11.00 – 12.30 FSM as a Business – session 1

Moderator: Georges Mikhael, Water and Sanitation for the Urban Poor (WSUP)

- Overview of business partnerships for removal, disposal and processing of faecal waste from urine diversion toilets, in eThekwini, South Africa - Nick Alcock, Khanyisa projects, Aqualima Trust, Durban, South Africa

- Developing business models for FSM in Maputo, Mozambique - Peter Hawkins, Water & Sanitation Program, World Bank, Maputo, Mozambique

- Supporting scale-up of FSM enterprises in Dhaka, Bangladesh - Habibur Rahman, Water and Sanitation for the Urban Poor (WSUP), Dhaka, Bangladesh

- Scaling-up sanitation businesses in low- and middle-income countries - Heiko Gebauer, Eawag, Duebendorf, Switzerland
Overview of Business Partnership Models for Removal, Disposal and Processing of Faecal Waste from Urine Diversion Toilets, in eThekweni, South Africa

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Theme: The Enabling Environment for FSM
Key Words: Urine Diversion Toilets, Incentivized Contracts, Business Partnerships

BACKGROUND
Since 2002, eThekweni Municipality has installed over 80 000 Urine Diversion (UD) double vault toilets at the household level in rural areas. This technology was selected to replace Ventilated Improved Pit Latrines (VIPs) as the Municipality’s basic onsite sanitation option as it was expected that the UD systems would produce a degraded sludge which could be safely removed and buried on site by the resident. This approach eliminated the challenges and costs encountered when servicing VIP systems, which included access to pits and sites, removal of sludge containing solid waste, and transport and disposal of sludge.

However, a number of concerns have since arisen over the removal of faecal sludge from UD toilets. These include health risks to residents who handle the potentially pathogenic sludge and dissatisfaction amongst household owners over the expectation that they will remove the sludge from their systems themselves while other recipients of basic sanitation receive a free service from the Municipality. The Municipality therefore needs to identify other safe and economically feasible faecal sludge removal options which can be provided to the 80 000 (and increasing) homes. Key challenges are summarized as follows:

- Health and environmental risks and regulations during the removal and transport of a regulated hazardous waste.
- The costs associated with transport of waste from remote areas to a decentralized processing plant
- Selecting suitable waste treatment processes
- Finding a cost effective and viable business model for processing the waste
- Meeting the expectations of communities and local politicians
- Finding appropriate incentives for maximizing the efficiency of the private sector involvement
- Sustainability of local business entities in the sanitation sector

Though funding from the Bill & Melinda Gates Foundation (BMGF), the eThekweni Municipality’s Water and Sanitation Unit (EWS), together with a professional consulting team (Khanyisa Projects, Partners and Development and the University of KwaZulu-Natal’s Pollution Research Group) are exploring the use of a number of business partnerships and incentivized contracts for the safe and efficient removal and disposal or processing of the UD contents.

BUSINESS MODELS
The Business Models being established include:

- Incentivized management contracts utilizing a managing contractor as well as a number of local businesses to either
  - remove UD faecal waste and bury on site where space and social issues allow; or
  - remove UD faecal waste and transport to a central processing site

- A public private partnership to test the Black Soldier Fly (BSF) technology for the processing of UD faecal waste to provide larvae for the livestock feed market as well as oil and soil residue.
PROCESS STEPS
The key process steps followed in order to develop these business partnership models include:

- An institutional analysis of the eThekwin Municipality including a detailed review of the contractual arrangements for the VIP waste removal program;
- Environmental and health compliance research;
- Ground truthing to test business model assumptions and community attitudes to different removal options;
- Business modelling including engagement with private sector organizations;
- Development of service level agreements (SLAs) and performance based contracts; and
- Development of a small contractor support program (or business incubator).

CONTEXTUAL ELEMENTS
It is important to understand the municipal environment within which EWS operates as not all municipalities have the capacity to undertake projects utilizing the kinds of models mentioned. eThekwin Municipality has a relatively robust rates collection system as well as access to central government grants which can be used to fund large scale management approaches for the removal of faecal sludge, as well as the formation of partnerships with private organisations. It also has solid institutional systems which ensure set processes are followed for procurement of service providers and adherence to health and environmental legislation. Without these kinds of institutional and financial arrangements in place at the outset, implementation of a project of this nature may be challenging.

RESULTS
The results of the project are two linked models which are explained as follows:

- A detailed model for the safe and compliant rollout of a UD faecal waste removal programme using assumptions such as sludge volumes, and the cost of labour, travel and transport, supervision, overheads and health and safety requirements. The model is based on the use of a full tender process to select a managing contractor who will be responsible for financial control, quality control and adherence to health and safety. A key responsibility is the utilization and mentoring of local enterprises to undertake the field work. It is proposed that in Phase 2 a Business Incubator will be established to support the local enterprises in order to transform them into viable businesses that can manage sanitation contracts in the future.
- A detailed model for the establishment of a BSF waste processing site using assumptions such as the sale price of products, municipal gate fee, personnel costs, utility costs and capital costs. However, there are some risks associated with the model. While the service provider is confident that the process is technically sound and the products can be rendered safe to the end users, they cannot state with confidence that the market will accept the product if faecal sludge forms part of the feed. In the agreement for the model, the parties (The Municipality and the Service Provider) have agreed that the finances of the plant will be ring fenced so that should it become evident that the product sales are successful and profit for the service provider rises, then the gate fee paid by the Municipality will be reduced accordingly. Alternatively, should the profit be lower than expected the gate fee will be raised.

The models are based on results recorded during other pit emptying projects, the existing institutional and regulatory frameworks, socio-political issues and the opportunities for partnerships with the private sector through incentivized contracts. During Phase 2 these two models will be rolled out at scale and further research will be undertaken and documented.

CONCLUDING REMARKS
Although a project of this nature requires access to finance and strong institutional arrangements, the approach could be modified to meet the requirements of cities with reduced resources. For example, small businesses operating directly with customers could supply smaller privately run BSF plants.

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Developing Business Models for Fecal Sludge Management in Maputo


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Theme: FSM as a Business

Key words: Fecal sludge management, small private operators

Fecal sludge Management (FSM) is still a major challenge in Maputo. With less than 10% of households connected to a sewerage system, about 50% of Maputo’s population use pit latrines and 40% use septic tanks. Nearly all of these on-site systems are built and serviced by the informal sector with no official oversight or regulation, resulting in gross pollution citywide.

Survey data show that about a quarter of Maputo’s on-site sanitation facilities need to be emptied on average every third year, equivalent to about 60 emptyings per day. Currently, most of these emptyings are not done hygienically, and fecal sludge is either dumped directly into the urban environment or buried locally (although space for this is running out in many houses). Emptying services are mainly undertaken by small service providers, ranging from manual emptiers practicing local disposal, to small enterprises using tankers which combine emptying with transportation to the sewage treatment plant.

Maputo Municipal Council (MMC) is partnering with the Water and Sanitation Program (WSP) and PPIAF of the World Bank and other development partners in a FSM pilot in the peri-urban district of Nhamankulo, which has about 30,000 on-site sanitation facilities. Selected micro-enterprises which already provide solid waste management services were trained and equipped to provide improved FSM services (hygienic emptying and transport to the municipal wastewater treatment works), with a view to assessing their technical and commercial viability. The pilot comprises five primary operators (emptying and local transport) and 3 secondary operators (providing both emptying services as well as transport to the treatment plant) – see Figure 1.

![Figure 1 – Business Model for FSM in Maputo](image)

This study analyzes the results of the pilot in terms of the technical and commercial viability of the business model. Preliminary results to date show greater viability where the operator covers the entire service chain from emptying to transport to the treatment plant. This is partly due to a change from the use of fixed transfer tanks, which proved difficult to site, to direct transfer from the primary to the secondary mobile equipment, and partly to the primary operators being essentially restricted to latrine rather than septic tank emptying, with smaller volumes and poorer customers.
Lack of regulation and monitoring threatens the FSM business, as small informal manual emptiers are competing with the improved operators. The informal emptiers are providing substandard services with dire consequences to the environment. The study recommends that institutional and regulatory framework be put in place in order to improve the business environment, including linkages between the private and public service provision, allowing for the establishment of improved emptying services and consequently reducing the risk of poor sanitation and its negative impact on public health. Additionally the study recommends that the development of FSM services should be complemented by a strong program of sanitation and hygiene promotion.

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Supporting Scale-Up of FSM Enterprises in Dhaka, Bangladesh

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**Theme:** FSM as a business (primary theme); the enabling environment for FSM

**Keywords:** entrepreneurs; partnerships; Dhaka

This presentation will share the learning from ongoing efforts to scale-up FSM enterprises in Dhaka, Bangladesh. It will outline the progress being made by five entrepreneurs in providing improved FSM services to 200,000 Dhaka residents, with a focus on the partnership recently established between the entrepreneurs and Dhaka Water Supply and Sewerage Authority (DWASA).

**Background**

The need for improved FSM services in Dhaka is well documented: only 20% of households and institutions are connected to DWASA’s sewerage network, with 80% of the city’s population dependent on on-site sanitation systems. Most pit latrines and septic tanks are manually emptied by informal service providers, posing health risks to both the public and the service providers themselves. The imperative for improved FSM services in Dhaka will only increase with time as the population continues to expand (see Figure 1).

The situation in Dhaka is further characterized by the lack of clarity on institutional mandates around sanitation. DWASA controls sewerage and main street drains; Dhaka City Corporation (DCC) has responsibility for lane drains and solid waste; and FSM falls somewhere and nowhere in between. NGOs such as Dushtha Shasthya Kendra (DSK) have been working to fill the gap where formal FSM services should be, but these NGOs typically operate on a non-commercial basis and have failed to achieve scale-up of FSM services in Dhaka (Opel and Bashar, 2013).

![Figure 1: Population and Sludge Projection - Dhaka City](image)

**Supporting new FSM enterprises in Dhaka**

In WSUP’s experience, supporting entrepreneurs to establish viable FSM services is a key step in achieving sanitation at the citywide level. Recognizing the urgent need for these services in Dhaka, WSUP is providing start-up support to five new FSM enterprises with funding from UNICEF and the UK government. The aim is to provide improved FSM services at scale to 200,000 residents of Dhaka by December 2015, with an additional 50,000 beneficiaries in secondary towns. The two key components of the intervention are described below:

**Component One:** The intervention is supporting three small-scale entrepreneurs in providing FSM services to the low-income communities of Dhaka that cannot be accessed by vacutug. Professional service agreements were signed in late 2013, and the entrepreneurs have now received training in performing pit-emptying services manually or using a gulper; in selecting emptying equipment; and in business management including record keeping. WSUP are acquiring permission to build a transfer station, after which the entrepreneurs will begin transporting the sludge to the transfer station using a tri-wheeler. The entrepreneurs have already invested BDT 70,200 each of their own finance (BDT 210,600 in total) towards the purchasing of new equipment and business maintenance costs.
Component Two: The intervention is also supporting two medium-scale entrepreneurs through training in business and financial planning, provided by the local consultancy firm LightCastle Partners; and through the provision of vacutugs under the lease agreement with DWASA. After receiving training and guidance on operating the vacutugs, the entrepreneurs will use the vehicles to provide pit-emptying services in those areas of Dhaka where vehicle access is possible, and to transport sludge from the transfer station to the DWASA disposal point which feeds directly into the sewer line. Importantly, they will also dispose of the sludge deposited in the transfer station by the small-scale entrepreneurs, ensuring that all sludge collected by both groups is safely disposed of.

Strengthening partnerships between DWASA and the private sector

An important feature of this intervention is the central role played by DWASA in taking ownership of the vacutugs provided by UNICEF and leasing them to the medium-scale entrepreneurs. By involving the entrepreneurs DWASA is able to scale its operations more quickly, to reduce the red tape associated with public sector service provision, and to free up resources to promote the overall sanitation chain including treatment. In the context of the FSM sector in Dhaka and the lack of clear institutional mandates, DWASA’s increasing willingness to engage in this area is significant. WSUP and LightCastle Partners facilitated DWASA’s involvement through a financial analysis, aimed at presenting DWASA with scalable business models for the private operation of the vacutugs, and informed by historical data on the cost structure and revenue parameters of the FSM services provided by DSK. The analysis first identified eight activities considered integral to providing safe and equitable FSM services (see Figure 2), before outlining three contractual options (lease, loan or service contract). DWASA have chosen to implement a performance-based lease contract, whereby DWASA will own the Vacutugs and associated equipment and lease them out to the entrepreneurs for a monthly fee and security deposit; reasons for selecting the lease model included lower start-up costs, a higher return on investment and greater flexibility. The final allocation of responsibilities (see Figure 2) demonstrates DWASA’s substantial involvement in the provision of the FSM service. The greatest challenge associated with the project will be creating and sustaining demand; WSUP will be supporting the entrepreneurs and DWASA with marketing activities to this end.

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<th>Regular Operational Activities</th>
<th>Frequent Maintenance Activities</th>
<th>Infrequent Maintenance Activities</th>
<th>Receiving Demand</th>
<th>Mass Marketing</th>
<th>Regulatory Activities</th>
<th>Replacing and Increasing Fleet</th>
<th>Disposal and Treatment</th>
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<td>Entrepreneur</td>
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Figure 2: Allocation of responsibilities for the FSM service between DWASA and the medium-scale entrepreneurs

Conclusions

Although this intervention is still at a formative stage, the activities outlined above are significant in two aspects. Firstly, the support to five entrepreneurs offers the opportunity to provide FSM services at scale to 200,000 inhabitants of Dhaka, a city where improved FSM services are urgently needed. These services are expected to expand rapidly over the next six months, with the key learning from this scale-up phase to be captured in the paper and presentation submitted to the conference. Secondly, the intervention offers a model that might be replicated elsewhere for establishing partnerships between institutions and the private sector, here achieved through a lease contract for the use of DWASA vacutugs by FSM entrepreneurs. In the Dhaka context, the strengthening of partnerships with the private sector can also be seen as a mechanism for promoting DWASA’s increased engagement with FSM as a commercially viable service.

References

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Scaling-up sanitation businesses in low- and middle-income countries

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The majority of urban populations in low- and middle-income countries still relies on onsite sanitation technologies, such as septic tanks and pit latrines. Considering the whole sanitation chain, onsite sanitation technologies are less expensive than sewer-based systems for the municipality, but still rather costly for households. Households have to make significant investments into the installation and maintenance of onsite sanitation technologies. They have to pay for toilets, emptying and transportation services. Municipalities and/or private firms need to cover treatment costs. Market-based approaches for sanitation, or in other words, considering sanitation as a business could offset some of these costs. It means that toilet manufacturing, emptying, transportation, and resource recovery from faecal sludge could provide viable business opportunities for sanitation businesses. Sanitation as a business advocates more traditional business-based investments in which the revenues cover these costs and generate profits. Unlocking such investments allows the sanitation businesses to become more independent of donations, governmental subsidies and philanthropic efforts. Sanitation businesses are active along the whole sanitation chain (e.g., toilet usage, emptying and transportation, treatment, reuse, an disposal).

Despite the increasing efforts to create sustainable and economically viable businesses in the context of faecal sludge management (FSM), most of them are still in the mode of securing their existence and maintaining their survival. Scale is limited, and sanitation businesses focusing on treatment options have not been able to treat a critical mass of faecal sludge, emptying and transportation business are not able to cover all geographical areas.

In our research, we observed that scaling-up entails two open research questions. The first question (How do sanitation businesses approach the sanitation chain?) arises from the sanitation chain. It remains open whether integrated or isolated sanitation businesses are more suitable. Integrated sanitation businesses cover various activities across the sanitation chain. Integration means that one sanitation enterprise is responsible for emptying pit latrines, transporting the faecal sludge, recovering the resources from the faecal sludge, and selling the derived end-products (e.g., biogas, compost, and so on). Isolated sanitation businesses would specialize on one activity in the sanitation chain. They would, for example, specialize on collection and transport services or end-product sales. Integrated businesses would have the advantage to be in control of the whole sanitation chain. They can control the sources (e.g., household, public, or scholar toilets) and origin (e.g., pit latrines or septic tanks) faecal sludge, which, in turn, would make end-products more reliable and the treatment processes easier to manage. Integrated enterprises can rely on multiple revenue streams such as collection and transportation fees as well as end-product revenues.

Ensuring the multiple revenue streams would require simultaneous and high investments into collection and transportation equipment, treatment technologies, and market development for end-
products. Isolated enterprises would only have a single revenue stream, but require less initial investments. Integrated sanitation businesses are system suppliers, whereas isolated ones are described as specialists.

The second research question *(How do sanitation businesses approach the scaling-up process?)* arises from the scaling-up approach. Scaling-up can either be an ‘organic’ growth or a replication. Organic business growth means that the sanitation business makes a stepwise extension of the business. Replication means that the success of the initial sanitation business is imitated by multiple other enterprises. In case of organic growth, a single enterprise drives the scaling-up, whereas replication would mean multiple sanitation businesses contribute to the scaling-up approach.

As illustrated in Figure 1, combining these two research questions leads to four pathways for scaling-up sanitation businesses: (1) Growing specialist for single sanitation activities, (2) multiple sanitation businesses replicating the success of the initial specialist, (3) Growing supplier of sanitation systems, and (4) multiple sanitation businesses replicating the success of the initial system suppliers.

![Figure 1: Pathways for scaling-up sanitation businesses.](image)

Each pathway emerges from our empirical research with sanitation businesses in Africa and Asia. Each pathway has unique business challenges in the scaling-up process of FSM. We describe these challenges and offer guidance for each pathway.