).

Bangladesh is often cited as a South Asia sanitation success story, due to its reported eradication of open defecation in just over a decade. However, while most of the population can access a toilet or latrine, only around 60% use improved sanitation facilities that adequately sequester faecal waste from users. On-site sanitation is by far the most prevalent sanitation method in Bangladesh - with the vast majority of households using septic tanks and various types of pit latrines - yet the faecal sludge management chain is under-developed and under strain.

This situation will only continue to degrade as urban migration continues apace. New arrivals to cities and towns are often forced to live in informal settlements with inadequate sanitation facilities: nearly one third of Dhaka's population lived in slums in 2014 (Ahmed 2014). These low-income areas rely on septic tanks and pit latrines but are commonly low-lying, fringe areas of cities where multiple households use one latrine, which fills up quickly.

National policies and institutional mandates on sanitation are weak in Bangladesh. Nationally, drinking water and sanitation at the statutory level are under the purview of the Ministry of Local Government, Rural Development and Cooperatives (MLGRD&C). The Department of Public Health Engineering (DPHE) takes functional responsibility everywhere except Dhaka and Chittagong (WSP 2015).

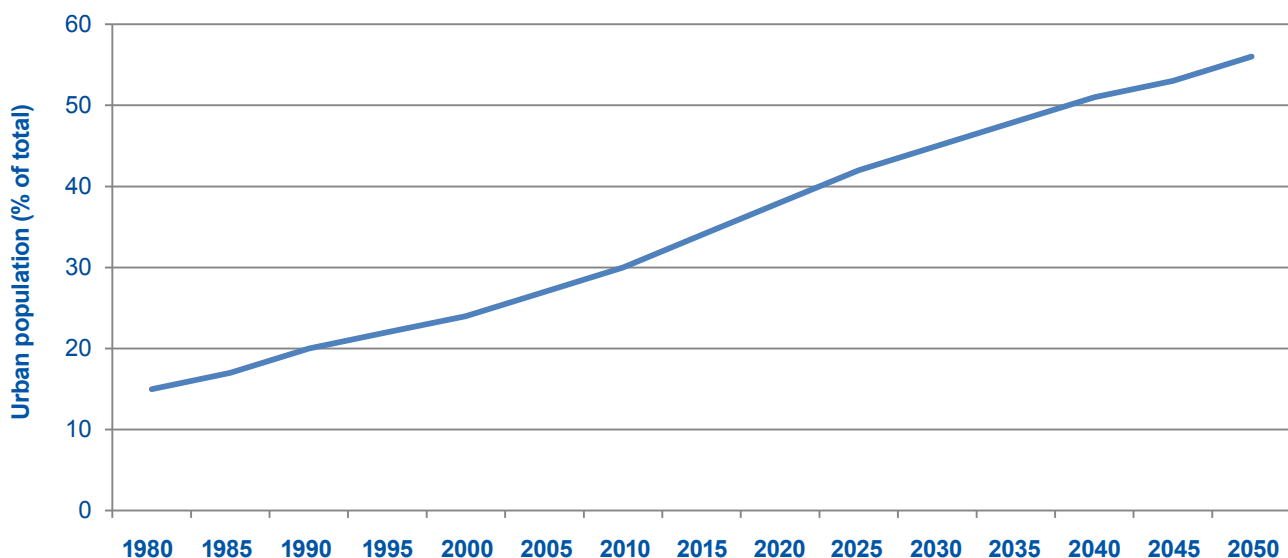


Figure 1: Growth of urban population in Bangladesh, 1980-2050 (projected).

Source: United Nations, Department of Economic and Social Affairs, Population Division (2014). World Urbanisation Prospects: The 2014 Revision, custom data acquired via website

FSM services in Dhaka

Like the rest of Bangladesh, most of Dhaka's population has access to a toilet (improved or otherwise), but 99% of the city's waste returns to the environment untreated (SFD Promotion Initiative 2016).

20% of households and institutions are connected to the sewerage network, mostly in mid- to high-income areas. However, the only sewage treatment plant runs at about one third of its capacity. Dhaka's dense population combined with high water use and wastewater generation means that septic tanks and soakage pits often overflow, exacerbated by frequent flooding. It is common practice in non-sewered areas to discharge waste—typically unprocessed—into the storm drain network (WSP 2015).

Households in low-income areas and informal settlements use pit latrines and septic tanks. Multiple households in low-income areas share a single latrine which becomes unusable if not emptied promptly. These neighbourhoods are much less likely to be connected to the storm drain network (let alone the sewerage or piped water supply systems) so rely on desludging services. Reported open defecation rates in Dhaka are low but within these areas a significant section of the population (up to 20%) is forced to practice open defecation - from time to time, at least.

Manual emptying is the most common desludging method in Dhaka. There is no fixed rate for manual emptying services, and price depends on the size of the tank and on the area.

Awareness of mechanical emptying is low and the layout of urban neighbourhoods can make access to pits and tanks challenging. Two non-governmental organisations (NGOs) have provided a mechanical emptying service for almost 15 years, supported by Dhaka Water Supply and Sewerage Authority (DWASA) and WaterAid Bangladesh, but only one of their vacuum tankers is operational and the service has yet to achieve financial viability. There were no private sector mechanical emptiers operating in Dhaka before WSUP's intervention.

Progress towards improving FSM is hindered by a lack of clarity around institutional responsibility for on-site sanitation: DWASA controls sewerage and drainage on major streets, but the Dhaka North City Corporation (DNCC) and Dhaka South City Corporation (DSCC) are responsible for solid waste and drainage in lanes.

FSM is not obviously under the auspices of either body, although the Local Government (City Corporation) Act 2009 mandated city corporations to take ownership of the FSM chain. The city corporations are supported nationally by MLGRD&C, who provide funding if required, and ensure that relevant national laws, policies, strategies and guidelines (such as they are) on FSM are followed.

Dhaka's city corporations can collaborate with DWASA, the Department of Public Health Engineering (DPHE), the Local Government Engineering Department (LGED), development partners, and the private sector.

Consideration of the FSM chain beyond the household remains patchy. Where there is regulatory FSM consideration, there is a lack of enforcement capacity. There is no national independent regulator for sanitation services. The Local Government Division of the MLGRD&C recently formed a national working committee to formulate a draft 'Institutional and Regulatory Framework for Faecal Sludge Management' which proposes that the mandate for urban FSM be definitively allocated to city corporations. In Dhaka the responsibility may be split between DWASA and the Dhaka City Corporations, with the latter responsible for collection and transportation, and DWASA for treatment.

Institutional arrangements for FSM in Dhaka

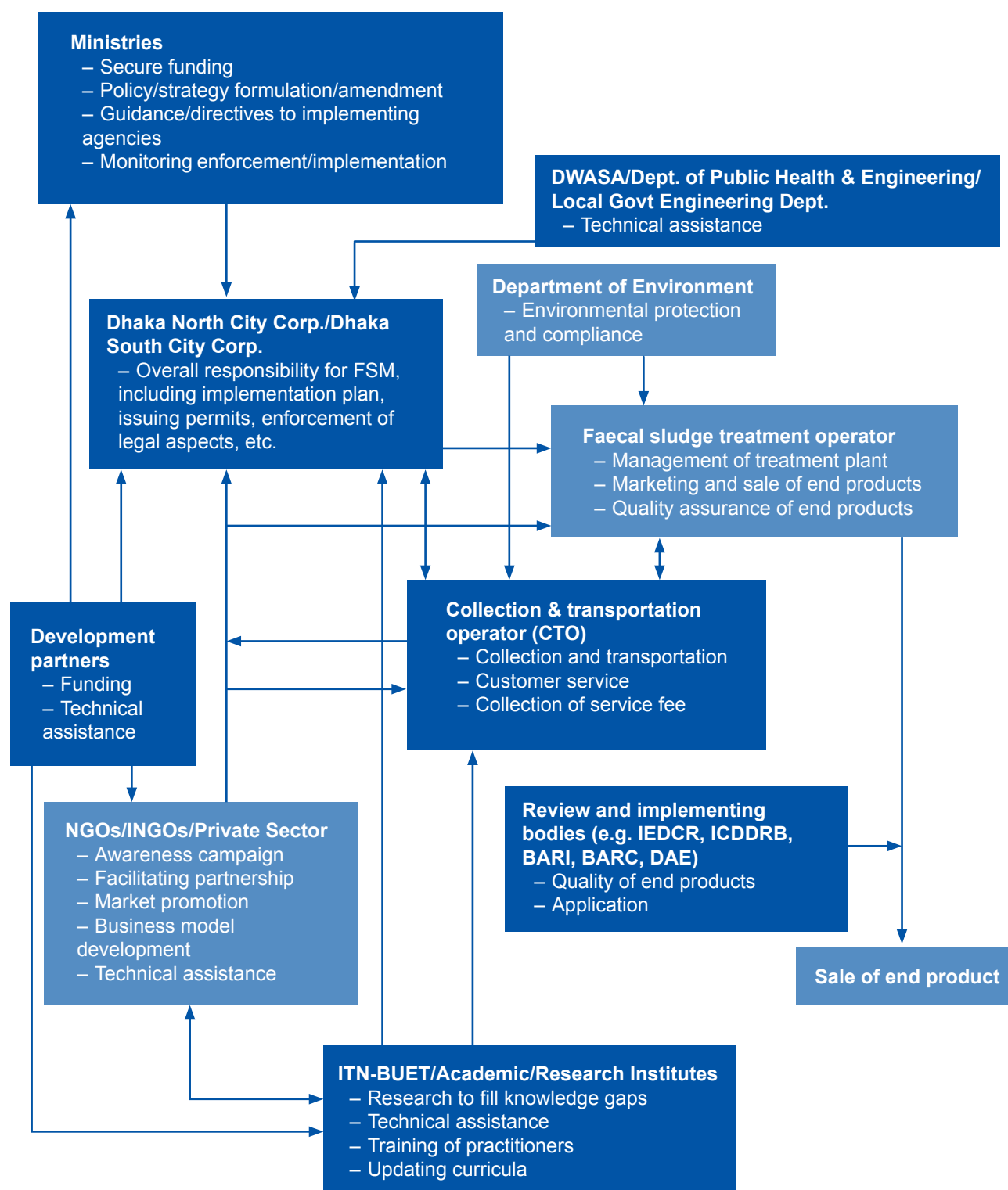


Figure 2: All abbreviations and acronyms are listed on page 10. **Source:** Working Committee formed by the Local Government Division, Ministry of Local Government, Rural Development and Cooperatives (2015) Draft Institutional and Regulatory Framework for Fecal Sludge Management (FSM): Mega City Dhaka.

SWEEP: a lease-based PPP model for FSM service delivery

In 2015, WSUP Bangladesh partnered with DWASA to develop an innovative FSM service delivery model in the city called SWEEP, providing safe, professional FSM services to consumers.

WSUP performed a financial analysis and designed a new PPP that brought together a range of different stakeholders who could complement each other in delivering the new FSM service. Supported by WSUP and UNICEF, a lease agreement was signed between DWASA and one SME for two 2,000-litre vacuum tankers owned by DWASA. As well as providing access to equipment, the agreement allowed the SMEs to provide safe and professional FSM services under the WSUP-created SWEEP brand.

This delivery model allows multiple SMEs to operate under the SWEEP brand in a competitive environment. If necessary, DWASA could eventually introduce a fixed price, but at the moment with the limited information it has and limited enforcement ability, this is not advised. If the price were fixed too high by mechanical emptying services such as SWEEP, customers would abandon their services.

WSUP provided the SME with technical and business management training to improve their ability to deliver services safely and profitably; and supported DWASA to develop a promotional and marketing strategy for the SWEEP brand. This included an SMS, video, leaflet and poster campaign promoting SWEEP, and hiring 'brand promoters' to conduct door-to-door visits in target areas.

Table 1 demonstrates how the PPP operates in practice, and how responsibilities for SWEEP's service are allocated. As of April 2017, the service has been operational for 24 months.

SWEEP currently targets mid- to higher-income residences and commercial institutions, with lower income customers making up 15% of the customer base. This is partly because higher-income customers are willing to pay more for desludging services and their tanks tend to be larger, enabling SWEEP technicians to completely fill vacuum tankers before making multiple trips to their official dumping points. Due to this initial focus on larger customers, the enterprise was able to cover its operational costs in full and became profitable five months after its launch in April 2015. As of October 2016, SWEEP had reached over 100,000 people in Dhaka and emptied nearly 4,000m³ of sludge.

Regular Operational Activities	Frequent Maintenance Activities	Infrequent Vehicle Maintenance Activities	Receiving Demand	Mass Marketing	Regulatory Activities	Replacing and Increasing Fleet	Disposal and Treatment
SME	SME	DWASA	SME	DWASA	DWASA	DWASA	DWASA

Table 1: Allocation of responsibilities for the FSM service between DWASA and the SME.

Financial and economic analyses

By October 2016, SWEEP had made a total profit of nearly BDT 700,000 (circa US \$9,000) (see Figure 3). SWEEP's current profit levels are the result of the initial focus on middle- and high-income customers, which includes institutional customers such as hotels.

The SWEEP experience suggests a combination of institutional and household customers can be highly beneficial to an FSM service in the start-up phase. A price analysis conducted by WSUP in 2016 demonstrated that customers with larger tanks are often willing to pay more; these customers also account for 60% of SWEEP's revenue, despite being only 15% of the customer base. However, the price analysis did not show a positive correlation between tank size and actual emptying price: to date, customers with small tanks have been charged more per litre on average than customers with a medium-sized tank (Walcott, 2016a).

SWEEP customers living in low-income areas are charged a lower tariff. The tariff is US \$6-7.50 per cubic metre for low-income customers and US \$10-15 for middle/high-income and institutional customers. However, the pricing structure is not fixed, given the widespread practice in Dhaka of negotiation over price for services rendered. Despite this potential barrier, the vast majority of jobs performed by SWEEP technicians generate a profit, with jobs that made a loss mostly confined to the start-up period in 2015.

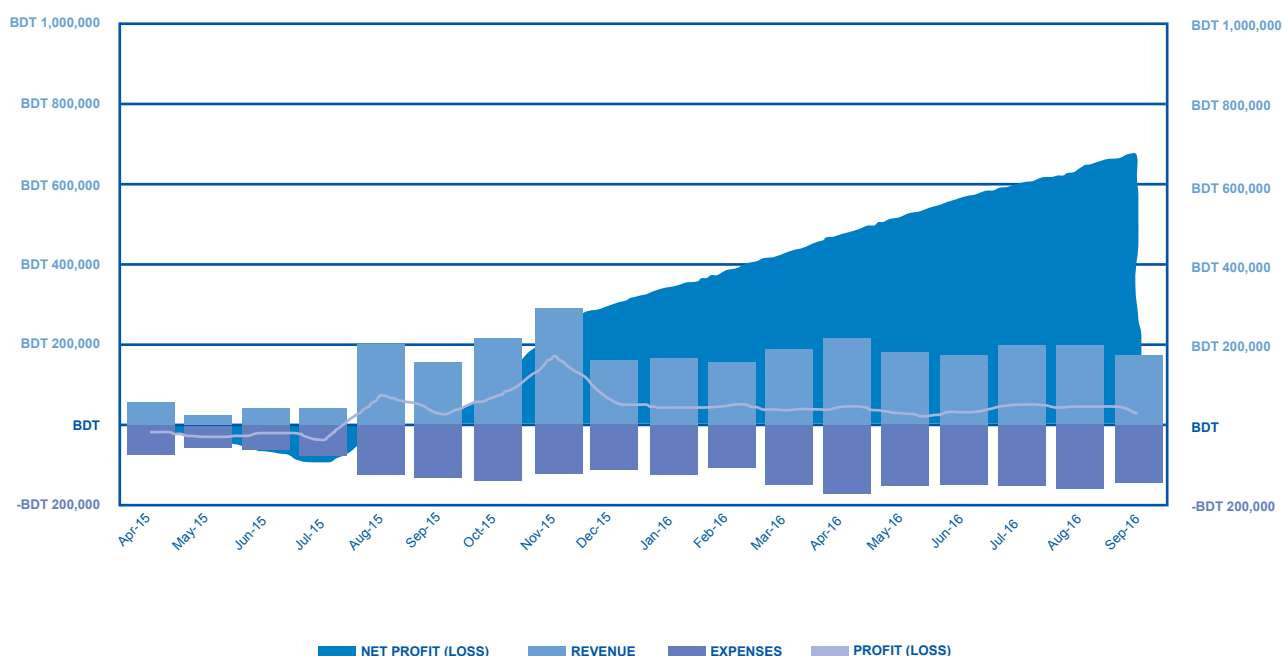


Figure 3: Overview of SWEEP's performance, April 2015 - September 2016. [Net Income (Loss) represents total revenue plus total expenditure since inception of the service; Income (Loss) represents monthly revenue plus monthly expenses.]

Drivers of change

Stimulating buy-in from the utility and sanitation entrepreneurs was vital during SWEEP's design and initiation, and ensured that scale-up and expansion are now possible both in Dhaka and elsewhere in Bangladesh.



Both the public and private bodies involved in the PPP must be invested in the process and in the eventual success of the enterprise. In DWASA's case, leasing their vacuum tankers to private actors minimises risk, and the scalability of the model meant that the utility could enter the FSM market without having to undergo significant internal restructuring. DWASA also receives regular monthly revenue from leasing fees.

The SMEs take on the risk of entering the FSM market, but risks are lessened thanks to the structure of the PPP: start-up costs are lower, and the SME sees a faster return on its investment and operates under the legal authority of the utility. The contract also guarantees eight official disposal points and marketing support for the SME. A competitive bidding process overseen by WSUP ensured that the strongest sanitation entrepreneur was chosen to deliver the service to customers (Gulshan Clean and Care). WSUP presented a strong business case to entrepreneurs to convince them of the feasibility of balancing low-income customers with running a successful (and profitable) business. This required overcoming the commonly held perception that mechanical emptying businesses that focus on low-income areas will not be financially viable: SWEEP's experience to date demonstrates that such enterprises can be profitable if activities are carefully targeted.

Notwithstanding the risk mitigation strategies that were developed, attempting to introduce an innovative FSM service delivery model requires a step into the unknown. The Commercial Manager of DWASA was an enthusiastic advocate of the new SWEEP model. This willingness to take risks and consider alternative options in order to make substantive city-level change is critical when designing and implementing new models. In addition, both the utility and the donor (UNICEF) held a clear vision of what needed to change in order to make substantial improvements for the population of Dhaka. Donors especially must be willing to push for innovation in urban sanitation programmes for new models to gain traction.

Lessons learned

This section details the key lessons learned from SWEEP's experience: on viability, PPPs, and how to create and maintain an effective faecal sludge management service in Bangladeshi cities.

1. Mechanical FSM services that serve the poor can be viable in Bangladeshi cities.

SWEEP's experience demonstrates that it is possible for mechanical FSM services to make a profit in a large Bangladeshi city such as Dhaka, provided institutional support and appropriate differential pricing are established; and that lower-income customers can be served without jeopardising a company's bottom line.

A contractual partnership with the public sector further strengthens this positive outcome; it is intended that serving a minimum percentage of low-income areas be made a contractual requirement of serving under the SWEEP brand. To ensure this is fair for the SME and its customers, data from the current operator is being processed to better understand necessary price points for higher- and lower-income customers that would allow for differentiated pricing in order to target households in low-income areas (currently around 30% of the total customer base) while maintaining a healthy bottom line for the business.

WSUP is conducting studies to analyse how to increase the incentives to service customers from low-income areas (which could include providing business planning or marketing support to SMEs that meet pro-poor targets), and a clear differentiated pricing structure.

In a simplified model, retaining the price for lower-income customers and raising the costs slightly for higher-income customers (by 23%, for which there is still willingness-to-pay) increases the percentage of customers from low-income areas from 16% to 30%, and achieves a comparable net profit margin for the SME. There are several other factors to be considered, but this analysis clarifies that increasing the service to low-income areas is feasible (Walcott 2016b).

2. PPPs offer a strong framework in which multiple stakeholders with a diverse strengths can operate.

The lease agreement signed between DWASA and the SME has advantages for both parties: the SME has benefitted from reduced risk to market entry through lower start-up costs, greater flexibility and a faster return on investment; and DWASA is able to service customers in a scalable manner across the city, while remaining flexible and maintaining ownership of its assets.

3. Detailed understanding of customers and pricing is critical.

The price analysis of SWEEP showed that it was the size of the customer's septic tank that indicated profitability and helped determine pricing (Walcott 2016a). Although this was related to customer income—in that higher-income households and institutions tended to own larger tanks, had more litres emptied and so paid more overall—on average customers with smaller tanks paid more per-litre than mid-sized customers.

How best to balance this with a company's utilisation rates must now be analysed in more detail: SWEEP operators are currently only operating about 50% of their potential working day, partly because smaller septic tanks do not take as much time to empty as larger ones, which require multiple trips to dumping points.

4. Disposal points are essential in promoting operational efficiency.

SWEEP's experience has affirmed WSUP findings from elsewhere that the provision of disposal points is vital to support the viability of emptying businesses, as they keep transport distances low and increase profitability. However, not all of the eight official disposal points provided by DWASA are currently operational.

5. A citywide vision is required to achieve impact at scale.

When engaging with potential public and private partners, implementers must design a strategy for the city as a whole. This means innovating at a micro-level, but maintaining a focus beyond the core business being promoted: it is vital to consider how the model will impact the urban sanitation sector at large, and to support sector-wide efforts to strengthen the enabling environment for sanitation.

Outstanding challenges, next steps, and plans for going to scale

SWEEP's early success in Dhaka is clear, but there are a number of areas that must be addressed to ensure sustainability and further expansion.

Increasing low-income customers' access to services

WSUP is currently assessing how best to encourage private sanitation entrepreneurs in Dhaka and elsewhere to extend low-income customers' access to services.

This could mean incentivising companies by providing business planning/marketing support to those that achieve pro-poor targets, or ensuring that future contracts include a clause that mandates operators to serve a target number of low-income households.

Creating demand

A significant number of households in Dhaka have toilets connected to surface drains and no need for the service, or are happy to continue to pay manual emptiers. During SWEEP's start-up phase, the team found that many people did not know that a mechanical emptying service was available, even though most of Dhaka's population would benefit from such an enterprise.

Optimising markets and sales to identify and close transactions more efficiently

WSUP will continue its support to SWEEP scale-up in Dhaka throughout 2017, with funding from the Bill & Melinda Gates Foundation. This will include further optimising marketing and sales to identify and close transactions more efficiently, with more repeat and satisfied customers; and ensuring safer, more hygienic disposal of waste. If demand creation steadily increases, and if the various interests within DWASA continue to support the model and allow for disposal within the sewerage network, more vacuum tankers could be leased under the SWEEP brand.

Ensuring long-term sustainability in Dhaka

After 2017, the current contract with the SME will be revised to reflect learning from the programme. To scale up, additional support would be required for DWASA to increase the utilisation rate of SWEEP vehicles, perhaps through a targeted marketing campaign in specific areas.

National policy has been further clarified, placing responsibility for FSM with Dhaka City Corporations, and there are ongoing discussions between DWASA and the World Bank for further sanitation investment.

The business community is recognising that this service can be profitable, particularly if support for capital investment is available. The existing SME owner is considering expanding the service using his own resources.

Learning from SWEEP's experience in Dhaka to inform scale-up and expansion elsewhere

The SWEEP model will also be replicated in other Bangladeshi cities. Supported by the Bill & Melinda Gates Foundation, work to roll out the model in Chittagong is already underway: WSUP and the Chittagong City Corporation have entered into an agreement to develop a new FSM service under a PPP arrangement similar to that in Dhaka. The policy environment and willingness to engage is even more apparent in Chittagong. The PPP came into operation in early 2017, with WSUP providing capacity building support to the SMEs involved. Diagnostic studies on the business model, business management and customers of Dhaka will provide invaluable data for SWEEP's expansion in other cities.

Improving Bangladesh's enabling environment for sanitation as the key to SWEEP's long-term success

The sanitation sector is under-regulated and there is little legislation that clearly allocates mandates, or policies and guidelines for stakeholders in urban areas. This is now recognised at the national and municipal level, and efforts to address this are underway, although it is likely that any resulting wide-scale changes will take a number of years to implement.

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Abbreviations and acronyms

BARC	Bangladesh Agricultural Research Council
BARI	Bangladesh Agricultural Research Institute
BMGF	Bill & Melinda Gates Foundation
DAE	Department for Agricultural Extension
DNCC	Dhaka North City Corporation
DPHE	Department of Public Health and Engineering
DSCC	Dhaka South City Corporation
DWASA	Dhaka Water Supply and Sewerage Authority
FSM	Faecal sludge management
GDP	Gross Domestic Product
ICDDR,B	International Centre for Diarrhoeal Disease Research, Bangladesh
IEDCR	Institute of Epidemiology Disease Control & Research
LGED	Local Government Engineering Department
MLGRD&C	Ministry of Local Government, Rural Development, and Cooperatives
NGO	Non-Governmental Organisation
SME	Small and Medium-Sized Enterprise
PPP	Public Private Partnership
WSUP	Water & Sanitation for the Urban Poor

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