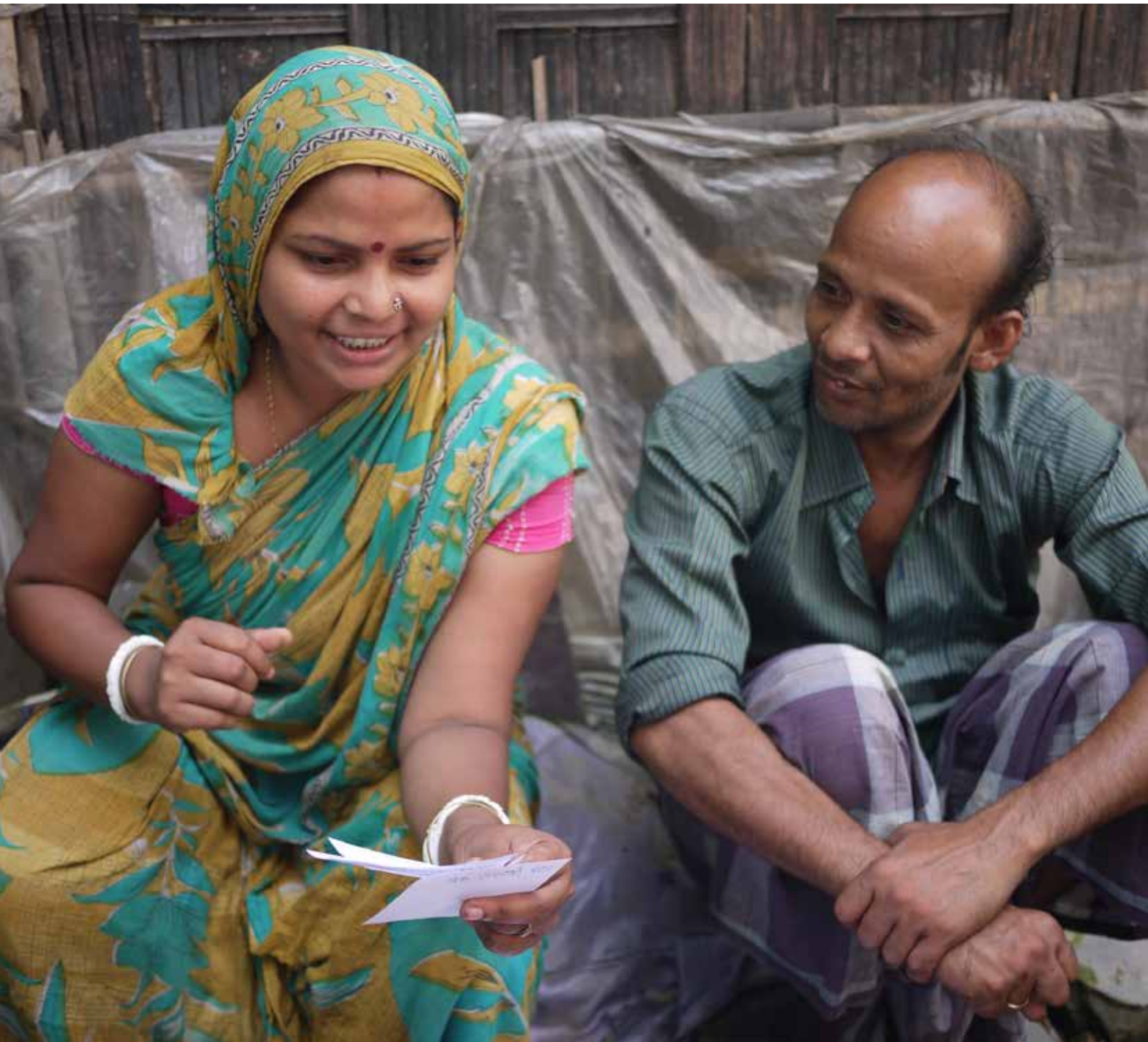
WSUP | Water & Sanitation for the Urban Poor

Adapting and replicating a proven partnership model for urban sanitation: SWEEP in Chittagong

Topic Brief | February 2018



Cover image: Potential customers being surveyed in Chittagong. **Credit:** Jeff Chapin

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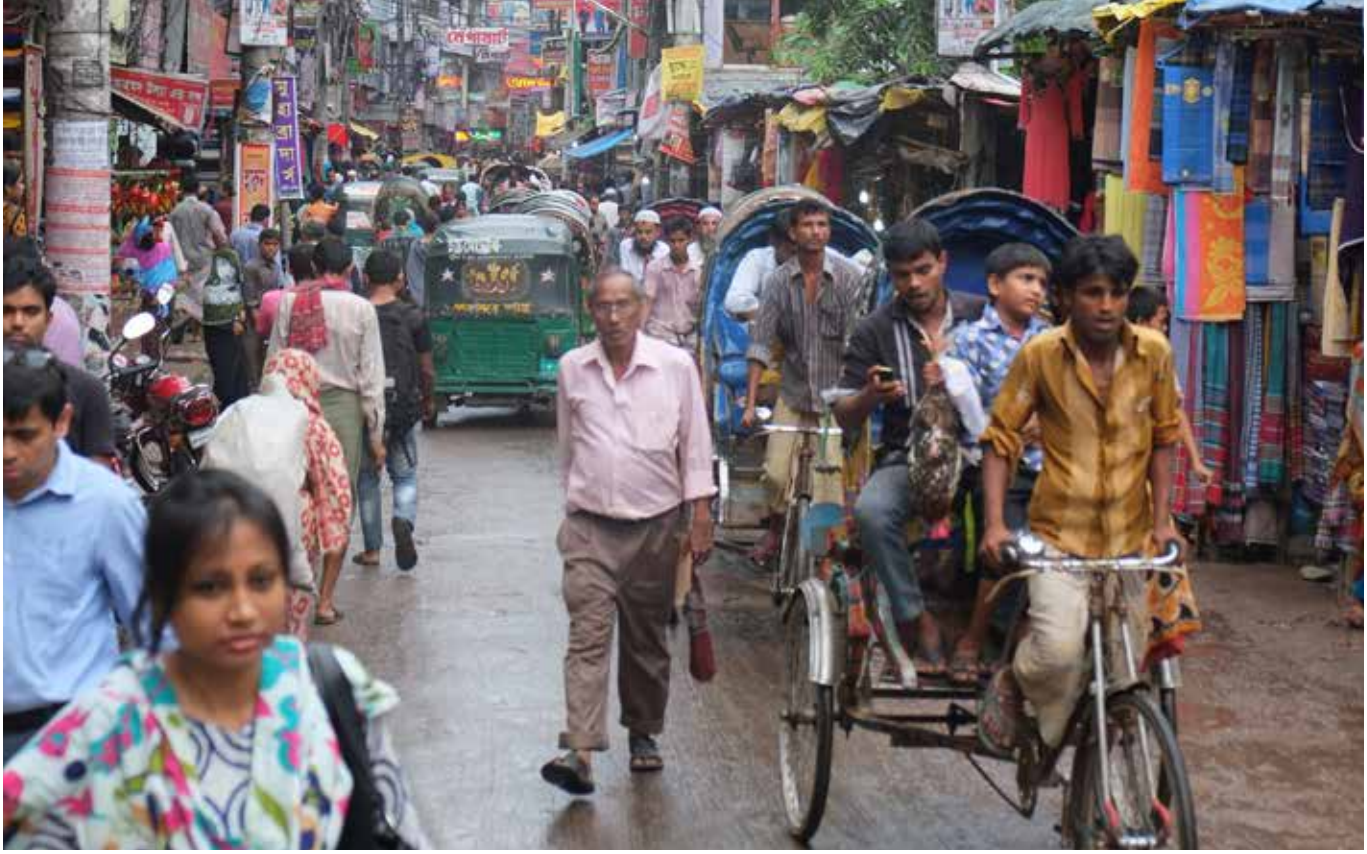


Image: Street in Chittagong **Credit:** Adrian Jankowiak

1. Introduction: Pilot, scale, replicate

This publication explores the replication of a public-private partnership (PPP) that provides safe faecal sludge emptying and transport from on-site sanitation facilities such as pit latrines and septic tanks, marketed as 'SWEEP'. Following a successful pilot period and subsequent expansion of SWEEP in Dhaka, WSUP is now replicating the SWEEP model in Bangladesh's second largest city, Chittagong, and will soon be launching the service in the cities of Rangpur and Barisal. This is the first time that WSUP has replicated a financially viable sanitation business model in a different city to where the pilot period took place: this publication shares the replication process and the lessons learnt to date for other sanitation service providers seeking multi-city expansion.

1.1 Bangladesh: a second generation sanitation challenge

Rates of open defecation have plummeted in Bangladesh over the last fifteen years or so, thanks to a concerted national effort to build on-site sanitation facilities and encourage their use. However, a 'second generation' sanitation challenge has subsequently emerged: how to safely manage the accumulated faecal sludge contained in on-site sanitation facilities throughout Bangladesh. The problem is particularly acute in densely populated cities such as Dhaka and Chittagong, and until recently there have been very few formal sanitation service providers that offer safe pit latrine and septic tank desludging to poorer households (or, indeed, any households).[1] Crucially, where pilot projects have achieved the above, they have not been able to achieve financial viability and to scale-up to city-wide service provision.

1.2 SWEEP in Dhaka: showing that scale is achievable

Notwithstanding the above challenges, the experience of one privately-run mechanised emptying and transport service suggests that scale-up in urban Bangladesh is possible. First established in Dhaka, SWEEP is a vacuum tanker-based faecal sludge emptying and disposal service provided by a private operator, and supported by Dhaka Water and Sewerage Authority (DWASA) through a public-private partnership (PPP) agreement. WSUP acts as a 'broker': gaining buy-in for the concept from key stakeholders within DWASA and demonstrating to business owners that faecal sludge management (FSM) was an untapped market and potentially profitable; designing a PPP agreement that adequately balanced the strengths and weakness of both partners; mediating between partners; and continuing to support the SME to scale-up.[2] SWEEP has now served nearly 200,000 people in Dhaka.

[1] For an overview of ongoing sanitation service delivery projects in Faridpur (Practical Action), Sakhipur (WaterAid) and Dhaka (WSUP), see Blackett I & Hawkins P (Eds.) 2017. FSM Innovation: Case studies on the Business, Policy and Technology of Faecal Sludge Management, 2nd ed. Bill & Melinda Gates Foundation

[2] For more detail on the SWEEP experience in Dhaka, see WSUP (2017) From pilot project to emerging sanitation service: Scaling up an innovative Public-Private Partnership for citywide faecal waste collection in Dhaka

2. Replicating SWEEP in Chittagong: context and approach

2.1 Context: the sanitation situation in Chittagong

Chittagong is the second largest city in Bangladesh, with a population of three million living in only 155 square kilometres. There is no sewerage in Chittagong: most of the population use septic tanks and a minority rely on wet pit latrines; an estimated 200,000 m^3 of faecal sludge accumulates in Chittagong's tanks and pits every year. The city's surface drainage system is treated as de facto sewerage: a WSUP survey found that almost half of Chittagong's residents connect their septic tanks and pit latrines directly to street drains to discharge faecal waste. Those who cannot connect their toilets in such a manner employ informal manual emptiers who dump the sludge in the nearest surface drain or water body. Others open their tanks and pits during the rainy season so the sludge drains away.

Significant structural barriers have stymied efforts to improve Chittagong's sanitation situation. As the largest port in Bangladesh and the country's import/export centre, Chittagong makes a major economic contribution to the country. Despite this, Chittagong City Corporation (CCC) has a relatively small budget (almost US$ 270 million for 2016-17).[3] This financial shortfall hinders municipal investment in sanitation infrastructure, including projects that would aid the development of professionalised FSM services such as treatment plants or decentralised transfer stations.

In addition to a lack of fiscal resource, FSM (until mid-2017) was in a legal and policy 'grey area' between Chittagong Water Supply and Sewerage Authority (CWASA) and CCC. Though nominally responsible for sewerage, CWASA primarily expanded the water distribution network, and CCC focused on solid waste management rather than delivering 'environmental maintenance' as mandated. According to the 2009 City Corporation and Pourashavas Acts, 'environmental maintenance' included FSM, although this distinction was unclear in cities where City Corporations co-existed with WASAs (as is the case in Chittagong). CCC's capacity to provide faecal sludge emptying services was extremely limited as the Corporation had only one vacuum tanker to serve the whole city. The lack of clarity meant that both CWASA and CCC were reluctant to take the lead in FSM but were equally hesitant to cede control to other actors, including those from the private sector.

2.2 Laying the foundations for replicating SWEEP

SWEEP's replication in Chittagong was the culmination of sustained engagement with CCC. WSUP established itself in Chittagong in 2015, aligning closely with Chittagong City Corporation (CCC) and Chittagong Water and Sewerage Authority (CWASA). For example, WSUP supported CCC to design an on-site sanitation strategy to prepare for the introduction of the national Institutional and Regulatory Frameworks for FSM (IRF). The IRF was signed into law by the Government of Bangladesh in May 2017, and definitively assigns responsibility for urban FSM to City Corporations (although Dhaka WASA will retain a role in the capital city), clarifying previous confusion about which institution takes the lead.

As the national frameworks for FSM regulation and policy formulation took shape, a more defined space for private sanitation service providers in Chittagong began to emerge. This, combined with pre-existing relationships between WSUP and Chittagong's major sanitation stakeholders such as CCC, CWASA and 'sweeper' (informal manual emptiers) communities, meant the city was an ideal replication site for the SWEEP model. WSUP worked together with the Chittagong City Corporation – now confirmed as the primary institution responsible for FSM – so that the need for private involvement to deliver high-quality FSM at scale was recognised.

[3] The Asian Age (10 October 2016) CCC declares Tk 2225cr budget for 2016-17

2.3 Consolidating the partnership: the value of demonstration

CCC staff were able to witness the SWEEP model in action in Dhaka during a learning visit to the capital city in 2016. This was a key factor in gaining CCC's buy-in for the replication and adaptation of SWEEP in Chittagong, confirming a broader lesson that demonstrating effective service delivery models is a powerful driver of change. CCC were able to observe the link between the rather abstract idea of a PPP arrangement in urban FSM and actual improvements in sanitation on the ground in Dhaka. Equally importantly, CCC staff could also visualise the role of the public sector in improving the enabling environment for sanitation businesses.

With backing from the CCC Department of Conservancy, the Mayor of Chittagong signed an MoU with WSUP to launch a private FSM service in April 2017. A strategy was developed with three main aims: to establish a safe and viable business (detailed in section 4); to serve the most vulnerable in the city (section 5); and to encourage others to enter, invest in and strengthen the sanitation sector in Chittagong (section 6).

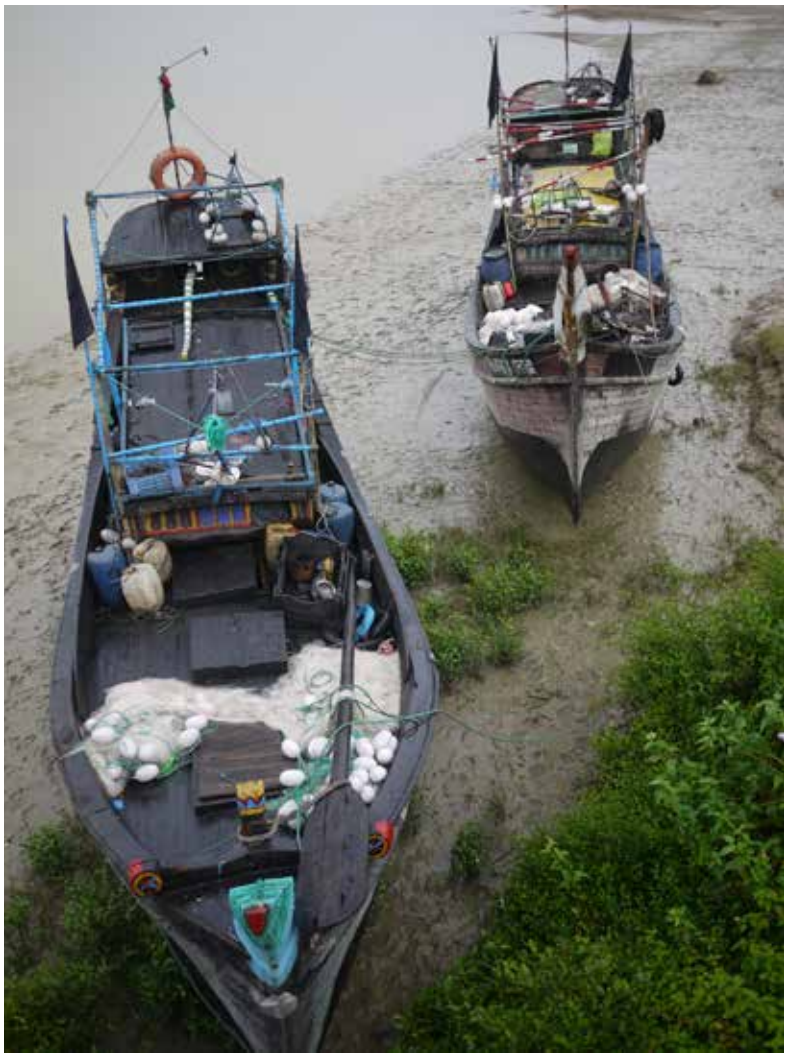


Image: Chittagong waterway. **Credit:** Jeff Chapin

3. The SWEEP PPP in Chittagong

Based on a market assessment of Chittagong and financial modelling, WSUP designed a PPP framework involving three parties: CCC (a government entity), a private operator (later identified as Chittagong Sheba Sangstha (CSS), a medical waste management company) and WSUP.

The SWEEP model was established in Dhaka before the implementation of the IRF, and so DWASA had de facto institutional responsibility for FSM, having been provided with two vacuum tankers by UNICEF. DWASA now leases those vacuum tankers to a private contractor, with WSUP acting as an intermediary between the asset owners (DWASA) and the asset operators (Gulshan Clean and Care, a waste management SME that was already in operation in Dhaka).

In Chittagong, this PPP arrangement differs slightly. Prior to SWEEP, there were no formal FSM services in the city, as CCC's only vacuum tanker was no longer operational. WSUP provided CCC with a 4m^3 vacuum tanker in April 2017, which CCC could then lease to a private sector entity in return for a safety deposit, a monthly lease fee and the assumption of all marketing, all vehicle maintenance and repairs, and other operating expenses. (WSUP procured an additional tanker for CCC in December 2017, which can access households in lower-income, dense communities). After CSS was selected, the three parties signed an agreement whereby CSS agreed to carry out day-to-day operations under monitoring from WSUP and CCC. WSUP would provide marketing and technical support, including training for CSS staff, while CCC would allow its logo to be used in marketing and truck branding, provide a site for safe dumping of faecal waste and refer clients from the private sector to CSS.

Such an arrangement is beneficial to the private operator; their initial investment is minimal, and WSUP and CCC absorb the longer-term cost of depreciation. This financial advantage is a means of compensating the business owner for entering a new sector, especially one as untested as safe and formalised urban FSM. The medium- and longer-term strategy is for CCC to use their budget for FSM allocated by the central government to acquire additional vacuum tankers. These tankers would be leased out to private operators, with the private sector purchasing trucks once the market for mechanised emptying becomes more firmly established.

Why a PPP arrangement?

The complexity of delivering improved and accessible urban sanitation services necessitates the involvement of both the public and the private sector. In Chittagong, for example, the successful reduction of open defecation rates obscures the lack of management or treatment for the sludge contained in on-site sanitation facilities, and city authorities are struggling to fill the gap and prevent environmental pollution. In WSUP's experience, bringing together municipal bodies (like the Chittagong City Corporation) with private service providers (such as waste management SMEs) in flexible service-level PPP arrangements lessens the risks for stakeholders, and partners can combine their respective strengths to reach under-served communities. Private sector entrepreneurs, for example, bring technical innovation, customer service, and efficiency, while public sector actors ensure that services protect public health and are affordable and accessible.[4]

Table 1: Allocation of responsibilities for the FSM services between the public and private sector actors in Dhaka and Chittagong

	Regular operational activities	Maintenance activities	Receiving demand	Mass marketing	Regulatory activities	Replacing and increasing fleet	Disposal and treatment
Dhaka	GCC	GCC	GCC	DWASA	DWASA	DWASA	DWASA
Chittagong	CSS	CSS	CSS	CCC	CCC	CCC	CCC

[4] WSUP (2017) Public-Private Partnerships explained: Urban sanitation service delivery in Bangladesh

4. Establishing a safe and viable sanitation business

4.1 Selecting a business to deliver SWEEP services

Replication of the SWEEP model required the identification of an entrepreneur with the capacity and drive to succeed in a challenging sector, as Gulshan Clean & Care have done in Dhaka. In order to do so, WSUP and CCC assessed thirty companies according to criteria including relevant experience, financial liquidity, and willingness to adhere to terms of the proposed PPP framework. Shortlisted businesses were invited to submit bids for the lease contract.

WSUP's experience in Dhaka highlighted the benefits of partnering with an SME that already worked in an analogous market to FSM, such as waste management. The business selected to deliver SWEEP in Chittagong – Chittagong Sheba Sangstha – delivers medical waste collection services within a PPP framework, and has a pre-existing customer base of health clinics, hospitals and pharmacies. CSS is accustomed to working within municipal regulations, having built a waste collection business in accordance with the strict parameters laid down by CCC.

4.2 Providing safe FSM services

CSS must protect the health and safety of the employees who deliver sanitation services, and the health and safety of their clients and neighbours. WSUP and the vacuum tanker manufacturer trained CSS operators on the management of the tanker, provided operational health and safety training, and vaccinated CCC staff.

WSUP also devised a disposal strategy that orginally centred on a pilot treatment plant built by an international NGO. When the pilot plant's launch was delayed, WSUP worked with CCC to construct trenches in Chittagong's solid waste dumping site as an interim solution. The faecal sludge collected by SWEEP was disposed of in the trenches, away from clients' neighbourhoods. To ensure that the sludge is transported to the official dump site, WSUP has installed a monitoring tracker on the vehicle so it can be located throughout its journey from septic tank to dumping site.

Image: SWEEP in operation in Chittagong, May 2017.

4.3 Building consumer demand

In Dhaka and Chittagong (or indeed any city), sustaining a business beyond start-up means identifying consumers who are willing to engage with a new service or new service provider. An initial assessment of the business potential for SWEEP in Chittagong included a market survey and willingness-to-pay study of twelve densely populated wards surrounding the dumping site. The households, businesses, sweepers and low-income residents surveyed in Chittagong (1,300 people) revealed that almost 50% were connected to surface drains, but those that are not connected were interested in using a service such as SWEEP. Some requested emptying immediately after they were surveyed.

Following the signing of the MoU, WSUP devised a launch process drawing on lessons learned from SWEEP's introduction in Dhaka. Based on customer feedback about the valued attributes of a sanitation service, Chittagong SWEEP is promoted along three key principles initially identified in Dhaka: reliability, safety and affordability. Mechanised emptying is demonstrably faster than manual sweepers and considerably cleaner: two important factors in

closing deals recognised by sales teams in Dhaka. Mechanised emptying using SWEEP's tankers can take only 30 minutes – in Dhaka and Chittagong, informal manual tank emptying can take all night. Comparing the two is a valuable sales technique first identified in Dhaka and adopted in Chittagong.

Following marketing models developed in Dhaka, marketing materials such as flyers displayed a combination of SWEEP's own branding alongside CCC's logo (establishing the new service's support from the city government). A marketing team hired by WSUP undertook door-to-door sales, neighbourhood canvassing and organised workshops with community leaders to explain safe FSM. The marketing team also reaching out to business leaders and established a network of sales agents throughout the city. A TV commercial airing from September 2017 was based on a similar commercial advertising SWEEP in Dhaka.

WSUP's close integration with CSS has paid off, ensuring that marketing activities turn into referrals, which then become sales. Biweekly sales strategies and progress assessments mean that CSS can incorporate steady learning into their operations, minimising the learning curve at a key stage of the start-up process.

4.4 Achieving financial viability

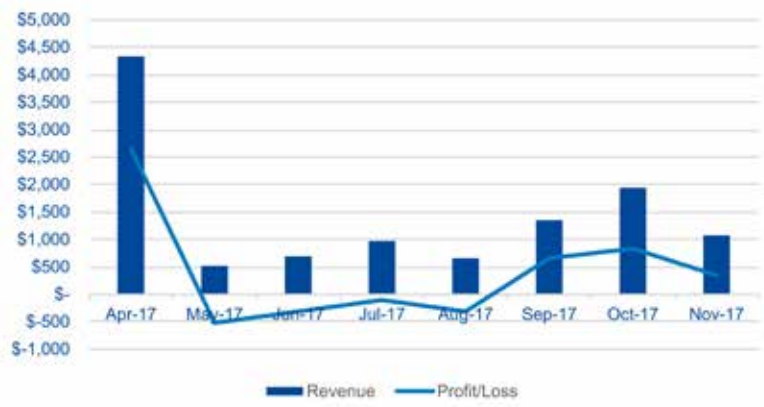
In Dhaka, SWEEP broke even after five months – a notable achievement given that it was the first of its kind in the country and began operating with little concrete data about demand for such a service. Dhaka SWEEP's financial viability was made possible by several factors, including that DWASA effectively subsidise the lease of the vacuum tankers, as they are provided at a low rate as part of the PPP agreement; a marketing drive undertaken a few months after launch drove demand at a crucial point; and customers were carefully targeted according to the size of their septic tank and assumed income.

This experience of SWEEP in Dhaka to date has been incorporated into the design and roll-out of the model's replication in Chittagong. Data analysis revealed that Chittagong's emptying market can be broadly categorised into three main consumer groups: high-income residential, low-income residential and formal business/ commercial organisations. These consumer groups are defined by their geographic location, as information on income bands is difficult to collect and septic tank size does not strongly correlate to income (multiple low-income households could share a large septic tank, for example).

A conservative estimate of the potential mechanised emptying market based on consumer response is as low as US$ 740,000 per annum, and as high as US$ 2.4 million per annum, based on an estimate of the informal emptying market. Such a market could theoretically sustain 10-12 medium-sized (4m^3) trucks, although this does not consider the operational expenses that would determine the market viability of mechanised FSM.

In its first eight months, SWEEP earned almost US$ 12,000 at a 28% profit in Chittagong, preventing almost 1000 m^3 of sludge from polluting the city's water bodies and providing more than 33,000 people with safe FSM services in the process (see Figure 1).

Figure 1: Financial performance of SWEEP Chittagong in its first eight months of operation (US $)



5. Serving low-income customers

5.1 Building a low-income customer base into the contract

The agreement with the SME in Chittagong specifies that SWEEP's customer base should be at least 30% low-income consumers (LIC). This insistence that SWEEP Chittagong be contractually pro-poor was based on experiences in Dhaka. SWEEP Dhaka was able to achieve positive net cash flow within five months due to its early focus on customers with larger septic tanks. These customers tended to be higher-income and were willing to pay more per litre of sludge removed from their tank.

This reliance on higher income consumers, while key to the early stages of SWEEP Dhaka's pilot period, had to be limited to ensure that the SME (Gulshan Clean and Care, GCC) would not solely target the most profitable households and institutions. A new clause was introduced to the Dhaka PPP contract in mid-2017 mandating GCC to ensure that 30% of their customers were lower income. A similar clause was embedded in the agreement with CSS from the very start of the SWEEP Chittagong programme.

LICs are defined according whether 1) they live in low-income areas (as identified by CCC), and 2) they use an outdoor shared toilet (pit or septic tank) and/or water point. WSUP verifies the status of consumers and according to the PPP contract, CSS can be penalised if it does not meet the 30% target each month or refuses to provide services to LICs referred to them by WSUP or CCC (this average is calculated quarterly as there is still significant variation in demand from month to month). This caveat was made clear to Chittagong SMEs bidding to be part of the PPP. LIC use of the service is a Key Performance Indicator in SWEEP's reports to CCC, where the Conservancy Officer has taken ownership of ensuring that the service is accessible to communities across the city. His team in CCC have been the driving force in referring LIC customers to CSS, as he is the main point of contact for LICs concerned about waste management and other sanitation issues in their neighbourhoods.

Image: SWEEP in operation in Dhaka.

Table 2: Breakdown of SWEEP Chittagong's customer base, April – October 2017

	Emptying jobs	Revenue	Volume (m3)	People served
LIC %	27.40	5.92	9.35	25.33
HIC/MIC %	65.75	53.99	54.39	35.83
Business %	6.85	40.09	36.26	38.83

5.2 Setting prices for low-income customers

Achieving citywide improved sanitation requires that FSM services be provided to all communities, regardless of income. Mirroring SWEEP's pricing strategy in Dhaka, LICs in Chittagong are charged 0.5 BDT per litre and high-income/middle-income residential and business customers pay a premium price of 1 BDT per litre or more. The latter is towards the higher end of what informal manual emptiers currently charge, though this is compromised by poor service quality and reliability. Based on detailed financial modelling, a 70-30% mix of high-income/businesses and LICs would ensure a sustainable business that was profitable enough to entice private sector participation (projected to equate to 27% net profit, 14% after depreciation) but inclusive enough to offer services to a broad range of customers throughout Chittagong.[4]

[4] SWEEP's financial modelling and subsequent lease fee designed by Georges Mikhael, former WSUP Head of Sanitation

5.3 Promoting SWEEP and FSM in LICs

Based on lessons from Dhaka, the process of identifying LICs in Chittagong was more focused and explicit. WSUP has a full-time staff member dedicated to LIC community liaison, primarily conducting workshops with leaders and organising demonstrations. WSUP holds frequent discussions on safe FSM with the owners of tea stalls (offering them a commission if they successfully refer customers to SWEEP), and attends meetings with women's community savings groups.

Demonstrations have been particularly successful in driving interest in FSM and SWEEP among LIC communities. A WSUP community mobiliser persuades a household to use SWEEP to empty (or partly empty) their septic tank or pit. The emptying would be performed during the day so that the mechanised service could be demonstrated to the client's neighbours, who could request their septic tanks be emptied at the same time. As well as driving sales, the SWEEP team could serve multiple LIC customers in one day – a crucial operational consideration as the price of emptying one small tank is not enough to cover the cost of the job from emptying to disposal (which includes fuel costs, labour costs, etc.) Notably, day-time emptying is considered more acceptable in LICs than in other areas, where SWEEP teams are asked to empty tanks at night.

Around 27% of the emptying jobs performed and around 25% of customers served by SWEEP Chittagong are for LICs (see Table 2 and Figure 2). While this number fluctuates from month to month, this compares favourably to SWEEP Dhaka's first year, where the proportion of jobs performed for LICs averaged at around 18%.

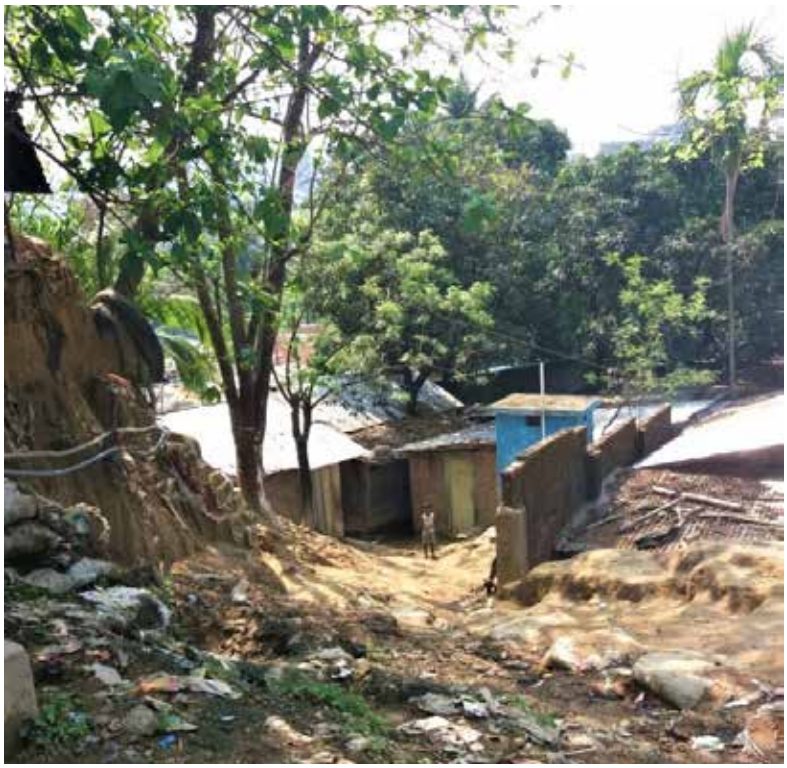
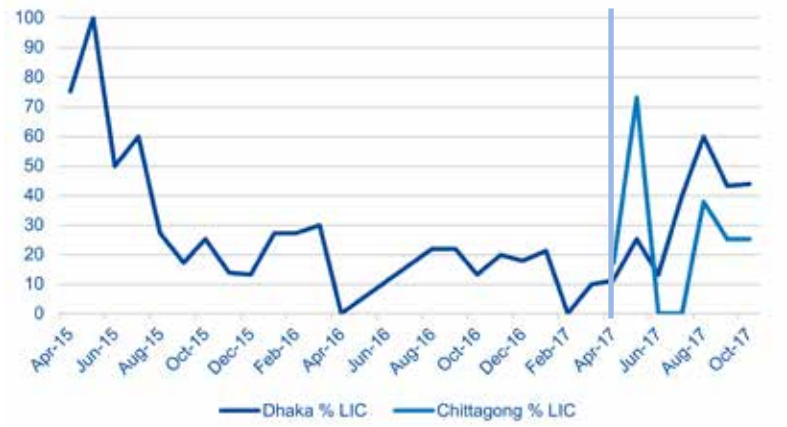


Image: LIC in Chittagong.

Figure 2: SWEEP in Dhaka and Chittagong: LICs as proportion of total customers (%). Line represents the introduction of the 30% minimum LIC contract clause in Dhaka



6. Strengthening the urban FSM sector in Bangladesh

6.1 Chittagong

Professionalised safe FSM is a relatively new concept in Bangladesh and is still in its infancy compared to the poor quality and dangerous practices that are commonly associated with manual sweeping in South Asia. SWEEP in Chittagong is an important antidote to this stereotype; WSUP therefore works hard to advocate for the benefits of partnerships between formalised private service providers and supportive public bodies.

Promoting SWEEP goes beyond marketing and customer acquisition; Chittagong's FSM sector must develop to the stage where multiple private operators are willing and able to enter the market. Activities such as providing training and vaccinations, organising a CCC Department of Conservancy site visit to the DWASA treatment facility, and delivering business development support to CSS are all part of a wider strategy to educate the public, the private sector and government bodies about how improved FSM can be delivered citywide.

These activities have had positive consequences for sanitation SMEs and Chittagong's FSM sector. Having seen the success of the emptying and collection aspect of SWEEP and the subsequent need for treatment infrastructure, the Mayor of Chittagong has approved land in the north-east of the city to be given to WSUP for the construction and management of a new drying bed. Given the demand for land in as densely populated a city as Chittagong, this demonstrates significant long-term buy-in from an important stakeholder. There is clear enthusiasm among CCC leadership for expanding SWEEP, particularly as it could lead to funding for additional vacuum tankers in Chittagong. Ideally, increasing competition amongst new private service providers would drive down prices, ensuring that LICs can continue to access improved FSM services.

International actors are also mindful of the importance of support for sanitation PPPs such as SWEEP. The World Bank, now in the process of funding the Chittagong Water Supply Improvement and Sanitation Project in close cooperation with both CWASA and CCC, has recommended that any future vacuum tanker fleets be outsourced to the private sector, as actors such as SWEEP are already demonstrating the applicability of this kind of model.

6.2 Further expansion

Beyond Chittagong, WSUP has signed MOUs with Rangpur and Barisal City Corporations to replicate SWEEP in their respective cities, and is in talks with Gazipur City Corporation following the local government's enthusiasm for a SWEEP-style service provider. With funding from the Skoll Foundation, WSUP aims to replicate SWEEP on a national scale, reaching several million people across Dhaka, Chittagong, Rangpur and Barisal by 2021.

SWEEP is just one part of a significant move towards improved urban FSM in Bangladesh, alongside organisations such as Practical Action and SNV who have convinced their local government partners to outsource vacuum tanker fleets in Faridpur and Khulna, respectively. The signing into law of the Institutional and Regulatory Frameworks is a positive indication of forward momentum on the national level, although how this translates to service providers such as City Corporations and private companies will be key to long-term sector change. However, demonstrating that such models are not only theoretically possible but can be successfully implemented in many different urban contexts will be of immeasurable value as the sanitation sector (and FSM in particular) continues to develop and take shape.

7. Conclusion

Following the successful piloting of SWEEP in Chittagong, a viable private sector-led model for FSM has been demonstrated in not one but two major cities in Bangladesh. Replicating businesses such as SWEEP does not mean simply transplanting the model from one context to another. In the case of Dhaka, for example, Dhaka WASA remains the primary public stakeholder in the SWEEP PPP whereas the Chittagong SWEEP PPP was designed with and signed by the City Corporation.

This partly reflects that City Corporations are now mandated to lead the development of urban FSM, but also that Dhaka remains something of an aberration as DWASA will continue to play an important role alongside Dhaka North and South City Corporations. This adaptation also reflects the relationships that WSUP teams in both cities have developed with different stakeholders. For example, DWASA's Commercial Manager is the focal official for SWEEP in Dhaka, acting on behalf of the Managing Director; in Chittagong, the Conservancy Officer and Secretary of CCC take the lead, supported by the Mayor and other key individuals with the Corporation such as the CEO and the Town Planner.

Figure 3: The key phases of the replication process of SWEEP in Chittagong

- Developing a close relationship with CCC
- Identifying a strong and driven entrepreneur
- Demonstrating a working version of the model in Dhaka to CCC staff
- Designing a marketing plan and pricing strategy based on detailed consumer analysis
- Providing visibility at launch through a marketing and communications campaign (television commercial, flyers etc.)

Image: An improved sanitation facility in a Chittagong LIC

In comparison to the original SWEEP contract in Dhaka, the entrepreneur in Chittagong has been contractually obliged to ensure that a certain percentage of his customer base is from lower-income communities. Additionally, WSUP's role in Chittagong is different from Dhaka: the vacuum tanker was procured by WSUP rather than by CCC, although CCC is now the owner and lease-holder. The 'Public' arm of the PPP arrangement in Chittagong is the City Corporation rather than the WASA (as is the case in Dhaka); this partly reflects the nature of the relationship that WSUP had with CCC in Chittagong prior to initiating SWEEP, but also is a response to the confirmation of City Corporations' responsibility for FSM in the new national Institutional and Regulatory Frameworks for FSM.

The SWEEP model is designed to be adapted, and the flexibility of the PPP arrangement allowed for the replication of SWEEP in Chittagong (and now Rangpur and Barisal). Considering the scale of the second-generation sanitation challenge in Bangladesh's cities, and the very real negative impacts of poor sanitation, the ability to transfer, adapt and replicate models such as SWEEP will be invaluable.

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