FSM INNOVATION

Approaches to Faecal Sludge Management in Peri-Urban Areas: A Case Study in the City of Lusaka

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EXECUTIVE SUMMARY

Lusaka is the rapidly growing capital city of Zambia, and as in many Sub-Saharan African cities, the majority of the population lives in informal, unplanned peri-urban areas where the ever-increasing sanitation deficit results in high levels of faecally transmitted diseases. In response to this, government agencies and their partners have been developing improved faecal sludge management systems in these areas, with improved non-motorized emptying and local faecal sludge treatment facilities. These systems are working well, and have started to displace informal and unhygienic manual pit emptying. Strong local involvement and ownership of the program have been key success factors, supported by intensive capacity-building and the active involvement of both the Lusaka water and Sewerage Company and local government structures. The services have been established on a commercial basis, but are to date unable to fully cover costs whilst remaining affordable to the local population. However, continuous efforts are being made to improve their administrative and financial management.

CONTEXT

With 40 percent of its inhabitants living in urban areas, Zambia is one of the most urbanized and fastest growing countries in Sub-Saharan Africa (UN-DESA,

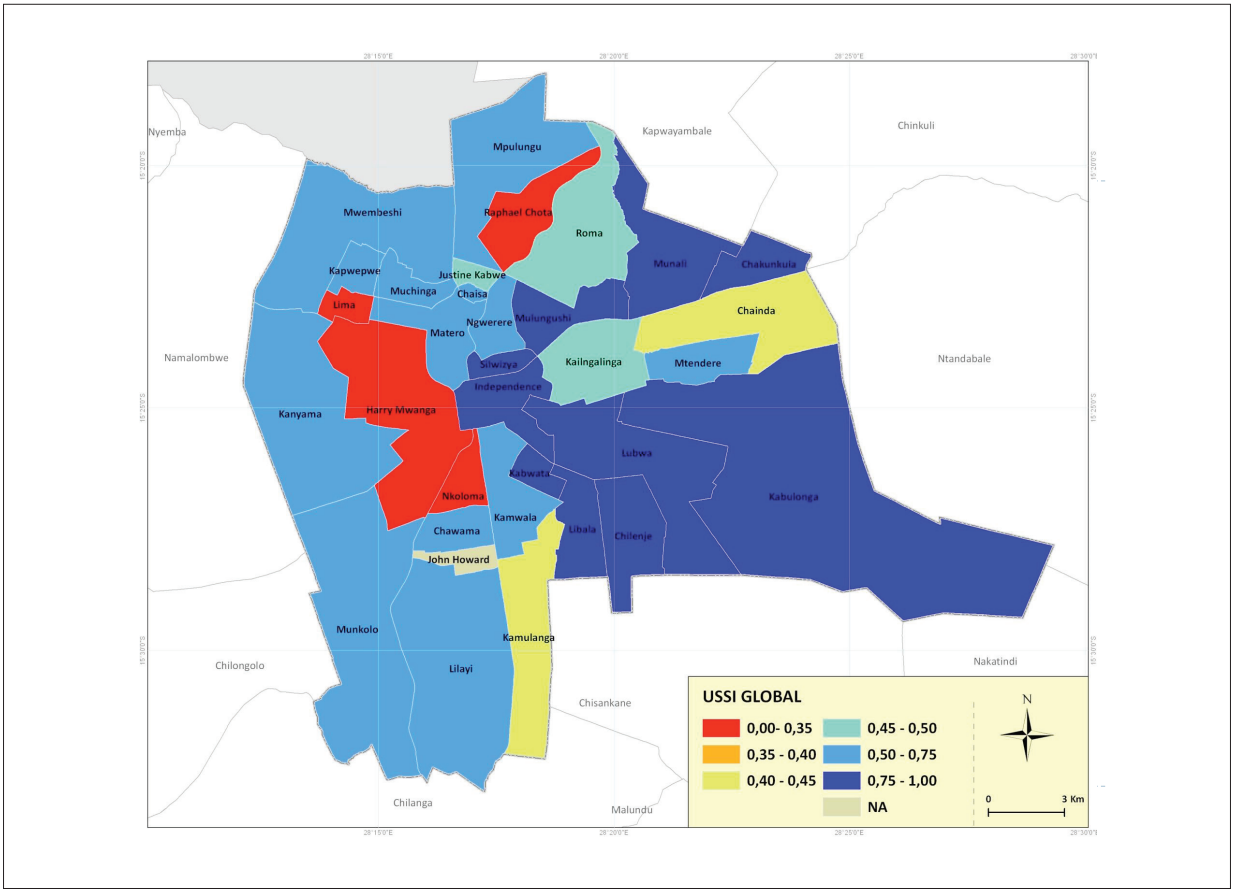

Figure 1: Sanitation status in Lusaka

2015). The national population is projected to increase 60 percent by 2050 (UN-HABITAT, 2015). Sixty percent of the population lives below the poverty line; life expectancy at birth is 61 years; under-5 mortality is estimated at 64 per 1,000 live births; and 48 percent of the population is estimated to be undernourished (World Bank, 2015). Currently, only 63 percent of Zambians have access to clean drinking water, and 43 percent to adequate sanitation. In Lusaka, only 36 percent have piped water on the premises, whilst 56 percent have adequate sanitation (LWSC ESIA, 2017). The lack of adequate sanitation has significant impacts on Zambia's development, causing an estimated 1.3 percent loss to GDP (World Bank Water and Sanitation Program, 2012).

Responding to rapid urban growth, low-income peri-urban areas have developed and absorbed the majority of new residents. These informal areas are characterized by lack of land tenure, high population density, poor housing standards and a lack of basic public infrastructure and services. The capital city, Lusaka, has approximately 35 peri-urban settlements which house 70 percent of the population (UN-HABITAT, 2007). These peri-urban neighbourhoods largely comprise lower income group households (LWSC ESIA, 2017) and are subject to regular outbreaks of cholera, typhoid and dysentery (WHO/UNICEF, 2015). During the 2016 cholera outbreak, 1,179 cases (of which 953 were in the city of Lusaka) were reported nationwide from 5 February to 2 May, with 31 fatalities (UNICEF, 2016).

In Lusaka, about 90 percent of peri-urban households use pit latrines, most of which are classified as "unimproved" by the Joint Monitoring Program. The other 10 percent of peri-urban residents are either connected to the sewerage network, use septic tanks, or defecate in the open (estimated at 1 percent). To further aggravate the situation, 60 percent of Lusaka's water supply is derived from fairly shallow groundwater abstracted within the city, which is prone to contamination through fissures in the underlying rock. The Lusaka Water and Sewerage Company (LWSC) provides sewerage services to approximately 14 percent of residents through 33,000 connections, and water through 91,342 connections serving 1.4 million people. There is little or no integration between sanitation and solid waste management services, mostly due to poor coordination between the relevant stakeholders (LWSC-ESIA, 2017). Solid waste management services are provided by the Lusaka City Council (LCC) while sanitation (excreta management – whether by sewerage or non-sewered systems) is provided by the Lusaka Water and Sewerage Company (LWSC).

The Lusaka Sanitation Program

Major investments in scaling up sanitation are currently in progress through the Lusaka Sanitation Program (LSP), supported by the World Bank, African Development Bank, European Investment Bank and KfW (LWSC, Hydroplan, 2015). The LSP seeks to improve sanitation services throughout the city with an integrated approach involving the rehabilitation, upgrading and expansion of sewerage, the improvement of sanitation conditions in peri-urban areas and informal settlements, and actively raising citizens' awareness around sanitation, public health and the environment and what can be done to improve the situation. The LSP will strengthen the institutional, operational and management capacity of LWSC and introduce measures to promote its long-term technical and financial viability. A faecal sludge management strategy will also be developed to establish a sound basis for this previously neglected issue (LWSC ESIA, 2017).

The LSP will implement 10,000 on-site sanitation facilities and a number of decentralized sewerage systems, benefiting 180,000 people in 37,000 households. Faecal sludge management (FSM) infrastructure and service providers will be developed, with the capacity to serve 25,000 on-site facilities used by about 450,000 people in selected peri-urban areas (LWSC ESIA, 2017). This will be supported by a major campaign of sanitation promotion, hygiene education and support for onsite household sanitation (African Development Bank, 2015).

INSTITUTIONAL AND LEGISLATIVE FRAMEWORK FOR SANITATION

In 1994 the Government of the Republic of Zambia (GRZ) launched a comprehensive water sector reform program, aiming to ensure good quality, sustainable water supply and sanitation at affordable prices. In 1997, parliament passed the Water Supply and Sanitation (WSS) Act in which a national regulatory agency, the National Water Supply and Sanitation Council (NWASCO), was established (International Monetary Fund, 1999). NWASCO's overall mandate is to license service providers, regulate water and sewerage services and advise the government on water supply and sanitation matters (MLGH, 2010). The 1997 Act also empowered local authorities (LAs) to form provincial level Water and Sewerage Commercial Utilities (CUs), which operate along commercial principles for the provision of water and sanitation services under the Companies Act of 1994 (Constitution of Zambia, 2016). Local authorities in the country can operate CUs as joint ventures with private companies as long as they are the major shareholders

of the ventures (NWASCO, 2004). Under the direction of the Ministry of Local Government and Housing (MLGH), the LAs also focus on the enforcement of Ministry of Health's hygiene regulations and, in the larger towns, development of by-laws on sanitation service provision through the Public Health Departments. LAs, through Environmental Health Officers and Health Inspectors, are also mandated to enforce sanitation-related laws under the 1994 Public Health Act (amended 2006) regarding the collection, transportation and treatment of wastewater. Further, LAs are mandated to provide other services related to the quality of the urban environment, and therefore have a broader remit for sanitation, including solid waste management and stormwater drainage (Constitution of Zambia, 2016).

In its efforts to improve water and sanitation services, the GRZ has developed various National Plans and Polices, as well as strategic documents for the urban and rural water and sanitation subsectors. For the urban subsector, an integrated National Urban Water Supply and Sanitation Programme covering the period 2011 to 2030 was promulgated by MLGH in February 2011. MLGH has also developed two sanitation strategies: The National Urban Sanitation Strategy (NUSS) promulgated in 2015 and the Open Defecation Free Zambia by 2020 Strategy. In particular, the NUSS aims to enable low-income households to access adequate sanitation through *"approved lower cost sanitation technologies with designs and standards approved by the Zambia Bureau of Standards; establishment and development of supply chains to manufacture and facilitate distribution of affordable components for construction; support to households for construction of latrines through non-governmental organizations (NGOs) and trained masons; access to finance via micro-finance institutions; voucher systems for marginalized households; increased enforcement of the Public Health Act underlining responsibility of landlords to provide sanitation systems to their tenants"* (NUSS, 2015).

The development of the NUSS revealed weak coordination amongst government institutions promoting, financing and managing urban sanitation, with each authority tending to focus on their own sectoral programs (NUSS, 2015). This was hindering the development of an integrated approach towards the planning, design and delivery of sanitation services, and in October 2016, GRZ re-aligned various departments from many ministries and formed the Ministry of Water Development, Sanitation and Environmental Protection (MWDSEP). This ministry is responsible for national sanitation policy and strategy development, and is mandated to coordinate the implementation of GRZ strategies related to water supply, sanitation and environmental protection (GRZ, Parliament, 2016).

Other institutions mandated for specific roles and responsibilities in the water and sanitation sector include the Zambia Environmental Management Agency (ZEMA) – responsible for regulating discharges into the environment, promoting water pollution monitoring and prevention programs according to enforceable water quality guidelines and standards; the Zambian Bureau of Standards – which defines the required technical standards for sanitation systems; and the Water Resource Management Agency – which manages fresh water resources in the country.

NWASCO has licensed LWSC to provide water and sewerage services in the city of Lusaka and surrounding areas. To extend the provision of water services to peri-urban areas, LWSC has partly delegated the provision of water to community based organizations (CBOs) called "Water Trusts" (founded by LCC with support from WaterAid in 2001) in 11 peri-urban settlements of the city. The Water Trusts are owned by local residents, under community oversight through the Ward Development Committees, with the LCC area Councillor as the Water Trust board chairman. In the peri-urban neighbourhoods of Kanyama and Chazanga, Water Trusts have been providing FSM services since 2012 and 2014 respectively, besides managing community market ablution blocks.

HOUSEHOLDS ARE RESPONSIBLE FOR THE PROVISION OF ON-SITE SANITATION FACILITIES WHERE NO SEWER NETWORK EXISTS

FSM SERVICES AND STAKEHOLDERS

According to the 1997 WSS Act, households are responsible for the provision of on-site sanitation facilities where no sewer network exists (constitution of Zambia, 2016). Although regulation of on-site sanitation construction standards is officially mandated to the LAs under the Public Health Act, in practice LAs usually lack adequate capacity and resources to enforce regulations (UN-habitat, 2015). Thus, on-site sanitation facilities vary according to the household's ability and willingness to invest in sanitation facilities.

As responsibility for FSM at household and community level in Lusaka is undefined, emptying of on-site

Figure 2: Tankers discharging faecal sludge

sanitation facilities has historically been undertaken by informal, unregulated individuals and operators. The type of emptying service available is dependent on the economic status of the area, type of sanitation facilities and the degree of road access.

In unplanned low-income areas where unlined pit latrines are the norm, pits have generally been emptied manually by informal pit emptiers (46 percent), household members (13 percent), CBOs (5 percent), vacuum trucks (30 percent) and, recently, by the new Water Trust services (6 percent). Thirty-nine percent of the emptied sludge is reported to be buried in household backyards, two percent dumped in the trash, seven percent dumped in nearby ditches, one percent sold to farmers, whilst the fate of 20 percent is unknown. Only 30 percent of the emptied sludge is transported to the treatment plant (LWSC, 2016). In the past, the predominant practice was to abandon pits when full, but with rapid urban population growth and increasing numbers of households within family plots, land for new toilet pits is increasingly scarce (UNESCO-IHE,2007). Only 41 percent of residents using pit latrines report having the potential to replace them with new ones (LWSC, 2016). Therefore, a change of habits is inevitable for many peri-urban residents. Mechanized pit emptying is often impossible due to poor road access, and the common practice of solid waste disposal in the pits (due partly to inadequate waste management services) makes them impossible for vacuum trucks to empty. Informal pit emptiers are the main service providers, often operating at night without the use of safety equipment. Prior to the FSM interventions in Kanyama (2012) and Chazanga (2014), no treatment options for faecal sludge were available in peri-urban Lusaka. Risks associated with unlined pits and burial of untreated sludge are exacerbated by the climatic and geological characteristics of Lusaka, which has intense rainy periods, a high water table and is located on a rocky sheath of dolomite. During the rainy season, severe flooding can resurface the buried faecal sludge, hence posing a threat to water resources and to human and environmental health.

Requests for informal pit emptying services are usually made through social contacts or direct inquiry to a person seen digging a pit near a latrine during the day. According to residents of Kanyama, the cost of pit emptying is about USD 80, inclusive of removing the sludge from the latrine and disposing of the extracted material, either by digging a pit nearby and burying it, or removing it from the site. In middle to high-income areas where vacuum truck access to the pit latrine or septic tank is possible, semi-formal services for mechanized emptying and disposal of faecal sludge are available.

Vacuum trucks in Lusaka are mostly owned by businessmen and operated by drivers, who may be mechanics, plumbers or simply self-trained by trial

and error. The vacuum truck drivers themselves hire helpers to provide manual labour for handling the desludging hoses, and fishing out solid waste from the pits, for which an extra fee is charged. If the faecal sludge is too thick for the truck to pump, the helpers usually desludge the pit manually, and either bury the sludge in a pit dug nearby or transport it to the authorized municipal sludge dumping site contained in sacks. The vacuum trucks discharge faecal sludge at LWSC's Manchinchi sewage treatment plant. The vacuum truck drivers interviewed reported a monthly salary of USD 150, plus USD 3.00 lunch money which they take from their daily receipts, whilst the helpers get USD 5.00 per emptying.

Currently, around 12 commercial liquid waste transport companies are licensed for public service in Lusaka, in addition to vacuum trucks registered to industrial companies for their in-house services and those belonging to housing estate firms and institutions such as the army and the Zambia National Service. To transport any type of sludge, vacuum trucks must be licensed by ZEMA, with fees set according to the estimated annual tonnage of waste likely to be transported (see table 1).

CLASS	ANNUAL TONNAGE	LICENSING FEE [USD]
I	> 200	1,000
II	100-199	630
III	1-99	330
IV	0.1-1	100

Table 1: ZEMA toxic waste transportation licensing fees, valid for three years

The cost of emptying depends on the distance of the household to the dumping point and negotiation by the customer. The vacuum trucks line up for hire at two locations in the city – next to the Manchinchi sewage treatment plant, and in the central business district next to the well-known Findeco building. Within Lusaka, the price of septic tank emptying by tanker is around USD 12.00 to 13.00 per m^3 (around USD 100 for a typical vacuum tanker load), and the dumping fee at the LWSC treatment plants is USD 3.60 per m^3. Illegal sludge dumping is reportedly non-existent, as trucks have to travel further than to the legal tipping point, and risk losing their licenses if detected. However, truck drivers mentioned a few cases of households buying sludge perceived to be of good quality from the trucks for fertilizing their grass lawns.

FSM INTERVENTION IN KANYAMA AND CHAZANGA

In September 2012 LWSC, with funding from Water and Sanitation for the Urban Poor (WSUP), engaged the Water and Sanitation Association of Zambia (WASAZA) in partnership with the Bremen Overseas Research and Development Association (BORDA) to develop and implement FSM services in Kanyama. This included the recruitment and capacity building of identified informal pit emptiers in safe emptying and transportation practices, and the design, construction, operation and maintenance of a faecal sludge treatment plant (FSTP). WSUP developed a comprehensive business model to ensure the financial sustainability of the project. The first FSTP, under the management of the Kanyama Water Trust, commenced operations in February 2013. It consisted of a 58 m^3 digester, desludging chamber and expansion chamber, with sludge drying beds situated three kilometres away due to land availability issues. The initial pilot project was designed to provide FSM services to about 30,000 residents of Kanyama (Zone 11), and also included raising community and local government awareness on FSM services through community meetings and site visits to decentralized waste water treatment plants.

Similar to water supply in the project areas, which LWSC has delegated to the Kanyama and Chazanga Water Trusts, the same Water Trusts were put in overall charge of the effort to professionalize and grow the improved manual emptying business. After three months' initial operation, the FSM system was evaluated by BORDA and WASAZA over a period of six months, during which time lessons were learned about dealing with solid waste in pit latrines, biogas production from pit latrine sludge, total solids content in the effluent, pit emptying methodologies and sludge transportation (Kanyama FSM M&E, 2013). The results of the evaluation delivered valuable data for the development of operation and maintenance schedules and expansion of the services.

Figure 3: Kanyama faecal sludge treatment plant

Building on the lessons learnt from the first FSM facility and pit emptying services, two more treatment facilities were commissioned one year later, extending services in Kanyama with a new sludge holding tank[1] to meet more of the demand from Kanyama's total population of 250,000, and another FSM facility in Chazanga, 11 kilometres away from the pilot facility, to provide FSM services in the northern peri-urban settlements. The Chazanga FSM infrastructure consists of a 50 m^3 biogas unit, a 10 m^3 two-chamber secondary settler, recirculation chambers, solid waste drying racks and sludge drying beds. Sludge at the Kanyama FSTP is partially stabilized in the biogas digester or holding tank before it is taken to the drying beds by vacuum truck, whilst in Chazanga the sludge is stabilized in a digester and dried on-site. An estimated 2m^3 of faecal sludge can be discharged into the facilities per day both in Kanyama and Chazanga, with the addition of water to fluidize the sludge both at the household and at the FSTP, bringing the total feed volume to approximately 3m^3. The sludge has been found to have an average solid waste content of 22 percent (BORDA, WASAZA M&E, 2013).

To generate revenue through resource recovery, dried sludge was to be sold to farmers as soil amendment. However, this product has yet to establish itself in the market, and was seen in piles at the Chazanga FSM facility, although some of the sludge from Kanyama was reported to have been sold to a training institute to fertilize their lawns. It had also been intended to pipe the biogas produced at the FSTPs for sale to nearby households at a value equivalent to that of charcoal, but this failed as these households are predominantly occupied by tenants who could not get consent from their landlords for gas connections. The gas is therefore used by the Water Trusts themselves, for the workers' canteen in Kanyama and by the caretaker living at the Chazanga FSM site. A weekly average of 4.2m^3/day of biogas was produced at the Kanyama biogas unit during the monitoring period (BORDA, WASAZA M&E, 2013). No monitoring of gas generation has yet been done at Chazanga.

The FSTPs become blocked up about twice every year due to the high sand and solid waste content of the faecal sludge from pit latrines. This requires FSM services to be suspended for an average of three weeks for the solids to be removed using buckets, and for extra funds from the Water Trust to cover the pit emptiers' salaries while they undertake the work. In addition, the solid waste screened out from the sludge has to be removed periodically to the municipal landfill by a registered waste transporter at USD 40 per 10-ton load.

FINANCIAL ASPECTS AND BUSINESS MODELS

Under the Kanyama and Chazanga Water Trusts, the FSM service operates independently from the water supply section, with each emphasized and weighted in the operation by assigning specific personnel to each department. The capital costs of the facilities were covered by WSUP as well as the procurement

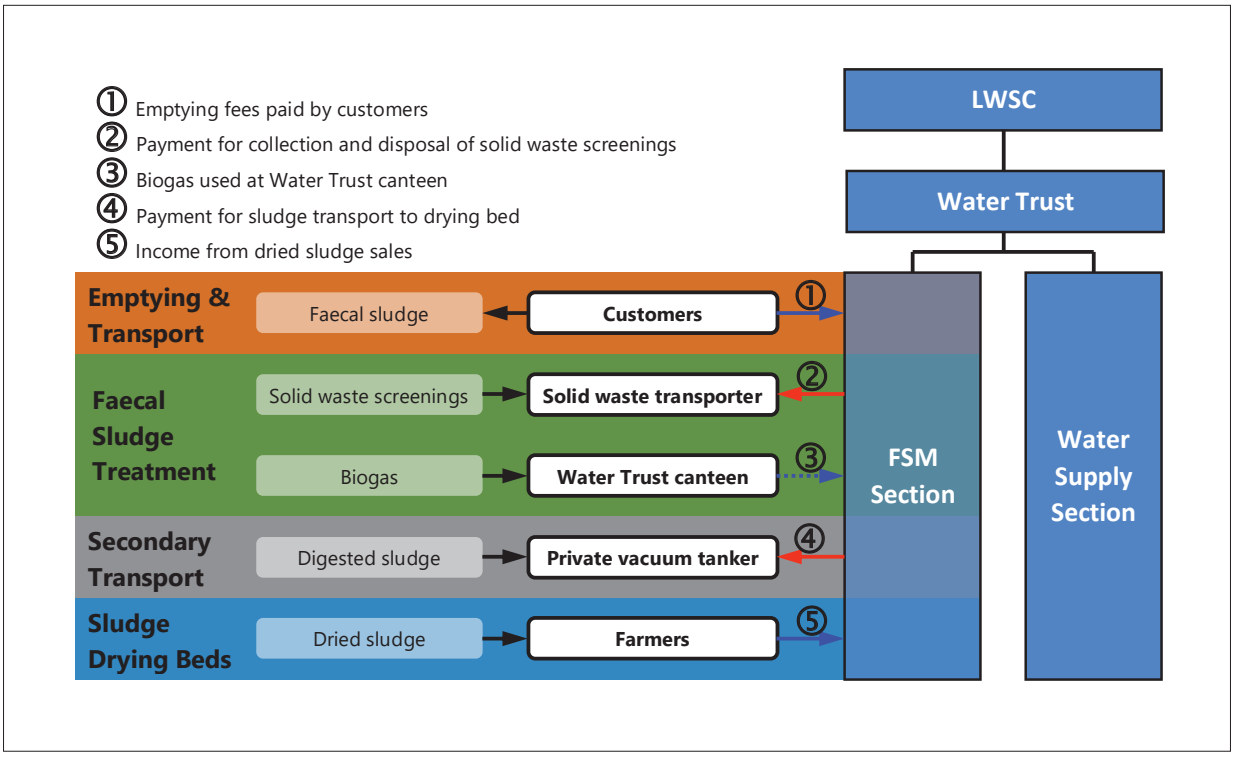

Figure 4: FSM management by the Kanyama Water Trust

of a light truck for transporting the 60-liter drums of faecal sludge. WSUP also paid for modifications and renovation works on the Kanyama and Chazanga FSTPs in 2013 and 2017.In order to gain market share, intensive marketing is required, together with enforcement to phase out informal pit emptying. Pricing of FSM services is based on estimated operation and maintenance costs, but constrained by the willingness of households to pay for the services, and the need to compete with informal service providers. Pit emptying revenue is administered separately from other Water Trust revenues and ring-fenced for FSM operations and maintenance. Initially, customers paid USD 24.00 for 12 sixty-litre barrels, USD 38.00 for 24 barrels and USD 48.00 for 32 barrels, but due to rising transport costs this has been raised to USD 34.00, USD 48.00 and USD 68.00 respectively. The emptiers are paid 60 percent of the total FSM revenue, and 40 percent is retained to sustain maintenance costs such as solid waste collection, transportation of sludge to the drying beds, disinfectants, safety equipment, etc.

The current pricing model based on packages of 12, 24 and 32 barrels has not been sufficient to cover all operation and maintenance costs, and a change to pricing on per barrel basis has been recommended. This is being promoted by the Water Trust managements in an effort to expand the market, and is expected to allow even the poorest households to call on the service depending on their available resources. With the current pricing model, the Chazanga Water Trust needs to empty at least 60 pit latrines per month to cover a monthly minimum wage of USD 100 for each of its six emptiers, plus basic tool maintenance and chemicals. However, the truck drivers are paid a fixed salary of USD 180 per month in Chazanga and USD 300 in Kanyama. The Chazanga driver's salary comes from pit emptying revenues, whilst the Kanyama driver is paid by the Water Trust.

THE EMPTIERS ARE PAID 60 PERCENT OF THE TOTAL FSM REVENUE, AND 40 PERCENT IS RETAINED TO SUSTAIN MAINTENANCE COSTS

The analysis of monitoring and evaluation data in 2013 showed that the services lost revenue through time used for walking to the household (hence the acquisition of trucks to substitute the pushcarts used initially), breaking the concrete latrine slab for access to the pit, and reinstating the slab on completion of the service, with average cement costs of USD 1.2 per latrine (BORDA, WASAZA M&E, 2013). This triggered a recommendation to modify all pit latrine slabs to facilitate access to the pit and to save the time and resources used for reinstatement. It was also recommended to charge extra, as the vacuum tankers do, for removing solid waste, as the large volumes of solid waste found in pits complicate emptying and also incur costs for its transportation to the dump site. Though this may increase service costs in the short run, it should also help to sensitize the community on solid waste management and thus result in overall savings.

SANITATION HAS BEEN WIDELY NEGLECTED BY THE INDUSTRY AND THERE IS AN URGENT NEED TO ADDRESS IT MORE INTENSIVELY AND PROFESSIONALLY

Overall, the FSM businesses were found not to be financially sustainable. Management costs are reportedly very high and cross-subsidies are often required from other revenues, such as water sales, to supplement revenue from FSM services.

CAPACITY DEVELOPMENT

The study found that utility companies mostly assign unskilled personnel to work in the sewerage department, with skilled personnel assigned to work in the department in most cases doing so against their will, due either to demotion or for disciplinary reasons. This shows that sanitation has been widely neglected by the industry and there is an urgent need to address it more intensively and professionally.

In Kanyama and Chazanga, the respective Ward Development Committees and Water Trusts mandated a "free-water" taskforce to create public health awareness, identify informal pit emptiers for formalization, and work to phase out informal pit emptying. The informal emptiers identified and selected were exposed to a training and capacity building program to formalize their activities. In Kanyama, a woman with no previous pit emptying experience joined the 11 informal pit emptiers. Initially, she was tasked to wash the sludge barrels after emptying, but she later joined the pit emptying teams and the barrel washing was shared around the group.

Figure 5: Pit emptying team

WSUP financed BORDA and WASAZA to develop an FSM operations and maintenance manual, which has been used as the basis for training the pit emptiers. GIZ (in coordination with LWSC) is also funding the development of a training plan, curriculum and training modules for more systematic technical/vocational training on FSM. In parallel, the capacity of students in higher learning institutions is being developed through projects related to FSM. Additionally, workers within the CUs are being exposed to faecal sludge management through hands-on workshops on pit emptying services and FSTPs.

Experience in Lusaka shows that the FSM business is an economic opportunity for community members. Eleven former informal pit emptiers have been trained and employed on FSM in Kanyama, and ten in Chazanga. The new service has empowered informal pit emptiers in the community; their new employment has delivered regular employment, a stable income, better working hours, and safer working conditions. Recruitment of new pit emptiers in Chazanga was initially quite challenging, due to the need to overcome social stigmas within the community, but the financial rewards available quickly overcame these challenges. However, some employee turnover has been recorded due to workers expecting more money than they actually earned. The pit emptiers reported that their new jobs were quickly accepted by their social peers. The good reputation of LWSC has also helped in building acceptance of the services by the community.

THE REGULATED NATURE OF THE WATER TRUSTS HAS MADE IT EASY FOR CUSTOMERS TO TRUST THE SERVICE WHICH THEY OFFER

DRIVERS OF CHANGE AND LESSONS LEARNED

Due to the provision of FSM services in peri-urban areas during daylight hours, customers have slowly been shifting from using informal operators to the Water Trust's pit emptiers, largely due to the higher perceived quality of the services. However, the proportion of latrines emptied by the formal Water Trust emptiers is still only 11 percent, compared to 59 percent by household members and informal service providers. The conventional vacuum truck business takes care of the remaining 30 percent of sludge from the septic tanks and latrines in the city. The regulated nature of the Water Trusts has made it easy for customers to trust the service which they offer, as evidenced by the capture of 11 percent of the market by formal emptiers despite the temporary suspension of services during the 2016 cholera outbreak (LWSC, 2016). Marketing by the pit emptiers through the distribution of flyers as they do their job has also helped to advertise the service. Additionally, competitive prices and pricing models have proven

crucial in attracting customers and promoting acceptance of the improved service.

As decentralized FSM services are new in the water sector, it is important for them to demonstrate high standards of public and environmental safety. The Lusaka experience shows that FSM service delivery should be implemented in coordination with household and community awareness campaigns on public health, regulations and the new services, and enforcement activities to curb informal pit emptying. A clear legal framework, together with strong regulation and enforcement, is highly recommended to promote the sustainability of the services. A highly regulated water supply and sanitation framework also ensures that water and sanitation services are strongly monitored to ensure the quality of service provision and client satisfaction. The engagement of a CBO such as the Water Trust, with a local leadership presence such as the Ward Committee Chairman on its board, reinforced by the licensing of its operations by LWSC, has proven to work well in gradually building cooperation with the regulators and acceptance by the community.

In the short term, improved FSM services have shown that they are *"unlikely to be sustainable, hence they require subsidy for a breakthrough"*, (LWSC, 2017). This is concluded based on the need for extra funding to make the services viable by providing a light truck, an accountant and a marketing officer paid through other revenue sources. A need has also been identified to change the institutional structure from a utility department to a self-sustainable entity. The current acceptance of FSM services by the market has been driven mainly by health and hygiene sensitization campaigns, the reputation of the entities involved, safe and reliable service provision, and the restriction of informal pit emptying by the free-water taskforce, which monitors and reports illegal community practices threatening public health to the municipality.

NEXT STEPS

Development of FSM services

To further promote acceptance of the improved FSM services, a sustained high level of performance is crucial, and depends on the efficient and reliable operation and maintenance of the FSM equipment and FSTPs. This includes maintenance of the facilities and trucks, periodic training for all parties involved, and monitoring of operations against the code of practice. These activities must be explicitly catered for in operational and financial planning. To reach scale, these services need to be offered at a price commensurate with the willingness of the target customers to pay for them. However, this will probably require a subsidy.

A city-wide model for FSM management largely depends on the prevailing institutional and legal framework, social acceptance, market conditions

Figure 6: Sludge drying beds

and political will. Three options are being considered for systematic analysis:

- The current Water Trust model – utility managed;
- Lease model – privately managed under the utility;
- Public private partnership – with task- and profit-sharing agreements.

Discussions with key FSM stakeholders favour the public-private partnership model. As a public institution, the Water Trust may have the capacity to invest in awareness creation and has already established a reputation for service delivery, whilst the private sector would be capable of efficient service delivery. The private sector partner can also benefit from investment and close observation by the utility. LWSC has already shown interest in establishing franchise agreements with existing FSM service providers in the expansion of quality services at affordable prices (LWSC, 2017).

A public-private partnership could also be of commercial benefit to LWSC, with the private company emptying pits autonomously and paying dumping fees to LWSC. On the negative side, the private service provider might not be willing to spend money on public health sensitization campaigns as they do not translate directly into profit, and might also cut corners on health and safety. However, they will want to undertake marketing to capture business, and in providing the resulting services should have a positive impact on public health. They will also wish to develop and preserve their reputation with the public, to maintain market share, and with the Water Trusts and LWSC, to generate their willingness to invest in equipment and training of their employees in operations and safety.

Onsite facilities

The existing pit latrines in Lusaka were not designed with emptying in mind, but now that the need is arising due to densification, and with the planned establishment of reliable city-wide FSM services, it is the right time to start working towards upgrading onsite sanitation facilities on a massive scale, which will be initiated under the LSP. Such upgrading should aim not only to make them easier (and therefore cheaper) to empty, but also to improve their performance in isolating faecal material from human contact. A related issue also requiring attention is the exclusion of solid waste from latrine pits, through a combination of user education, improved solid waste management services and technical improvements to latrines.

CONCLUDING REMARKS

The critical factors in defining a faecal sludge management system are numerous and closely interrelated. Each category – the legal framework, social acceptance, management and sustainability, operation and maintenance, safety and reliability – has its own parameters which should be closely analysed for overlaps and dependence. Detailed scoping before planning and implementing a new FSM system, or before adjusting an existing one, is highly recommended.

The motivation and experience of future FSM operators is equally important. Efforts to meet legal standards, provide safe and reliable service and achieve social acceptance will only be successful if there is interest in the provision of high quality services and not just a focus on immediate profitability. This can only be achieved in the context of an appropriate and viable business model.

NOTES

[1] It was found that the partially digested sludge from pit latrines was not very suitable for anaerobic digestion, so a simple holding tank was built instead of another digester

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ABBREVIATIONS AND ACRONYMS

BORDA	Bremen Overseas Research and Development Association
CBO	Community based organizations
CU	Commercial Utility
FSM	Faecal Sludge Management
FSTP	Faecal sludge treatment plant
GDP	Gross domestic product
GIZ	Deutsche Gesellschaft für internationale Zusammenarbeit
GRZ	Government of the Republic of Zambia
KfW	Kreditanstalt für Wiederaufbau
LA	Local authority
LCC	Lusaka City Council
LSP	Lusaka Sanitation Program
LWSC	Lusaka Water and Sewerage Company
MLGH	Ministry of Local Government and Housing
NUSS	Nation Urban and Sanitation Strategy
NWASCO	The National Water Supply and Sanitation Council
WASAZA	Water and Sanitation Association of Zambia
WSS	water supply and sanitation

WSUP	Water and Sanitation for the Urban Poor
ZEMA	Zambia Environmental Management Agency

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