Monday 19 January 2015 – CONFERENCE DAY 1 – Program

Room 2

16.30 – 17.15  **FSM as a Business –session 3**

**Moderator: Dinesh Mehta, CEPT University, India**

*Optimizing supplier incentive schemes to maximize sewage sourcing from manual pit latrine emptiers in informal communities: A case study of a Mombasa slum* - Rachel Sklar, UC Berkeley, School of Public Health, Department of Environmental Health Sciences, Kenya/USA

*Developing financially viable community management of Vacutugs* - Rajeev Munankami, SNV Netherlands Development Organisation, The Hague, the Netherlands

*Strengthening pit emptying services in Kampala, Uganda* - Anna Kristina Kanathigoda, Reform of the Urban Water and Sanitation Sector, GIZ, Kampala, Uganda
Optimizing Supplier Incentive Schemes to Maximize Sewage Sourcing from Manual Pit Latrine Emptiers in Informal Communities: A Case Study of Mombasa Slums

FSM as a Business

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Keywords: Pit-emptying; fecal sludge management; informal-communities

Background: Over 1.77 billion people worldwide rely on pit latrines as their primary form of sanitation.1 When these latrines fill, due to the prohibitive costs of emptying, households are often left without basic sanitation once again. This is particularly a challenge in densely populated slums where narrow alleyways are inaccessible to exhauster trucks. In these places, manual sludge removal remains the cheapest and often only means of removing the pit waste. These services are typically performed by emptiers who shovel out the waste, then bury it onsite or dump it in a nearby stream. These practices pose significant and persistent occupational hazards to these marginalized workers and threaten the public and environmental health of the broader community.2

Aims: The ultimate objective of this study was to assess the effects of various incentive schemes in promoting the safe and cost efficient transfer of sludge from pit latrines to a waste-to-fuel facility.

This study summarizes: (1) economic, social, and geographic factors that drive fecal sludge management practices of landlords, emptiers, and households in informal communities in Mombasa, (2) essential strategies and components of a safe and cost effective incentive program and (3) the revenue and cost implications of implementing different incentive programs.

The results were used by Pivot, a sludge-to-fuel company, to design optimally aligned incentive programs that increase the volume and the cost efficiency of sludge removal and transport from informal communities to their waste-to-fuel facility.

Methods: This study was conducted in the dense informal settlements of Mombasa, Kenya that house approximately 500,000 residents3. Over a 12-week period, alternative incentive schemes for supplying sludge to Pivot’s plant were trialed and monitored to determine the capital investment and operating costs, and the value in revenue of fuel produced. Incentives were designed to meet constraints experienced by landlords, emptiers, and households in the removal, hauling, and transport of pit latrine sludge. Examples of these incentives include providing emptiers with personal protective gear and receptacles for sludge hauling, subsidizing transport and fuel costs, and providing prizes and cash-based incentives for the delivery of sludge to Pivot’s factory.

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Baseline and follow-up surveys were conducted before and after the implementation of incentive trials to elucidate the drivers of successful incentive programs across different key players – landlords, emptiers, households – in different communities. The characteristics tested included: (1) household satisfaction with existing latrine emptying mechanisms; (2) costs of fecal sludge management to landlords, households, and emptiers; (3) household, landlord, and emptier socio-economic and demographic characteristics; and (4) geographic distribution of these drivers.

Structured observations of the work of emptiers were conducted during the trial period to determine the time and monetary constraints of their operations, potential workplace hazards, and the costs of addressing these constraints and hazards.

A mobile web application was used to track logistics during pit emptying events such as the geolocations of the latrine, the distance between the latrine and the truck focal point, travel times, and distances traveled between the emptying site to the wastewater treatment plant. This data was analyzed in parallel with the survey data in order to determine the optimum alignment of incentives required to produce the efficient sludge supply chains that maximize the amount of wastes diverted from the community to the treatment plant and ensure profitable fuel product yields.

**Results:** Our results indicate that an average of 0.36 tons of raw sludge equivalent to $23.59 in fuel revenue can be generated from each latrine per emptying, which typically occurs every two years. The costs associated with processing the sludge at Pivot’s current scale are $16.33/latrine so an expected $7.26/latrine in fuel profit can be generated from each latrine emptying event.

The unit cost of the cheapest incentive schemes was valued at $6.53/latrine yielding a profit of $0.72/latrine. The combination of incentives that led to the highest rates of sludge recovery and product yields were those that incurred the highest operational costs- exhauster truck costs and transportation schemes. At $229.89/latrine, the current cost of exhauster truck services represents a loss of -$222.63/latrine. Based on these findings, if full recovery of pit latrine sludge is to be achieved in all of Mombasa’s estimated 118,000 latrines⁴, subsidies will be necessary.

Ultimately, the costs of the most effective incentive schemes exceed fuel revenues. This confirms the challenge of safely and reliably removing waste from informal communities, and the likely need for ongoing subsidies and development assistance directed to this component of the value chain in order to ensure the safety of waste-workers and residents of low income communities and allow private businesses such as Pivot to be able to target informal communities as part of their operations.

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Developing Financially Viable Community Management of Vacutugs

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Bangladesh on track to meet the Sanitation MDG

Bangladesh provides a striking example of progress to meet MDG 7 to halve, by 2015, the “proportion of urban population with access to improved sanitation”. Open defecation has reduced from 19% in 2000 to 3% in 2012, though 53% of households still do not use improved sanitation[¹]. But the increase in fixed-place defecation has created an urgent need for Faecal Sludge Management (FSM) in Bangladesh’s cities, where most human waste is dumped untreated into waterways or onto marginal land, harming the health of the country’s poorest. The 2012 Economics of Sanitation study estimated that poor sanitation and hygiene costs the economy of Bangladesh US$ 4.2 billion, equivalent to 6.3% of Gross Domestic Product[²]. Of Bangladesh’s 46 million urban inhabitants[¹], more than 80% use on-site sanitation. This requires regular emptying, majority of which is done manually by marginalised communities, while mechanical emptying is limited to certain areas of a few cities. Most of the cities, including the third largest Khulna[³], have no designated dumping sites or treatment facilities for faecal sludge despite acute sanitation challenges owing to high population density, rapid and unplanned growth.

Faecal Sludge Management (FSM) in urban Bangladesh

The national regulatory framework identifies municipalities as responsible for FSM, but lack of resources and poor understanding about risks means that the majority of human waste overflows into drains and water bodies. Bangladesh has 522 urban centres[³] accounting for 29% (44m) of the national population[¹]. Khulna (pop 1.4m[⁴]) has no sewer network or treatment facilities and household sanitation in Khulna is predominantly on-site technologies, (68.4%) tanks and (31.6%) pits[⁵], which require regular emptying. But formal emptying is rare as most are directly connected to surface water drains or water bodies. The rest are mainly emptied manually by “sweepers”⁵ who often do not have capacity to transport emptied sludge to a safe or designated place for disposal.

There have been a few development project initiatives to introduce vacutugs⁶ in different cities but these are not readily replicable in other towns and their size limits their use in narrow streets, particularly in informal settlements.

Barriers to safe FSM in urban Bangladesh

Urban populations are growing very rapidly due to economic migration. Sweepers are declining in number as they are opting for safer, less stigmatized livelihoods. Currently the costs of emptying tanks and pits are prohibitive and make customers unwilling to desludge their toilets regularly and safely. As a result, most city residents connect their tanks directly to drains and local line-agencies have been unable to regulate pollution effectively despite the detrimental effects on the environment⁷ or the public health threat⁸.

The SNV FSM programme

SNV’s “Demonstration of pro-poor market-based solutions for faecal sludge management in urban centres of Southern Bangladesh” programme will operate in Khulna City Corporation, Kushtia and Jhenaidah Municipalities. This programme combines governance, private sector development and demand creation interventions to address the entire FSM value chain from toilet user interface to final sludge disposal.

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⁵ In Bangladesh, the term _sweeper_ refers not only to person’s _occupation_ but a _social/ religious caste_ who are restricted to menial livelihoods such as cleaning streets and sludge from pits and tanks.

⁶ A vacutug is a tank on wheels with a suction/vacuum pump and may be motorised. A vacuum within the tank sucks faecal sludge from the pit or septic tank through a hose. The tank is then transported to a disposal site, and pressure created within the tank pushes the waste out of the tank.
Designing financially viable FSM services

The need for financial viability is a lesson that has been learnt by all city authorities who have not managed to address FSM despite past capital investment in emptying/treatment facilities. Kushtia’s 2012 treatment plant has been unable to create demand for reuse or disposal of bio-solids and therefore remains financially viable. Jhenaidah treatment plant has never operated since being built in 2012. The Urban Partnerships for Poverty Reduction Project (UPPR) of UNDP subsidised the $60,000 purchase and operation of 3 vacutugs to the Cluster Community Development Committees (CDCs)\(^7\) in Khulna for the first three months, with the intention that the FSM service would become financially self-reliant from the fourth month, but has faced various challenges.

The authorities recognise that robust financial models are critical for sustained service delivery. SNV plans to develop business models for localised FS collection and disposal with the CDCs. This local focus will keep the programme manageable for community groups, but requires it to be financially viable, not a subsidised social operation. To prevent existing manual emptiers from losing their livelihoods, the programme will target them for skills training and employment as vacutug operators, reducing their health risks, while also providing more convenient and acceptable emptying services to households.

Initiating CDC managed vacutug services for FSM

A 2012 study of 154 emptying businesses in Asia and Africa concluded that FSM services can be a profitable business when operated by entrepreneurs\(^9\). Therefore SNV plans to build on the UPPR vacutug initiative by developing an alternative management approach which brings KCC, CDC and other relevant private sector stakeholders together to deliver financially viable FSM services. Vacutugs provide safer emptying for operators and it is hoped the more hygienic service will be more appealing to customers.

This paper presents the details of the proposed efficiency improvements with justification and supporting evidence. It outlines proposals for increasing demand for services through behaviour change messages. It also identifies the support that will be provided to local government to enforce existing pollution regulations, generating revenue through fines, so that direct discharge into drains is no longer an option for households.

To support market development for FS products, the benefits of FSM bio-solid use are being researched by the Bangladesh Agricultural Research Institute (BARI) to provide the necessary level of confidence for the government to promote it as culturally acceptable and agriculturally beneficial.

References

3. Prof. Nazrul Islam (2012), Urbanisation and Urban Governance in Bangladesh
5. Opel, Aftab et al (2011), Landscape Analysis and Business Model Assessment in Faecal Sludge Management: Extraction and Transportation Models in Bangladesh

\(^7\) Under UPPR, urban households are mobilised by joining Primary Groups (PGs) for grassroot level community governance. These PGs form Community Development Committees (CDCs) to develop Community Action Plans (CAP), which identify the needs of their communities and design appropriate solutions in order to improve living conditions and reduce poverty. Cluster CDCs are then formed, where several CDCs can share experiences and lessons learned, establishing networks for greater poverty alleviation.
Strengthening Pit Emptying Services in Kampala

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Theme 4: FS desludging and transportation

Keywords: pit-emptying; sanitation business models

On-site sanitation systems such as pit latrines and septic tanks remain the most ubiquitous sanitation solutions in developing countries (Sandec, 2006). Periodic emptying of such systems is required to extend their service life, and the activity forms the bulk of maintenance costs that are largely borne by households. Owing to competing needs for meagre incomes typical of the urban poor, households opt for cheap but inferior services – endangering both public health and the urban environment. Innovative models are thus required to establish affordable pit-emptying services, and secure public health and the urban environment.

Like in most cities of Sub-Saharan Africa, Uganda’s capital Kampala is largely un-sewered, and faecal sludge management is still in its infancy. Small-scale independent providers (SSIPs) dominate the pit-emptying and transport sector, but due to myriad challenges from inadequate capital to inadequate business skills to poor organisation, the SSIPs do not operate at scale. It is estimated that less than 20% of Kampala’s on-site sanitation facilities are emptied hygienically, while 50% are abandoned without emptying. The human waste from the remaining 30% is indiscriminately disposed into the urban environment (Günther et al 2011).

The GIZ Reform of Urban Water and Sanitation Sector (RUWASS) programme has over the years provided targeted support to SSIPs involved in pit-emptying services – with mixed results. That changed recently with the introduction of The Gulper pit-emptying technology into the Ugandan market. GIZ in partnership with the International not-for profit Water for People worked towards identifying and growing sanitation businesses around The Gulper – to provide pit-emptying services that are not only accessible for previously hard-to-reach areas, but are affordable. The Gulper also provides a formidable alternative to traditional mechanical emptying technologies, and has introduced competition – an element previously lacking in the market.

Using GIZ’s leverage with a multitude of stakeholders in Kampala’s WASH sector, the SSIPs using the Gulper enjoyed a broad range of business support services including trainings, marketing services, support in registering an association, etc. In order to enhance profitability and stimulate entry of new providers, dumping fees at the FS treatment were waived for Gulper operators. The mix of support instruments has resulted in 100% increase in pit-emptying businesses using The Gulper – in a space of 12 months. By operating under an umbrella association, better regulation of the SSIPs is also expected – with attendant public benefits. The Kampala experience demonstrates how public funding could be better targeted to nurture demand for pit-emptying services and create sustainable sanitation services.

References
