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**TRANSFORMATION TOWARDS SUSTAINABLE
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Piloting of a mobile faecal sludge transfer tank in 5 divisions of Kampala City

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BRIEFING PAPER

A mobile faecal sludge transfer station was designed to reduce sludge transportation costs of small scale manual latrine pit emptying entrepreneurs. Two pilot transfer stations have been developed within Kampala City, Uganda and these are being implemented within five slums. Small scale gulper pit emptying operators deliver faecal sludge in small quantities from the filled-up latrines to these transfer stations. Operational costs for these emptying operators have reduced significantly and consequently the charge of pit emptying to households has reduced by roughly 40% and in turn more pits within the slums are being emptied.

Background

Water for People in 2013 partnered with GIZ to increase access to sanitation coverage through promotion of sustainable sanitation technologies and scaling up the pit emptying business in 3 parishes; i.e., Bwaise I, Bwaise II and Nateete. Among the achievements of this engagement was the recruitment of 6 entrepreneurs of which 5 are still active to-date, and development of business plans for the entrepreneurs. The entrepreneurs emptied over 400 pit latrines within two years. One of the challenges to the gulper entrepreneurs and clients during the 2013 project was the high costs of gulping. The business model implemented was deemed to be more expensive for some communities particularly due to transportation costs that are factored into the cost per trip made to the dumping site, and thus borne by the client. The project recommended the need to have a system that will ensure affordable collection costs incurred by the client.

A pilot test of a small fixed transfer tank system as an intervention in the Fecal Sludge Management (FSM) chain (figure 1) which would allow transport cost savings for manual pit latrine emptying businesses was initiated. However, the project failed due to land issues that are common in Kampala. Some land owners were not authentic; in other areas, the development plans would not allow permanent transfer tanks, while hiring private land or buying is not only expensive but unsustainable. It is with this background that an idea of mobile sludge transfer tanks was conceived.

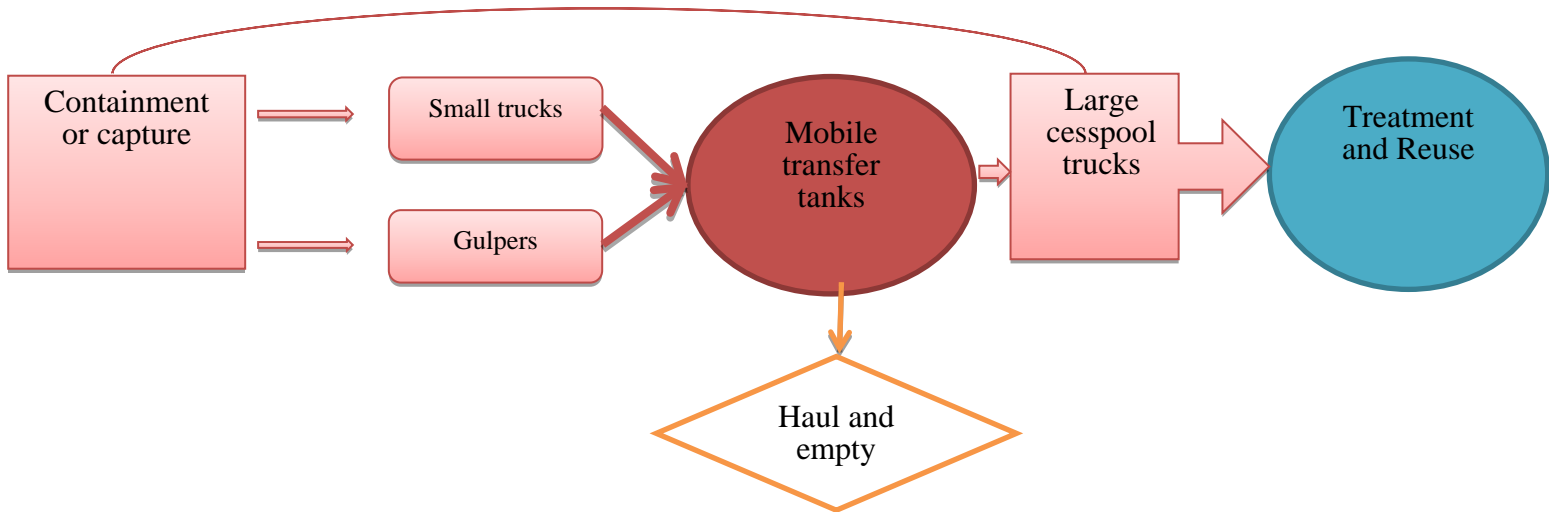


Figure 1. Transfer tank in FSM

Objective

The main objective is to promote bulk transportation and dumping of faecal sludge and thereby reduce gulping operational costs

Methodology

The project involved a desk study and design of a transfer tank, modifying 2 grounded vacuum tankers into transfer tanks and piloting the transfer tanks in the 5 pilot parishes within Kampala Capital City.

Design process

Two 5m³ grounded cesspool trucks belonging to KCCA were to be remodeled into mobile sludge tanks. Suitability of these grounded trucks for this purpose, extent of damage and workable components were all assessed and identified.

Based on this assessment a detailed engineering design drawing of the transfer tank was drafted using AutoCAD 3D software. Design was wholly aimed for the semi-mechanical gulper operators and thus all systems for loading and offloading fecal sludge to and from the transfer tank was made manual. For ease of dumping at the treatment sites, a 6inch valve was considered for the outlet, horizontal and vertical hydraulic systems were also installed to tip and open back compartments during gravitational force driven dumping.

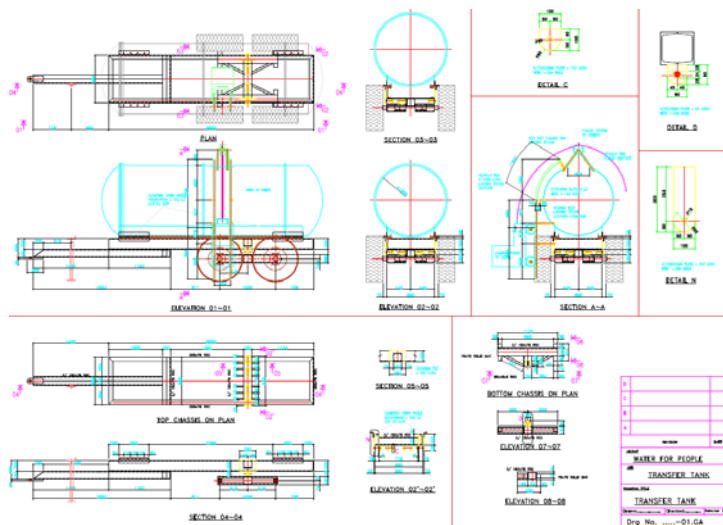


Figure 2. Transfer tank design drawing

Fabrication process

Chassis: The two chassis were fabricated with a walking beam axle and tire size 12.5/80. The chassis type fabricated was of design strength 10tonnes and a towing bar included for easy towing by a tractor

Tank mounting and fixing: The tanks from the grounded trucks were placed and attached to the chassis, all leakages and valves were fixed.

Manual loading trough: A manual loading trough was fabricated and fixed on a fixed pulley along each tank. A 1000kg winch was fixed on the opposite side of the trough to reduce effort and increase manual loading efficiency. This loading trough was fabricated and fixed as per the design to ensure zero spillage in the self-loading process.



Photograph 1. modification of vacuum tanker to a transfer tank

Hydraulic systems: Vertical and horizontal hydraulic systems were installed to enable vertical and horizontal tipping for easy sludge removal and tank cleaning.

Final fill welding and red oxide coating: Full welds were applied to all joints and connections to ensure a proper finish and durable connection. A red oxide undercoat was finally sprayed on the tanks.

Pilot testing

The two mobile sludge transfer tanks are hauled by a tractor on a rotational basis to target areas for the pilot (Kanyanya, Mutungo, Kamwokya 2, Busega and Kibuye 1

The tanks are suitably stationed around KCCA rubbish skip areas or private appropriate grounds.

Gulper operators empty their filled sludge barrels into these tanks (photograph 2) which on fill-up are hauled by the same tractor to Bugolobi treatment plant for dumping. Sludge loading mechanism is purely manual, sludge from barrels is poured in an L-shaped loading trough which is then lifted using a manual 1tonne capacity winch and pulley system to the inlet at the top of the tank.



Photograph 2. Gulper operator delivering sludge to the tank

With this model, prior sensitization is carried out and households in each parish are notified when the transfer tank and gulper operators will be in their area. For more effective community awareness, an advertising firm Nomad agency carried out a sensitization campaign dubbed 'wetaase'. The transfer tanks were branded, and marketing campaigns are carried out to inform households of the availability and schedules of the transfer stations

Results

The operational costs of the gulper pit emptiers in terms of transport and dumping charges has been significantly reduced and in turn cost of latrine pit emptying per 200l barrel has been brought down from more than UGX30,000 to UGX 20,000. Currently the two-available mobile sludge transfer tanks make round trips through Kibuye 1 and Kanyanya parishes. On average 3 trips are made a month, households within these informal settlements have thus gained from this service within the first six piloting months.

Challenge

Low speed and high operator efforts while manually loading fecal sludge into the tank
Low profit margins of the transfer tank entrepreneur

Way forward

Modify design to allow easier and faster loading
Increase the number of tanks to ably serve the entire city

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Reference

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