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**WATER, SANITATION AND HYGIENE SERVICES BEYOND 2015:
IMPROVING ACCESS AND SUSTAINABILITY**

**Pit emptying business model:
lessons from Dar es Salaam, Tanzania**

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WaterAid Tanzania in 2007 tested and piloted the use of low cost sludge pump (Gulper) to empty pit latrines, and motorbike as a vehicle to transport sludge to the Waste Stabilization Ponds (WSP) or to a decentralised wastewater treatment (DEWAT) facility. In 2010, WaterAid supported four CBOs to scale up the pit emptying business model. They were given capacity building support including business development and access to credit. Two of the CBOs (UMAWA AND NUMAGRO) were given revolving loans by WaterAid and two (SHIMAWA and TFKM) were guaranteed to access loans from commercial banks. UWAMA also received support from BOARDA to build a DEWAT facility in its complex. UWAMA and NUMAGRO are still in business whilst SHIMAWA and TFKM have stopped operations. This paper uses the Canvas business model to capture the project's journey, key learning and challenges of the urban sanitation business model.

Introduction

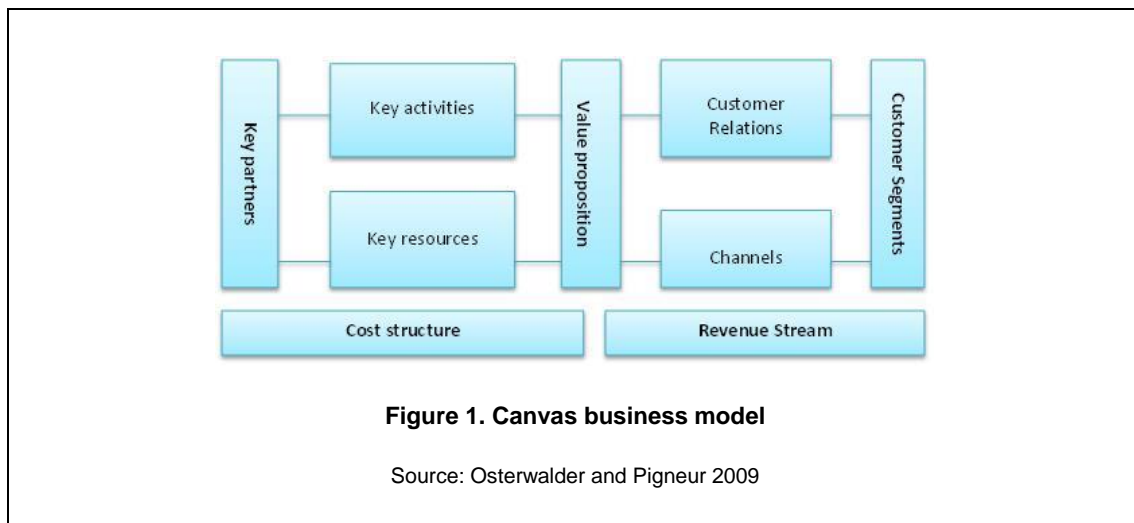
Sanitation and pit emptying in Dar es Salaam, Tanzania

Dar es Salaam is the largest city of Tanzania with about 3.5 million people. The city is divided into 3 municipal councils, Temeke, Ilala and Kinondoni. The majority of the population (about 80%) are settled in unplanned areas, which makes service provision difficult. There were a total of 55 informal settlements in the late 1990s (WaterAid, 2009), with the majority of residents relying on on-plot sanitation. These are mainly pit latrines lined with cement blocks provided by the house owner or by landlords in the case of rented houses (Ndezi, 2012). The responsibility for sanitation lies with Dar es Salaam Water and Sanitation Company (DAWASCO) but in reality only covers the sewerage systems, which has less than 10% of the residents connected. The municipal councils are responsible for on-plot sanitation systems, which covers about 80% of the population. Although the conventional method of emptying septic tanks is the use of large vacuum trucks, this is often not affordable and not feasible for the residents of the unplanned settlements. The majority of pit latrine users empty full pits manually either by employing labourers or by draining the pits during the rains. Unregulated and unhygienic manual pit emptying practices have contributed to the frequent outbreak of cholera and diarrhoea diseases in Dar es Salaam. Attempts have been made in the past to develop appropriate technologies for improved pit emptying in unplanned settlements. The UNHABITAT Vacutug MKII, which is a mini vacuum truck was piloted in several countries including Tanzania but has not been successful. There were issues with the vacutug's ability to empty pits and also with the business model. The Manual Pit Emptying Technology (MAPET) was also developed and piloted in Dar es Salaam but also failed. In 2007, WaterAid in conjunction with the London School of Hygiene and Tropical Medicine developed and piloted the use of Gulper pump for pit emptying and a motorcycle for transporting waste. WaterAid supported 4 CBOs in 2010 to scale up the pit emptying business model that uses the gulper pump and the motorcycle. This paper describes the pit emptying business model, outlines lessons learnt using the Canvas business model as the framework. These 4 CBOs will be referred to in this paper as Improved Pit Emptying Service Providers (IPESPs).

Documentation design

The documentation of the urban sanitation business model used the Canvas business model to review the experiences, and learn lessons from the 4 CBOs supported by WaterAid to establish improved pit emptying services. The 4 CBOs are UWAMA in Kigamboni - Tungi ward, NUMAGRO in Tandika – Azimio ward, TFKM in Keko machungwa- Mibulani ward and SHIMAWA in Mbagala-Charembe ward.

The Canvas Business Model “is a strategic management and entrepreneurial tool that allows you to describe, design, challenge, invent, and pivot your business model” (Osterwalder and Pigneur 2009). It can be used to plan for the successful operation of a business, identifying sources of revenue, the intended customer base, products and details of financing, and it consists of 9 Building Blocks (fig 1). Qualitative methodologies including focus group discussion, observation, in-depth and semi-structured interviews were used for the data collection.



Urban sanitation business model (WaterAid Gulper project)

WaterAid supported the capacity building of 4 CBOS that were providing solid waste collection services to also establish pit emptying business in 4 wards of Temeke municipality of Dar es Salaam. UMAMA and NUMAGRO have since registered their pit emptying services as small individually-owned business enterprises. TFKM and SHIMAWA continued to operate as CBOs. The 4 CBOs were given various training on establishing a business, operation and maintenance of the gulper pump and the moto cycle for transportation. WaterAid contracted 2 *business development support agencies (BDSA)* to work with the CBOs to further build their business development and management capacity. UMAWA and NUMAGRO (group 1) were assigned to HATCH whilst TFKM and SHIMAWA (group 2) were assigned to EDAT. The startup capital for the 4 groups was also provided by WaterAid. UWAMA received additional support from BOARDA (technical and financial) for the construction of a decentralised wastewater treatment (DEWAT) facility.

Customer segments

The main customer segments for the IPESPs are residential houses with pit latrines lined cement blocks, and to a lesser extent, pour flush toilets. The sanitation market is considerably large and IPESPs are not able to reach the majority of the potential residential customer segments, who are mainly using labourers (locally known as frogmen) to manually empty their latrines. Only one IPESP (UWAMA) is providing services to commercial (bars and restaurants) and institutions (Military base) customer segments.

Customer relation

Good customer relations is a key factor for a successful business model. Customers need to trust and believe in the service that they are receiving. The pit emptying services need to be reliable and ready to respond to customers when needed. All the 3 IPESPs have not really built any form of customer relation with the exception of UWAMA who maintains a database of all its customers. They also make follow-up visits to

customers, responds to their calls and demands within a short period and they see the UWAMA team as reliable, trustworthy and polite. UWAMA has also established contracts and good relationships with commercial and institutional customers.

Distribution channel

Distribution channel describe how IPESPs reach their customers. The majority of pits in the low-income residence are still emptied by frogmen even in areas where IPESPs are present. Three of the IPESPs wait to be contacted by potential customers except UWAMA who goes out to solicit for customers. Since the launch of the campaign funded by WaterAid to promote the use of gulper pump, none of the IPESPs except UWAMA has done any form of marketing. SHIMAWA sees its activities as a project that they are implementing for the municipal council instead of a business. Customers indicated that they would like to hear more about the IPESPs through various channels including direct personal contact, street government meetings, public announcements, campaigns and posters.

Value proposition

This refers to how customers view the value of the services that the IPESPs are offering. Figure 2 gives an overview of what any value proposition should aim to achieve. Findings from group discussions with past and potential customers indicate that they will be willing to pay for services that: *empties pit completely, takes sludge (pit contents) away from property, does minimal destruction to the latrine slab and the pit lining, no requests for extra materials (salt, paraffin, alcohol, etc.), less inconvenience (no need to vacate property), leaves latrine/property clean and disinfected, and provides quick and affordable service.* IPESPs are currently able to respond to the majority of the demands except for their inability of the gulper pump to empty pits completely.

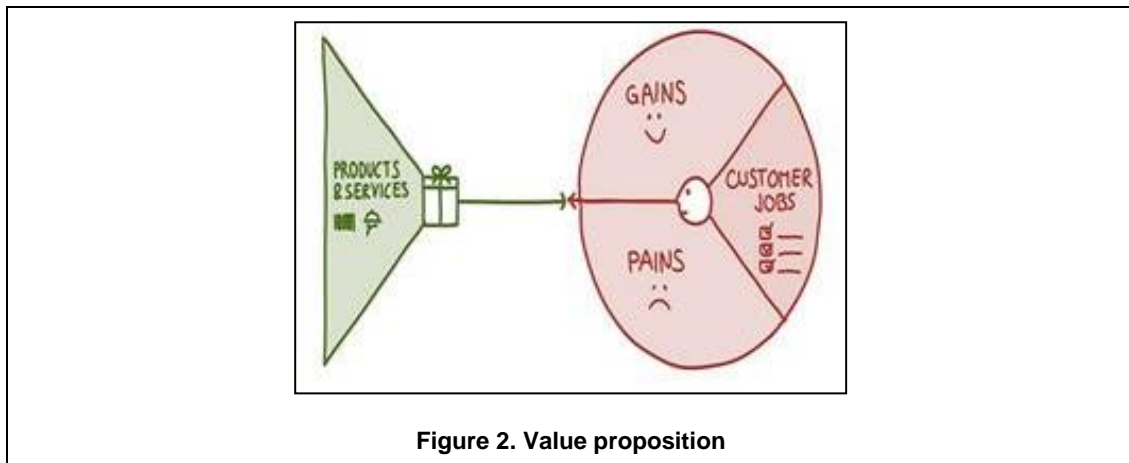


Figure 2. Value proposition

Key activities

This refers to the activities that are linked to the value proposition. In order to deliver the value proposition that will meet customers’ needs, the IPESPs’ activities should include *demand generation, collection (pit emptying), transportation, and treatment/disposal.* There is evidence to suggest that the business model for the 4 IPESPs focused more on collection and transportation and less on other activities. Using the gulper pump as the only means of pit emptying also makes the service less effective, as it is unable to empty pits completely. The distance of waste stabilization ponds from 3 IPESPs (NUMAGRO, TFKM and SHIMAWA) reduced their effectiveness and efficiency. UWAMA have invested a lot more time and resources on all the key activities and also received support for the construction of a DEWAT facility. This may be one of the contributing factors to its success.

Key resources

This refers to the key resources that are required to be able to deliver effective and efficient pit emptying services. UWAMA and NUMAGRO received a revolving loan of TSh5.5 million (£1500) at 2% interest and a repayment period of 2 years from WaterAid. The loan was a start-up capital, which they received in the form of pit emptying equipment (1 gulper pump, 1 motorcycle with trailer, 2 480litre tanks, and 3x25 litre

containers). UWAMA has also taken further loans from microfinance agencies to purchase a dewatering pump, 1 gulper, 1 motorcycle, and two 2,000 litre tanks, in addition to the DEWAT facility from BOARDER. The other 3 IPESPs dispose of waste from pit at the waste water stabilisation ponds. TFKM and SHIMAWA received a WaterAid guaranteed loan of TSh 10 million (£3000) from Kenya Commercial Bank (KCB) at 12% interests and repayment period of 2 years. The loan was also in the form of pit emptying equipment. All the IPESPs except UWAMA had 1 pit emptying team consisting of a gulper operator and the motorcycle rider. UWAMA has 2 pit emptying teams and also 2 marketing persons. At the time of the review, TFKM and SHIMAWA had ceased operation. SHIMAWA had all their equipment taken by Temeke municipal council due to poor operations and non-payment of loans.

Key partners

These include all partners that provided or continue to provide support to the IPESPs. The partners have been categorised according to the type of support provided.

- **Initiators & guarantors:** WaterAid were the main initiators and provided the seed capital for the establishment and capacity building including equipment for the 4 IPESPs. WaterAid also contracted 2 **Business Development Support Agencies** (BDSA), HACH and EDAT to provide further capacity building for the IPESPs. There is evidence to suggest that the BDSAs did not achieve the objective for which they were contracted.
- **Financers:** WaterAid provided a revolving loan to UWAMA and NUMAGRO. KCB (Kenya Commercial Bank) provided a bank loan to TFKM and SHIMAWA guaranteed by WaterAid.
- **Suppliers:** Hanes Africa manufactured and supplied gulper pumps to the 4 IPESPs. AGRICON supplied motor cycles/trailers and tanks for waste transportation.
- **Infrastructure support:** UWAMA received support from BOARDER to construct a DEWAT facility with a contribution of land and labour for the digging.

Cost structure

This refers to fixed and variable costs for the IPESPs pit emptying activities.

Item	UWAMA	NUMAGRO	TFKM	SHIMAWA
Capital - Revolving loan	5million (paid)	5million (paid)	3million	3million
Bank loan	<ul style="list-style-type: none"> • 5million (paid) • 10million (70% paid) 		10m (40% paid)	10m (0% paid)
Total capital	20million	5million	13million	13million
Loan repayment (monthly)	500,000	0	480,000	480,000
O & M (fuel / maintenance)	unclear	unclear	unclear	unclear
Disposal	0	75,000	18,000	4,000
Street government levy				4,000
Human resources	1.3 million	300,000	306,000	80,000
Total (per month)	1,800,000	375,000	804,000	564,000

Revenue stream

The income that the IPESPs generate from pit emptying services is dependent on the number of trips multiplied by the unit cost per trip of TSh40,000. The demand for pit emptying is seasonal with demand

increasing in the rainy season. UWAMA earns an estimated monthly income of TSh7.2 million in the dry season and about Tsh12 million in the rainy season. NUMAGRO earns about Tsh1.2 million and TSh6 million in the dry and rainy season respectively. TFKM earned TSh600,000 to TSh2.4 million whilst SHIMAWA earned between TSh240,000 to TSh540,000. Judging from the estimated income and expenditure, UWAMA and NUMAGRO operates at a profit while TFKM and SHIMAWA operated at a loss. Neither TFKM nor SHIMAWA has made any profit from the pit emptying business for the months that they were in operation.

Lessons learnt

- **Existing IPESPs**

The 4 IPESPs have had varying experiences and levels of successes due to internal and external factors. Though it seems logical to have the same group providing solid and liquid waste services, pit emptying is more complex than solid waste collection. CBOs are community based organisations that often do not have the capacity required to run a business and are more accustomed to implementing small projects. Converting a CBO into a business enterprise can be quite challenging, particularly when the business model is related to a complex service such as pit emptying. This was evidence from the performance of the 4 IPESPs, where only 1 (UWAMA) can be said to be successful.

UWAMA: Their success can be attributed to various factors including previous experience of managing a drilling business. Although UWAMA is registered as a CBO, the reality is that it is a small enterprise with a distinctive leader/owner and decision maker. It does not need further financial support from WaterAid but will require support to make improvements to the gulper, and to explore other pit emptying and transportation equipment that will enable them to increase their customer base and to provide a more efficient and effective service. UWAMA will be willing to purchase an improved pit emptying technology and transportation vehicle with its own fund but will not be able to finance the research and development.

NUMAGRO was the first CBO that piloted the use of gulper pump, which it implemented as a CBO project fully funded by WaterAid. The owner is project-oriented and is now more interested in facilitating and mentoring new groups than maximising the potential of his current pit emptying business. Efficient pit emptying services are required in Tandika, where NUMAGRO operates considering its past history with cholera epidemics. It is necessary to explore other potential enterprise that will be willing to establish a more efficient pit emptying business.

The other 2 groups (TFKM and SHIMAWA) are women only CBOs with no previous experience of managing a profit making venture or supervising the operation and maintenance of any equipment. Leadership amongst the groups is not very clear, which in turn affects decision making. The set-up of the 2 groups does not and will not support a business model such as the pit emptying, which they were funded to manage especially without a clear management and decision making structure.

- **Selection of Improved Pit Emptying Service Providers (IPESPs)**

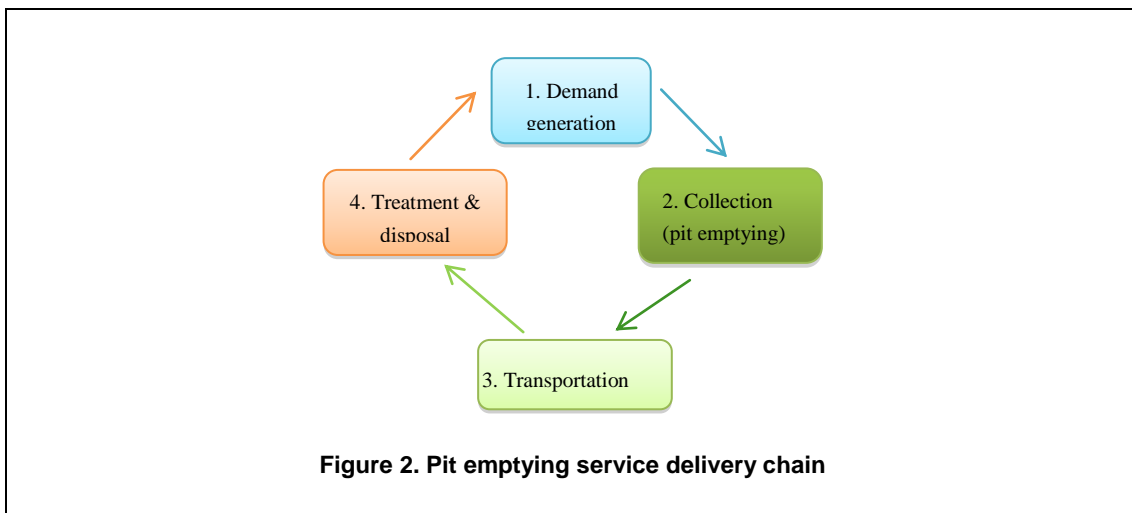
Lessons learnt from the 4 case studies indicate that the nature of most CBOs make them unsuitable for a pit emptying enterprise that will operate as a business. Leadership and decision making structure are important factors for a pit emptying business enterprise. Some criteria to consider when selecting future IPESPs include the following:

- Target a private enterprise rather than a CBO
- Clear decision making and leadership responsibility,
- Dynamic and innovative leadership with entrepreneurial qualities,
- Previous experience of running and/or managing mechanised equipment & vehicles,
- Previous experience of managing loans or bank accounts
- Engagement in solid waste collection (a plus),
- Access/ownership of land for a storage, transfer or treatment facility.
- In order to create some form of competition and to test their level of interest and willingness, consider advertising for service providers. Shortlist about 3 and then conduct a more in-depth analysis of their previous experiences and involvement in businesses including sanitation.

- **Developing and implementing sanitation business plan**

Developing a clear business model is fundamental to establishing any business. The business models used by the 4 IPESPs are not very clear. Considering the evidence and lessons learnt; future pit emptying

businesses should commence with developing a clear business model. The Canvas business model is a comprehensive and applicable model for a sanitation business. All future IPESPs should be facilitated and given adequate support to develop a comprehensive business model for pit emptying using the Canvas business model. It provides a systematic approach for designing, managing and monitoring the performance of any pit emptying business. Pit emptying business can potentially become a successful business venture if all the nine building blocks of the Canvas business model are thought of and prepared adequately. These include defining and targeting the right *customer segments*; developing good *customer relations*; identifying and establishing an effective *distribution channel* for reaching the customer segments including marketing and promotion strategies; ensuring that the *value proposition* is attractive to the various customer segments and that it responds to their needs and preferences; implementing *key activities* that are necessary for achieving the value proposition. An important lesson learnt from the review is the identification of ***pit emptying service delivery chain*** (fig 2). The chain defines all activities that are necessary in order to provide efficient and effective pit emptying service delivery and to make the business successful. Other important building blocks include *key resources*; *key partners*; *cost structures* and *revenue stream*, which must be estimated prior to establishing any pit emptying business.



Conclusion

The growing urban population has led to more pressure being placed on the poor sanitation in the unplanned settlements of many developing countries. The provision of water supply and sanitation services to these difficult areas has even become more complex. A great majority of the residents of these settlements rely on on-plot sanitation; mainly pit latrines for their sanitation needs. The increasing lack of space has meant that new pits cannot be built and therefore warrants the establishment of effective and efficient systems for pit emptying. Findings from the 4 case studies indicate that pit emptying business not easy. CBOs that are involved in solid waste management are not necessarily suited for pit emptying business as is evidence from the case studies where 2 out of the 4 IPESPs ceased operations. The application of the Canvas business model to the 4 case studies helped to explain why some CBOs succeeded and some failed. A sanitation business must address all the stages of the pit emptying service delivery chain, and not just the pit emptying itself, if the business is to be successful.

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