

A study of the pit emptiers' market: insights from quantitative surveys and qualitative findings

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Introduction

Water For People (W4P) has worked to develop and grow pit emptying businesses in Blantyre, Malawi and Kampala, Uganda since 2010. These businesses operate in urban areas which are not served by sewer connections, are often unreachable by large vacuum trucks due to the density of housing, and are populated with households with a low ability to pay for sanitation services. The objective of W4P's work in this area is to develop an ecosystem of regulated and financially viable pit emptying businesses to provide reliable, affordable, and hygienic pit emptying and waste management services to non-sewered areas of these cities.

As a result of an iterative and adaptive approach to developing these sanitation market systems, both cities are now served by a network of pit emptying businesses which serve non-sewered households and are financially independent. The individual enterprises do differ, however, in terms of business size, customer base, and number of customers served; while many enterprises have remained relatively small in size, others have grown large enough to purchase additional equipment and increase the number of their staff.

A multi-faceted, adaptive approach was required to 'experiment' and test different ideas for getting these businesses off the ground. However, there only exists anecdotal evidence as to what was most effective, what worked or not, and "what else" is still needed. This research aims at better understanding, among others: market dynamics on the demand side, effectiveness of investments/ TA/ ecosystem support provided to the pit emptier sector, economics of pit emptying businesses and related growth/ profitability drivers, and lessons learned to replicate this approach further/ elsewhere.

The research process included the following steps:

1. End user survey conducted via phone by W4P in April/May 2021, aimed at understanding the profile, needs, preferences, etc. of the clients of pit emptying businesses. The team collected answers from 47 end users in Malawi and 91 in Uganda. The data was analysed by LeFil in collaboration with W4P to characterize and segment users (e.g., based on socio-economic background, gender, type of toilet, etc.) and identify drivers of demand and user satisfaction.
2. Pit emptier survey conducted via phone by W4P in September/December 2021, aimed at collecting extensive information about the profile of pit emptiers, their operations, trajectory and financials of their businesses, and the support they received. The sample included 10 pit emptiers in Malawi and 15 in Uganda. The data was analysed by LeFil in collaboration with W4P to identify different operational models, determine drivers of growth and profitability, and assess the effectiveness of the support provided. Additionally, the financial data was used to build a P&L for a "typical" pit emptying business, and identify key cost and revenue drivers.
3. Field visit to Kampala conducted by W4P and LeFil in September 2022 and by W4P in Malawi in October 2022, which included numerous in-depth interviews and visits of sanitation entrepreneurs¹ and their

¹ Sanitech, Pitcare, Shamo, Brilliant, Watcom, Naeriah, SSG, Viare

clients, the Gulper Association of Uganda (GAU), and Kampala Capital City Authority (KCCA). Insights from the visit were complemented with an analysis of dumping record of the GAU.

Note about this document

This document consists of 3 sections:

- The first section summarizes key findings drawn from the field visits conducted by W4P and LeFil in Kampala in September 2022.
- The second section summarizes the findings drawn from the surveys conducted with the end users and pit emptiers in Kampala and Blantyre. This section is organized in 3 sub-sections which dive into sets of hypotheses and questions formulated by the W4P at the onset of the research, including:
 - market demand & supply-demand fit
 - “ideal” profile of entrepreneur to run a successful pit emptying business
 - unit economics and levers to improve profitability
- Regarding the third section, the W4P team will conduct field visits on their own in Blantyre, which will result in a write-up focusing specifically on the learnings for the Malawi team. This section will be written separately by the Malawi W4P team and is not included here.

Section 1: Findings from the Kampala field visit

1.a. Findings related to the performance and operations of sanitation entrepreneurs (at enterprise level)

3 business models seem to be emerging among the surveyed sanitation entrepreneurs:

1. entrepreneurs focusing on larger jobs (10 barrels or more, using typically a pick-up truck and possibly a cesspool truck), whereby the per-job profitability is normally higher given the fixed costs (fuel, some salaries, truck amortization) are spread over a larger volume of barrels (e.g. Pitcare, Shamo, Brilliant, Naeriah)
2. entrepreneurs focusing on smaller jobs (3-6 barrels, using typically tricycles), whereby the per-job profitability is normally lower, but the operations are also leaner (less staff, driver also emptying, etc.) (e.g. Sanitech)
3. entrepreneurs focusing on “organized emptying”, which includes institutional emptying (e.g. schools), as well as “emptying campaigns” outside the city (i.e. a given town’s inhabitants have a limited time window to sign up for emptying), whereby the per-job profitability varies, as this model requires additional investments and more complex operations. The emptying campaigns outside of the capital city are typically undertaken on a seasonal basis, when business is slow in town. (e.g. Brilliant, Viare)

There are a number of entrepreneurs following each model, with varying degrees of success, i.e. there is no “optimal” business model, but rather different ones which get executed more or less well. Model 2 is typically the entry point for those entrepreneurs with little start-up resources. Over time, these may choose to continue focusing on this model, or some will try to “move on” to model 1 (by investing into a pick-up truck), and then possibly to model 3 for the ones established longest.

Model 2 is the one serving base-of-pyramid (BoP) customers within Kampala (i.e. households who have little cash-at-hand to pay for a large(r) number of barrels), however these sanitation enterprises are also

the ones with the highest costs per job, i.e. the enterprises most vulnerable to any pressure on the pricing (as their comparatively poorer customer base tries to get lower prices) or an increase in costs (such as the recent inflationary trend and increasing fuel costs). It is unclear whether model 3 serves BoP customers outside of Kampala, as entrepreneurs may use the “limited time offer” argument to charge relatively high prices, and as informal, cheaper alternatives might still be widespread for the poorer segments living in these semi-rural settlements. When interviewing the entrepreneurs following the model 2, it appears that they struggle to keep the business afloat, but what allows them to grow and develop their company is the money they make on institutional contracts (e.g. with schools), which guarantees a) a certain, regular level of income along the year, and b) a certain price, which typically includes a reasonable margin – not because the price is necessarily higher than for households, but rather because these jobs can be handled very efficiently.

Model 3, i.e., adopting a zoning approach, whereby the entrepreneur covers a given group of communities (mostly outside of Kampala) for a certain period of time (and use radio and/or local authorities/village representatives to line up users), seems to be a promising strategy, but is typically undertaken by entrepreneurs with “broader shoulders”, i.e., those who are sophisticated and connected enough to organize such actions.

All surveyed entrepreneurs have adopted look-alike strategies to drive demand, with varying degrees of success. These include allowing their operators to become “freelance promoters” to fill in the truck/tricycle “on the spot”, hiring a marketing person (whose job is to line up more barrels before or during jobs), giving commissions to local “agents” who live in the communities and line up clients for them. Most entrepreneurs report that above-the-line marketing and branding is not really effective. As for the call centre, the ones awarded contracts for it reported it was useful for business development (i.e., hoping to get business through word-of-mouth from customers coming from the call centre and then referring their company to neighbours, etc.), but that they served most of these customers at cost or at a loss. Rather, word-of-mouth is systematically the preferred way to get new business, as it is low-cost (unless they promise a commission to the former client), and it means that the new customers know exactly the kind of service s/he is getting. Finally, some of them keep lists of past customers. However, this does not seem very helpful in terms of business development, as past customers tend to decide themselves if and when they will invest into re-emptying their pits, rather than being prompted to do so.

Most entrepreneurs report difficulties in “playing clean” in the formal institutional bidding space, as this requires a lot of paperwork and investment into licenses, etc., while it yields little actual contracts. However, this could be an area where W4P and KCCA could really make a difference. Focusing on entrepreneurs who otherwise serve underserved segments (i.e., model 2 above) and helping them to get such contracts (e.g., with a few schools), not only improves significantly the growth prospects of those businesses, but it also allows them to invest more confidently in vehicles and staff for more professional operations, and allows to smoothen revenues during the dry season. Hence, instead of subsidizing prices, or trying to act as an “invisible hand” to optimize transport and operations, W4P/ KCCA could rather explore how to encourage more institutions to contract GAU members (in particular those offering smaller jobs to households struggling paying for a large number of barrels) for pit emptying. This recommendation does also probably make more sense than reported plans to pilot scheduled pit emptying (focusing on underserved areas), whereby entrepreneurs would bid to serve a given area. We understand that, in theory, this idea appears to have advantages (e.g., more rational route management, aggregation of demand, etc.), but our analysis shows that it would likely not yield the intended results, for different reasons: a) the main issue for poor households is the cash-at-hand, i.e., ability to pay for a large number of barrels, which is on the other hand the most important profitability driver for any pit emptier; b) these households are not necessarily concentrated geographically; c) pit emptying is not something that households plan for; rather they postpone it until absolutely necessary, then empty as much as they can

afford to pay, and want/ need it done the same day or the next one; d) more broadly, it appears that pits fill in at very different speeds and it is actually very difficult to predict overall demand over time in a given area; e) while fuel is an important expense, the problem is less about helping entrepreneurs drive marginally less km, but rather having as many barrels on the vehicle as possible; f) last but not least, these emptying contracts would probably put some kind of constraint/ pressure on pricing, and this would be extremely difficult to get right, given how fragile the economic equilibrium is for emptiers, in particular those following model 2.

Finally, still on the revenue side, we found that a large number of entrepreneurs pursue multiple business activities. When looking at their financials, this did not make much sense as it seemed a distraction rather than an addition (i.e., little revenues, poor resulting profitability, probably higher business complexity). However, it appears that this is probably done out of necessity, to smoothen revenues and offer alternative work opportunities for key staff, plus increase the utilisation of the vehicles, also during the low season. These additional activities can be related businesses (e.g., building toilets, selling sanitation hardware), but also any business that uses a truck, driver, etc. In fact, seasonality might be one of the biggest hurdles to making these businesses more robust, and arguably, all support measures should probably take this aspect into account (or help address it) to be truly effective.

Across all 3 models described above, entrepreneurs seemed to have found reasonable strategies to keep key costs down, including most notably:

- Staff costs: e.g., keeping costs low by using drivers as emptiers; variable/ flexible salary payment arrangements for operators
- Fuel: aggregating orders in an area to maximize vehicle use per trip, or allowing operators to find extra jobs in an area after a scheduled job
- Interest rates for those repaying a vehicle: engaging into side business activities (e.g., latrine refurbishment or construction, Sato-pan sales, etc.), which allow to keep revenues more constant over time, so that interest payment can be honoured also in low season
- Letting no job down: if an entrepreneur cannot serve a customer (because s/he doesn't have the right vehicle, capacity, or it is too remote), s/he will bounce the job to a colleague (against a commission), hence optimizing the supply provision among themselves.

Hence, we do not believe that there is much improvement levers on the cost management side, especially ones that would work across the board, given the variety of entrepreneurs, models and situations.

Looking at the data, it clearly appears that the main profitability driver is the job size (i.e., how many barrels per trip given vehicle's capacity), rather than the number of customers or the location of the customers. But again, this is something that all entrepreneurs already strive to optimize.

Last but not least, the use of the gulper seems rather anecdotal, with a few exceptions (e.g., 1 entrepreneur who used to be an operator himself and is committed to "being a better boss for his own staff"). While the 4 versions of the gulper have addressed a number of complaints/ issues over time, the gupers can only be used in a number of jobs (lined pits where cesspool trucks cannot access, and where the sludge is liquid enough without adding much water). Coupled with the pressure of maximizing the space on the vehicles (especially for tricycles), the difficulty of training the ever-churning operators appropriately, and the added complexity of having to use the gulper in a very tailored fashion, this probably explains why most entrepreneurs do not seek to enforce a maximum usage of this equipment.

1.b. Findings related to the overall formal sanitation services market (excluding the cess-pool truck business)

There are a number of signs pointing at the fact that the market is getting over-saturated with sanitation services suppliers. Virtually all entrepreneurs report hardly ever turning down a job, no matter the price, and many entrepreneurs seem to struggle to keep sufficient business (in terms of volume) to stay afloat during the whole year (in particular during the dry season). Two consequences of this situation are: the high level of influence by the “local agents”, who play suppliers against each other (favouring the ones giving them the biggest commission rather than those with lowest end price); and the fact that the pit emptiers are increasingly looking to go out of Kampala city to find sufficient business. Many of them also report diversifying away, also beyond sanitation-related services (e.g., real estate, wastewater recycling, etc.), as they feel that the sector is getting saturated.

Moreover, the overall context is getting increasingly difficult for all of them. The relative increase in dumping fees at the bay, the increasing price of fuel and overall inflation are tipping the profitability limit for many. In addition, for those who have to repay a vehicle, break-even over time is becoming even more challenging, unless the entrepreneurs have access to institutional contracts and larger/more constant volume of business. More worryingly, the entrepreneurs following Model 2 (i.e., those serving BoP) are the ones most vulnerable in the current economic context.

In this light, W4P/ KCCA need to carefully rethink any measure that would tip the balance further, by either putting even more pressure on prices, or facilitating the entry of more sanitation service providers, or increasing significantly the capacity of existing providers, as this will likely drive a number of the existing ones out of business, or towards informal strategies (like non-renewals of licenses, illegal dumping, etc.). In fact, the need for support measures seems rather limited at this stage, beyond perhaps providing refresher courses on the gulper (but targeted at operators, and very hands-on, so that operators would know how to make the best use of the gulper in real-life situations). That said, a number of operators, especially the ones deep in debt for repaying large trucks, repeatedly asked for financial support to alleviate their interest rate burden. It is true that it is extremely difficult to pay back a large truck on the back of a pit emptying business, in particular in the dry season, and close to impossible for operators which accept to serve customers with a limited number of barrels (unless they have a lot of institutional business). However, we do not think that it is necessarily a good idea to extend such support anymore, as it would drive vehicle purchase and over-capacity in the market, unless it was specifically targeted to encourage selected existing entrepreneurs to go “out of town” and start servicing other districts. Also, we have seen entrepreneurs use all kinds of resilient strategies to access trucks (either buy them second-hand and refurbish them themselves, or get a loan from friends and family, or giving their family home as collateral, etc.), if they truly believe they can make it work.

Moreover, while voucher programs for end users have got their “political” use (poor people always challenge high prices for what “ought-to-be” public services), and in the past possibly helped launch some newer entrepreneurs who needed to build a customer base, they should probably be discontinued, unless they allow entrepreneurs to charge directly a price that is sustainable in the mid-term (i.e. more than UGX 25k/barrel for simple jobs and UGX 30k/barrel for unlined pits, remote jobs or small quantities), and somehow favour entrepreneurs who are ready to do as little as 3 barrels with tricycles. Otherwise, the voucher programs introduce a distortion into a market which struggles to stay in equilibrium. Similarly, the call centre is doing a disservice by reportedly attempting to “fix the prices” on behalf of the clients, without consideration for the actual cost and difficulty of the jobs, obliging entrepreneurs to take on jobs at a loss. In fact, this trend is also noticeable from the data, as entrepreneurs who work with the call centre tend not to break even. If KCCA/ W4P wants to support appropriate servicing of the BoP market, it needs to think about other levers to encourage/support entrepreneurs who target this segment (e.g., stronger

enforcement with end users, notably those with unlined pits who tend to use twice more illegal emptiers than those with lined pits, low-season-specific campaigns such as “Sato-pans promotion days”, etc.).

Besides of sector-wide supply-demand dynamics, another key insight is that there is a very large variability in the use of the dumping bay by the entrepreneurs. For instance:

- While on average the dumping bay registers 10 total trips per day (in total, by various entrepreneurs), with an average of 9-10 barrels per trip, some days there are 1-2 trips and some others 20+ trips
- The same variability can be observed within the enterprises themselves, with the exception of 2-3 ventures which seem to work almost systematically every day. Some others do relatively large volumes of business, but not regularly (likely those doing business out of the city and only returning at certain points in time to cover certain zones or large jobs), and finally many others do small volumes of business quite unfrequently (depending on the month, between 25% and 50% of GAU members do not visit the bay at all in a given month)
- This leads to a large fragmentation of the space, beyond the 2-3 companies leading the pack, with about 20% of GAU members doing 55% of the total volume dumped at the bay, while 32% of the smallest members total hardly 7% of the volume.

Such fragmentation and variability are not good news in the long term: either most of these entrepreneurs do pit emptying opportunistically (and hence either have another occupation on the side, or will go out of business eventually), or demand is really hard to generate and unpredictable in nature for most of them.

This finding also needs to be considered in light of the overall decline in volume of waste brought to the bay: compared to 2021, 2022 volumes are about 30% down (that means that the average monthly volume over the last 10 months has been about 1,000 barrels lower than before). Again, this could be explained by having entrepreneurs reconverting into other activities or going out of business, or by demand slowing down.

More strategically, it appears that entrepreneurs using the GAU dumping bay cover only 25% of the addressable market². This begs the question as for what happens with the remaining 75%. Explanations could include:

- A percentage of the addressable market is dumping illegally (either in rain flashes down the drain, or by hiring illegal providers who dispose of it inappropriately, or by having operator staff of registered GAU members doing it “undercover”). However, all data we collected (interviews with users, pit emptiers, etc.) seems to point at the fact that the market share of illegal emptying hovers between 10 and 20% for Uganda.
- A percentage of the addressable market still has extra space to dig a nearby latrine. This seems unlikely in informal, urban neighbourhoods, and is probably marginal in terms of volumes.

² This estimate is based on KCCA-provided information that, as per the 2017 census, 180k toilets were identified in Kampala, out of which 140k were household latrines. 42% of those were unlined, which means 59k latrines, which are the primary targets for GAU members (given they cannot be served by cesspool trucks). Assuming an average household size of 10 people per (shared) latrine, 3 barrels of faecal sludge added per year per latrine (as per estimates given by pit emptiers), and an average pit latrine size of 9 barrels (as per pit emptiers and also which corresponds roughly to end user survey) (i.e., requiring emptying every 3 years, for the observed average job size of 9+ barrels), this means that there should be about 19-20k jobs performed every year (or about 180k barrels in total). However, the GAU members only do 33-46k barrels a year, or 20-25% of this total volume. Of note, this estimate is very conservative, as GAU members also serve in large numbers lined latrines which may be difficult to access with cesspool trucks, which are not counted here.

- A percentage of the addressable market is still not happening, i.e., a proportion of latrines fill up very, very slowly, possibly because they are not properly sealed and/or are built on “absorbing” ground. Another explanation factor could be the increasing use of chemicals which “collapse” the waste, as reported by the pit emptiers, who also see it as a problem for unlined pits as the chemicals are extremely corrosive and cause the pit to collapse. While the average pit filling pace estimated by pit emptiers hovers around 1.5 barrels a year for a household of 4-5 people including children (while most of the pit latrines are shared between 2+ households totalling approximately 10 people), the entrepreneurs also claim that approximately 60% of the pits they empty were never emptied before, giving some credit to this explanation.
- A percentage of the GAU service providers find ways to use the cesspool bay instead of the GAU dumping bay by transferring the waste into a cesspool truck at some point (this would be clearly cheaper for larger quantities); of note, this could be done by the entrepreneurs themselves, or by the operators (without the knowledge of the entrepreneur). This practice has been reported to us by a number of witnesses (including bay staff), but does not seem to be so widespread that it would explain for a lot of the observed gap.
- A percentage of the GAU service providers dump their waste outside Kampala at sites that may or may not be appropriate for this kind of waste. While we heard of a number of such instances, it is unclear how feasible and systematic this option is, given the distances, and how much of a pollution risk it represents.
- Not all barrels are formally recorded at the bay (e.g., operators’ staff bribe the bay officer to dump for free, with or without the knowledge of the entrepreneur). We have no evidence on whether this is happening or not.

Given that only the first hypothesis would be problematic in terms of health hazards and ground water pollution, we would recommend organizing some kind of action-orientated field study in selected communities, to actually observe any instances of illegal emptying / dumping. While all the people we interviewed seemed to converge and say that these practices cannot cover more than 20% of the total market, we trust that some level of validation would be useful. The purpose would not be to fine the illegal emptiers / dumpers, but rather get a sense for how widespread the problem is. This survey would mostly revolve around observing systematically what is truly happening in a community over a period of time (e.g., 2-3 weeks): who is emptying, how, whose services they use, etc. Based on these findings, a more appropriate response could be elaborated (e.g., even stronger penalties on households, or on illegal service providers, etc.). This survey could also help verify hypotheses 2 and 3.

Last but not least, let us briefly touch upon the role of the GAU for the sector at wide. Establishing the GAU clearly had its purpose, most notably: setting joint rules for all the members (not to have anyone undercutting the others by operating differently/ at different standard levels); offering a dumping bay which would be used by all, given their specific dumping needs; (trying to) enforce safety/ hygiene standards across the board (e.g., wearing overalls, branding of vehicles, etc.). At this stage, however, while the GAU’s overall and financial management could be stronger (e.g., we could not get dumping bay records systematically despite repeated requests), we do not think the association necessarily needs much further support either. Furthermore, the main value of the GAU is to operate the bay and offer a forum to jointly solve/ address issues in the market. In that sense, it should rather be encouraged to keep levelling the playing field further (e.g., by ensuring that all operators renew their licenses consistently, which is not the case now³, thus giving a number of the less-compliant ones more room to undercut prices).

³ Reportedly, out of all 28+ active GAU members, only 8 are completely compliant with all legal requirements, while the others may not have all their licenses renewed (including some rather large ones).

1.c. Beyond Kampala – what now?

All in all, the efforts to formalize and grow sanitation services in Kampala seem to have been a success. A dynamic group of providers is now serving the market in extensive ways. This begs the question: can this success be replicated elsewhere, and can it be done faster/ better? While this was not the main focus of this assignment, there are a number of pointers on this question, which we gathered along the way:

There is no ideal profile of a sanitation entrepreneur, and so it is rather difficult to guess which ones to invest in at the onset. Perhaps, a good way to go about this is to let “many flowers bloom”, and see which ones become more dynamic over time, and invest only then. Another possibly better way would be to ask the more solid existing entrepreneurs to open “franchises” in other cities, whereby it would be their job to find, coach and support a team for a period of time, and then, if successful, support that franchise directly.

It does take time for fresh entrepreneurs to figure out a new market, including building a customer base. However, best practices and learnings can easily be replicated through new entrepreneurs shadowing existing businesses. Hence, instead of providing grant-funded marketing, business, operation trainings and support, it would likely be more appropriate for W4P/ KCCA to let wannabe entrepreneurs in other cities learn from existing ones (by working in their businesses for a while for instance), while W4P/ KCCA’s support would mostly concentrate on the systemic and infrastructure issues (e.g., regulation, enforcement, dumping bay construction, etc.).

The economics and dynamics in smaller towns are likely quite different than in Kampala. While there is probably a fair amount of accumulated unaddressed demand to be found in the larger towns, there is likely not enough demand to sustain a group of entrepreneurs in the long run below a certain size of town/ level of urbanization. And supporting only 1 or 2 entrepreneurs per town would be tricky, because it would create a situation of (quasi) monopoly. In this light, the 2 models currently piloted by a number of sanitation entrepreneurs to scout and serve these peripheral markets (more or less successfully) seem to make sense and should be further facilitated:

- **“Mobile services” around the country:** the entrepreneur serves different zones over time. This however means being constantly on the road with the full team, and requires very close ties with local partners/ authorities (to line up the demand ahead of time), strong commitment from the operating team, as well as strong logistics and coordination capabilities. It also means probably high prices to accommodate such a set-up, but this is partly warranted given the level of effort required and the lack of alternatives available.
- **“Hub-and-spoke” around Kampala:** the entrepreneur focuses on municipalities which are located not too far from a dumping point, uses radio to advertise services ahead of time, and selectively serves that area for a selected period of time. His/her main business remains in Kampala, but this allows him/her to improve the utilization of the trucks and team, while probably charging higher prices outside than within Kampala. For that model to truly take off, the financing of additional dumping stations within reasonable distance from Kampala would be very beneficial, as it would allow entrepreneurs to gravitate around more areas (i.e., have multiple hubs), but also have alternative dumping points for those striving to serve the whole of Kampala and incurring high fuel costs for doing so.

Section 2: Consolidated findings from the end user and pit emptiers' surveys in Uganda (Kampala) and Malawi (Blantyre)

2.a.1. Understanding market demand & supply-demand fit - overview

Key starting hypotheses	Key take-aways and remarks
There is a problem of missing supply → need to facilitate market development, support the creation of more pit emptying businesses, organize them, provide them training	The survey data does not allow to assess the total supply of pit emptying services, and how it changed over time
	The impact/benefit of the GAU and capacity building activities on turning pit emptiers into successful businesses seems mitigated. There is a significant portion of pit emptiers (20% in Malawi and 38% in Uganda) that is not reaching breakeven despite having received various forms of support/subsidies
There is a problem of supply-demand coordination, users lack knowledge and awareness about proper pit emptying practices → need to raise awareness, help customers find pit emptiers and vice-versa (call center, advertising, commercial support, etc.)	The main channel for finding clients is word of mouth. Advertising has not been widely effective (esp. in Uganda); call center works with certain market segments, but not all (particularly not the poor), but still yielded a roughly estimated 15-20% of total jobs in 2021 in Uganda. Brokers/agents are used widely, but do not bring much business consistently, as they keep offering to the highest “bidder” (i.e. they give the jobs to the emptier that gives them the best deal)
	Commercial support (marketing/ promotion of pit emptying services, information on where to find customers, etc.) was deemed useful by pit emptiers (especially in Malawi) and seems associated with growth in customers and revenue, but not necessarily with better profitability (again especially in Malawi)
	From the user perspective, using a formal vs informal pit emptier doesn't seem to make that much of a difference (in terms of price, speed, satisfaction, retention, etc.)
	Most people need pit emptiers once a year or less (for varying quantities), so market demand is scattered and hard to predict
There is a lack of demand among poor segments driven by low ability to pay → need to provide customer vouchers	Poorer segments tend to have more frequent smaller jobs (partial emptying) due to limited ability to pay
	Market demand segmentation (in terms of needs, behaviour, preferences etc.) is driven mostly by pit type, not really matching income level of neighbourhood
	In Uganda, the voucher/subsidy model seems to have had an impact on client acquisition and revenue generation, especially for newer businesses which struggled to identify/capture a customer base in a given area. However, pricing might have been problematic, and entrepreneurs involved in the voucher scheme struggle with profitability
The market needs more regulation to function properly	Licensing and market regulation did not have much impact on business performance (although they were useful to level the playing field among players and ensure more compliance among GAU members)

2.a.2. Understanding market demand & supply-demand fit - detailed findings from end users

	Malawi	Uganda
Pit type	Lined pits are the most common type overall, both in middle-high income areas (75%) and poor areas (44%). Unlined pits are quite common in poor areas (31%) vs only 7% in middle-high income areas. The share of people with septic tanks is quite similar between middle-high income areas (18%) and poor ones (14%).	Lined pits are the most common type overall, both in middle-high income areas (76%) and poor areas (55%). Unlined pits are quite common in poor areas (23%) and less so (12%) in middle-high income areas. The share of people with septic tanks is quite similar between middle-high income areas (8%) and poor ones (10%).
Pit ownership and management	Most people own the toilet both in middle-high areas (90%) and poor areas (81%). People in poor areas are more likely to share their toilet (53%) than people in middle-high income areas (43%). Among those who share it, for 60% the responsibility to clean/repair the toilet falls on the owner, for 5% on the tenant, and for 35% it's shared between owner and tenant.	Most people own the toilet both in middle-high areas (87%) and poor areas (84%). A majority of people (65%) share their toilet in both middle-high and poor areas. Among those who share it, for 22% the responsibility is to clean/repair the toilet falls on the owner, for 14% on the tenant, and for 63% it's shared between owner and tenant.
Pit emptier type	Overall, 50% of customers have used a pit emptying company before, and 30% an informal laborer. These percentages are very similar between middle-high income areas and poor areas. There is a small correlation with pit type: 33% of users with unlined pits called an informal	Overall, 86% of customers have used a pit emptying company before, and 17% an informal laborer. These percentages are very similar between middle-high income areas and poor areas. Users with unlined pits are much

	laborer vs 30% of those with lined pits and 27% of those with septic tank.	more likely to use an informal laborer (31%) vs those with lined pits (15%) or septic tanks (14%).
Quantity removed	Overall, customers remove an average quantity of 2,664 liters of sewage (13 drums), but this varies depending on pit type: customers with septic tanks report an average quantity of sewage removed of 3,870 liters (19 drums); those with lined pits an average of 2,586 liters (13 drums); and those with unlined pits an average of 1,961 liters (10 drums). Companies remove on average 13% more sewage than informal laborers (2,501 liters/13 drums vs 2,207 liters/11 drums).	Overall, customers remove an average quantity of 1,398 liters of sewage (8 barrels), without big variations depending on pit type: customers with septic tanks report an average quantity of sewage removed of 1,518 liters (10 barrels); those with lined pits an average of 1,368 liters (8 barrels); and those with unlined pits an average of 1,473 liters (9 barrels). Informal laborers remove on average 14% more sewage than companies (1,512 liters/9 barrels vs 1,323 liters/8 barrels).
Frequency	Overall, 64% of customers empty their pit every few years, 27% once per year, and 8% more than once per year. The average quantity of sewage removed is inversely correlated with the frequency of removal: customers emptying the pit every few years remove on average 2,856 liters (14 drums), vs 2,267 liters (11 drums) for those doing it once per year, and 1,319 liters (7 drums) for those doing it multiple times per year. Customers using informal laborers tend to empty their pit more frequently (55% once per year or more) than those using companies (39%).	Overall, 25% of customers empty their pit every few years, 28% once per year, and 47% more than once per year. The average quantity of sewage removed does not have a clear relationship with the frequency of removal: customers emptying the pit every few years have the lowest average quantity (1,120 liters or 7 barrels), vs 1,679 liters (10 barrels) for those doing it once per year, and 1,351 liters (8 barrels) for those doing it multiple times per year. Customers using informal laborers tend to empty their pit more frequently (100% once per year or more) than those using companies (75%).
How found	The 2 main channels for finding a pit emptier are word of mouth (46% of customers) and advertising (38% of customers). Only 2% of customers found the pit emptiers through the call center. Word of mouth is more common in middle-high income areas (50%) than poor ones (39%), while advertising is similar across both types of areas. Advertising is more important for companies (53%) than informal laborers (36%), while word of mouth is similar for both types of pit emptiers.	The main channel for finding a pit emptier is word of mouth (55% of customers), followed by call center (27%) and direct approach by pit emptier (12%). Only 4% of customers found the pit emptier through advertising. Call center is much more common in middle-high income areas (35%) than poor ones (12%), direct approach is much more common in poor areas (19%) than middle-high income ones (8%), while word of mouth is quite similar across both types of areas (53% middle-high income vs 58% poor areas). Word of mouth is more important for informal laborers (80%) than companies (49%), similar to direct approach (20% vs 9%), while call center only plays a role for companies (32% vs 0% for informal laborers).
Delayed emptying	Overall, 22% of customers delay pit emptying sometimes, and 12% all the time. Customers living in middle-rich areas are less likely to delay (68% never delay, 24% delay sometimes and 6% all the time) than those living in poor-very poor areas (57% never delay, 4% almost never, 17% sometimes and 22% all the time). Customers who delay emptying tend to have less quantity removed (2,837 liters or 14 drums on average for customers who never delay vs 1,747 liters or 9 drums on average for those who delay all the time). There is no clear relationship between delayed emptying and frequency of emptying. 88% of those who delay emptying do it for lack of money. Among those, 68% would be willing to take out a loan to avoid delaying in the future; the share is higher among male customers (75%) than female ones (60%).	Overall, 33% of customers delay pit emptying sometimes, and 12% all the time. Customers living in middle-rich areas are slightly less likely to delay (49% never delay, 9% almost never, 38% sometimes and 4% all the time) than those living in poor-very poor areas (41% never delay, 9% almost never, 23% sometimes and 27% all the time). Customers who delay emptying tend to have less quantity removed (1,769 liters or 10 barrels on average for customers who never delay vs 701 liters or 4 barrels on average for those who delay all the time). Customers who delay emptying tend to empty a bit more frequently (55% of those who delay sometimes or all the time empty more than once per year vs 36% of those who never or almost never delay). 91% of those who delay emptying do it for lack of money. Among those, 37% would be willing to take out a loan to avoid delaying in the future; the share is the same among male and female customers.
Satisfaction	On a 1-10 scale, customers have an average likelihood to recommend the pit emptying service of 7.2, with 31% rating 9 or 10, 36% rating 7 or 8, and 33% rating 6 or lower, corresponding to a NPS score of -3. Female customers tend to be more satisfied than male (average rating of 7.8 vs 6.6). There is no difference in satisfaction between customers	On a 1-10 scale, customers have an average likelihood to recommend the pit emptying service of 6.5, 14% rating 9 or 10, 28% rating 7 or 8, and 58% rating 6 or lower, corresponding to a NPS score of -44. Female clients tend to be more satisfied than male (average rating of 6.8 vs 6.1). Customers who used a company tend to be less

	<p>who used a company and those who used informal laborers, while customers with a septic tank tend to be more satisfied (average rating 8.2) than those with a pit, either lined (7) or unlined (6.9). Satisfaction is negatively correlated with price paid: customers who paid less than 0.038 USD per liter (6,000 MWK per drum) gave an average rating of 8.6 vs 7.2 among those who paid between 0.038-0.43 USD per liter (6,000-6,999 MWK per drum), and 6.7 among those who paid 0.44 USD per liter or more (7,000 MWK per drum).</p>	<p>satisfied (average rating 6.4) than those who used an informal laborer (7.4). Customers with a septic tank tend to be more satisfied (average rating 7) than those with a pit, either lined (6.5) or unlined (6.4). There is no linear relationship between satisfaction and price paid: while those who paid least (less than 0.04 USD per liter or 25,000 UGX per barrel) gave the highest average rating (7.3), those who paid 0.04 USD per liter (25,000 UGX per barrel) gave the worse rating on average (5.4) while those who paid the most (0.05 USD per liter or 30,000 UGX per barrel) gave intermediate ratings (6.3 on average).</p>
Most liked aspects	<p>Overall, the most liked aspect is the reliability/availability of the service (selected by 67% of customers), followed by speed/efficiency (53%) and cleanliness (52%). Female customers like cleanliness more often than male ones (61% vs 44%), while male customers like speed/efficiency more often than female ones (59% vs 47%). Customers using informal laborers liked the reliability/availability (67%) and speed/efficiency (67%) more frequently than customers using companies (58% and 39% respectively), while cleanliness was liked similarly across the 2 groups (28% and 56%).</p>	<p>Overall, the most liked aspect is the cleanliness of the service (selected by 73% of customers), followed by speed/efficiency (62%) and reliability/availability (56%). Female customers like cleanliness and reliability/availability more often than male ones (80% vs 65% and 63% vs 48% respectively). Customers using informal laborers liked the reliability/availability (80%) and price (80%) more frequently than customers using companies (51% and 35% respectively), while cleanliness and speed/efficiency were liked similarly across the 2 groups (73% and 80% for cleanliness, 61% and 60% for speed).</p>
Least liked aspects	<p>Overall, the least liked aspect is the high price (40% of customers), followed by slowness/inefficiency (25%) and uncleanliness (23%). Female customers dislike slowness/inefficiency more often than male ones (33% vs 18%), while male customers dislike uncleanliness more often than female ones (33% vs 11%). Customers using companies disliked the high price (45%) and the slowness/inefficiency (32%) more frequently than customers using informal laborers (22% and 11% respectively), while uncleanliness was disliked similarly across the 2 groups (19% and 22%).</p>	<p>Overall, the least liked aspect is the high price (54% of customers), followed by unreliability/unavailability (38%). Male customers dislike slowness/inefficiency and uncleanliness more often than female ones (32% vs 15% and 29% vs 10% respectively). Customers using companies disliked the high price (58%) and unreliability/unavailability (40%) more frequently than customers using informal laborers (20% and 20% respectively), while customers using informal laborers disliked the slowness/inefficiency more frequently (40%) than customers using companies (23%); uncleanliness was disliked similarly across the 2 groups (21% and 20%).</p>
Interest for subscription	<p>Overall, 48% of customers would be willing to switch to a cheaper subscription service and 17% say it would depend. The most common factor that would make customers switch is a better price (41% of customers). Customers living in poor-very poor areas are more willing to subscribe (48% would do it and 26% say it depends) than those living in middle-high income areas (48% would do it and 13% say it depends). Customers who use a company are more willing to subscribe (65% would do it and 16% say it depends) than those using an informal laborer (44% would do it and 11% say it depends).</p>	<p>Overall, 79% of customers would be willing to switch to a cheaper subscription service and 4% say it would depend. The most common factor that would make customers switch is a better price (68% of customers). Customers living in poor-very poor areas are more willing to subscribe (82% would do it and 5% say it depends) than those living in middle-high income areas (78% would do it and 4% say it depends). Customers using an informal laborer are more willing to subscribe (100% would do it) than those who use a company (81% would do it and 2% say it depends).</p>
Repeat customers	<p>Overall, 80% of customers always use the same pit emptier. The share is similar between customers who used a company (84%) and those who used an informal laborer (88%). Customers who found the pit emptier through advertising are more likely to always use the same emptier (88%) than those who found them through word of mouth (72%). Customers who always use the same pit emptier are more likely to recommend it than those who don't (average rating of 7.5 vs 6.1). Customers who always use the same pit emptier paid a lower price on average (0.031 USD per liter or 4,900 MWK per drum) than those who don't (0.041 USD per liter or 6,493 MWK per drum). Customers who always</p>	<p>Overall, 44% of customers always use the same pit emptier. Customers who used an informal laborer are slightly more likely to always use the same (60%) than those who used a company (52%). Customers who found the pit emptier through the call center are more likely to always use the same emptier (67%) than those who found them through word of mouth (41%) or direct approach (22%). Customers who always use the same pit emptier are more likely to recommend it than those who don't (average rating of 7.4 vs 5.8). Customers who always use the same pit emptier paid roughly the same price on average (0.036 USD per liter or 21,675 UGX per barrel)</p>

	use the same pit emptier are less likely to consider subscribing to a cheaper provider (36% would not do it) than those who don't always use the same (23% would not do it).	than those who don't (0.037 USD per liter or 21,467 UGX per barrel). Customers who always use the same pit emptier are more likely to consider subscribing to a cheaper provider (only 10% would not do it) than those who don't always use the same (23% would not do it).
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2.a.2. Understanding market demand & supply-demand fit – detailed findings with pit emptiers

Support received	Malawi	Uganda
<i>Overall</i>	Emptiers that report having benefited from vouchers for customers, setting up call center, and construction/adaptation of treatment plant have more customers and revenue than the others. Emptiers who benefited from free vehicles have higher revenue (not more customers) than the others	Emptiers that report having benefited from free equipment, financial support, and vouchers for customers have more customers and revenue than the others
Pit emptiers association	All emptiers are members of the association, on average since 5.3 years. On a scale from 1 (least useful) to 10 (most useful), emptiers give the usefulness of the association an average rating of 6	All emptiers are members of the association, on average since 3 years. On a scale from 1 (least useful) to 10 (most useful), emptiers give the usefulness of the association an average rating of 6.8
Capacity building of pit emptiers association	Emptiers who received strengthening/ capacity building of pit emptiers association as support (60% of the total) rate it as 5 th most important support. 10% prioritized it for future support. Emptiers who received this support have more customers (median 240 vs 88) and revenue (median USD25k vs USD10k) than those who didn't, but are less profitable (median USD500 vs USD6.5k profit and 3% vs 57% margin)	Emptiers who received strengthening/ capacity building of pit emptiers association as support (92% of the total) rate it as 3 rd /4 th most important support. Nobody prioritized it for future support (note: not possible to compare size/revenue/profit of those who received this support vs not because only 1 emptier did not receive it)
Commercial support	70% of emptiers received commercial support, and they rank it 2 nd /3 rd most useful support. 30% prioritized it for future support. Emptiers who received commercial support have more customers (median 240) than those who didn't (median 128), but lower revenue (median USD13k vs USD16k), profit (median USD600 vs USD6k) and margin (median 13% vs 58%)	46% of emptiers received commercial support, and they rank it 5 th /6 th most useful support. 8% prioritized it for future support. Emptiers who received commercial support have more customers (median 688), higher revenue (median USD95k), profit (median USD52k) and margin (median 42%) than those who didn't (median 588 customers, USD31k revenue, USD3k profit, and 10% margin)
Call center	50% of emptiers report "setting up customer call center" as support received, and they rank it 3 rd /4 th most useful support. Emptiers who received this support have more customers (median 240) and higher revenue (median USD33k) than those who didn't (median 96 customers and USD11k revenue), but are less profitable (median USD600 profit and 2% margin vs USD6k profit and 56% margin)	46% of emptiers report "setting up customer call center" as support received, and they rank it 6 th most useful support. Emptiers who received this support have more customers (median 834) than those who didn't (median 384), but have lower revenue (median USD50k vs USD85k) and are less profitable (median USD3k profit and 4% margin vs USD5k profit and 34% margin)
Vouchers	Emptiers who received customer vouchers (60% of the total) rank it as 2 nd /3 rd most useful support received. There is no correlation with years of operations. Nobody prioritized it for future support. Emptiers who received customer vouchers have significantly more customers (median 273 vs 84), more revenue (median USD34k vs USD9k) and more profits (median USD4k vs USD1k) than those who didn't, but lower profit margins (median 10% vs 14%)	Emptiers who received customer vouchers (38% of the total) rank it as 2 nd /3 rd most useful support received. Vouchers were more common among newer emptiers (44% of those with up to 3 years of operations received vouchers, vs 33% of those with 4-6 years and 0% of those with over 6 years). 15% prioritized it for future support. Emptiers who received customer vouchers have twice as many customers (median 720 vs 336) and revenue (median USD105k vs USD50k) than those who didn't, but are much less profitable (median USD-4k vs USD6k profit and -44% vs 23% margin)
Licensing/ registration	90% of emptiers report having a business registration/license. The 1 emptier without a license has more customers (240), higher revenue (USD75k) and is more profitable (USD11k profit and 15% margin) than those with a license (median 128 customers, USD13k revenue, USD600	85% of emptiers report having a business registration/license. The 2 emptiers without a license have more customers (median 2k), higher revenue (median USD339k) and are more profitable (median USD53k profit and 16% margin) than those with a license (median 384

	profit and 13% margin). 80% of emptiers mention “introducing license and standards” as support received and rank it 5 th most useful support; nobody prioritized it for future support. 60% received free or cheaper licenses and rank it 6 th /7 th most useful support; 10% prioritized it for future support. Emptiers who received free or cheaper licenses perform worse in terms of customers (median 184), revenue (median USD14k) and profitability (median USD1k profit and 10% margin) than those who didn’t (median 193 customers, USD21k revenue, USD3k profit and 36% margin)	customers, USD41k revenue, USD5k profit and 12% margin). 46% of emptiers mention “introducing license and standards” as support received and rank it 3 rd /4 th most useful support; 15% prioritized it for future support. 15% received free or cheaper licenses and rank it 7 th most useful support; nobody prioritized it for future support. Emptiers who received free or cheaper licenses perform better in terms of customers (median 616), revenue (median USD75k) and profitability (median USD37k profit and 33% margin) than those who didn’t (median 588 customers, USD58k revenue, USD5k profit and 12% margin)
Financial support	40% of emptiers received financial support, and they rank it the top most important support. (Note: financial support was not provided as an option to prioritize for future support). Emptiers who received financial support have fewer customers (median 112 vs 273), lower revenue (median USD12k vs USD34k) and worse profitability (median USD1k vs USD3k profit and 10% vs 14% margin) than those who didn’t.	15% of emptiers received financial support, and they rank it as the top most important support. (Note: financial support was not provided as an option to prioritize for future support). Emptiers who received financial support have more customers (median 1188 vs 384), higher revenue (median USD82k vs USD41k) and better profitability (median USD35k vs USD3k profit and 36% vs 10% margin) than those who didn’t.
Construction/ adaptation of treatment plant	30% of emptiers report having received this support, and they rank it as the second-least important support. 10% prioritized it for future support. Emptiers who report receiving this support have more customers (median 576 vs 96) and higher revenue (median USD 33k vs USD 13k) than those who didn’t, but worse profitability (median USD 423 vs USD 6k profit and 2% vs 15% margin).	69% of emptiers report having received this support, and they rank it as 4 th most important support. 31% prioritized it for future support. Emptiers who report receiving this support have similar number of customers as those who didn’t (median 588 vs 504), lower revenue (median USD58k vs USD177k) but better profitability (median USD7k vs USD513 profit and 12% vs -5% margin).

2.b.1. Ideal profile of entrepreneur to run a successful pit emptying business - overview

Key starting hypotheses	Key take-aways and remarks
There is an ideal profile that will make someone a ‘good entrepreneur’ and/or a standardized journey to make a pit emptying business successful	Overall, individual variability is very high, much higher than differences between different categories of emptiers → many different factors interacting and influencing end performance, very difficult to figure out in advance who will be a successful entrepreneur; perhaps there are some individual characteristics that can give a slightly higher chance of success, but minor impact compared to the many factors involved. When asking the entrepreneurs themselves about what they consider was key to their success, 2 answers come back: persistence/ resilience (i.e. the ones who came in because there was easy / free support at the beginning didn’t last long); and being hands-on the job (i.e. knowing the dealings of the staff, getting involved with customers, being on top of day-to-day operations, etc.)
Staff of existing pit emptying businesses are good candidates to launch their own venture, as they know the market, know where to find customers, have relevant assets etc. (spin-off/ family tree model)	Newer businesses perform better than older ones → there is no obvious linear trajectory (e.g., growing organically at a certain pace) for these businesses. In Uganda, this might be due by the fact that the newer entrepreneurs are typically spin-offs of older enterprises, who started their own venture out of necessity (old enterprise going bust) or out of opportunity (franchise). These entrepreneurs were already quite knowledgeable, and had some assets to build on (e.g. contacts with customers, former colleagues they could poach, etc.)
Only low/uneducated people would enter this sector	Pit emptiers who had prior experience in pit emptying or a related sector are a minority, and don’t necessarily perform better Pit emptiers who launched their business because they “saw an opportunity given the assets they had at the moment (e.g. vehicles or staff)” tend to be more successful
(no particular assumption on initial financing)	40-45% of pit emptiers have higher education, although lower-educated ones seem to perform better The few emptiers who started their business thanks to a bank loan are bigger in customer base and revenue than the others, probably because it allowed them to invest earlier into (more) vehicle(s). The same logic probably holds for entrepreneurs who received either free

	equipment or financial support, as they also tend to perform better. Of note, the loan is rarely provided by a bank. It may come from friends and family, and typically they used their own home as collateral
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2.b.2. Ideal profile of entrepreneur to run a successful pit emptying business – detailed findings from pit emptiers

	Malawi	Uganda
Education	40% of emptiers have superior/university education, 40% secondary and 20% primary. Uni-educated emptiers have the most customers (median 441 vs overall median 184) but primary-educated ones have highest revenue (median USD43k vs overall median USD14k). Secondary-educated emptiers have lowest customers (median 88) and revenue (median USD10k)	46% of emptiers have superior/university education, 23% secondary and 31% primary. Uni-educated emptiers have most customers (median 834 vs general median 558) but primary-educated ones have highest revenue (median USD97k vs general median USD58k). Secondary-educated emptiers have lowest customers (median 240) and revenue (median USD41k)
Sector experience	Nobody was a former pit emptying employee. Emptiers with experience in a related sector have fewer customers (median 128) but higher revenue (median USD15k) than those previously working in an unrelated sector (median 164 customers and USD10k revenue)	Emptiers who were former pit emptying employees and those with experience in a related sector have fewer customers (median 384 and 437 resp.) but higher revenue (median USD85k and USD186k resp.) than those previously working in an unrelated sector (median 588 customers and USD41k revenue)
Entrepreneurial experience	Emptiers with previous experience of running a business have more customers (median 240) and higher revenue (median USD33k) than those without (median 88 customers and USD10k revenue)	Emptiers with previous experience of running of running a business have similar customers (median 588) and lower revenue (median USD58k) than those without (median 602 customers and USD70k revenue)
Motivation ⁴	The motivation associated with highest customers (median 576) and revenue (USD33k) is “I saw an opportunity given the assets I had at the moment” (indicated by 3 pit emptiers), followed by “I knew where to find customers” (indicated by 4 pit emptiers; median 240 customers and USD22k revenue). Pit emptiers who did not select the “opportunistic” motivation (7 pit emptiers) had a median of 96 customers and USD11k revenue.	The motivation associated with highest customers (median 992) and revenue (USD338k) is “I saw an opportunity given the assets I had at the moment” (indicated by 3 pit emptiers), followed by “I know how to run a pit-emptying business” (indicated by 5 pit emptiers; median 992 customers and USD85k revenue). Pit emptiers who did not select the “opportunistic” motivation (10 pit emptiers) had a median of 336 customers and USD36k revenue.
Financing	The 1 emptier who got a bank loan to start the business has highest customers (305) and revenue (USD184k), followed by those who used own money (median 240 customers and USD16k revenue), while those who got a grant perform worse (median 96 customers and USD13k revenue)	Emptiers who got a bank loan to start the business and those who got a grant have high customers (median 992 both) and revenue (USD109k and USD85k resp.), followed by those who used own money (median 720 customers and USD105k revenue), while those who borrowed from friends/family perform worse (median 212 customers and USD19k revenue)
Dependents	Emptiers with 4 or less dependents have more customers (median 240) and higher revenue (median USD33k) than those with 10 or more dependents (median 88 customers and USD9k)	The 1 emptier with no dependents has highest customers (4.7k) and revenue (USD198k); those with 4 or less dependents have more customers (median 1k) but lower revenue (median USD58k) than those with 10 or more dependents (median 640 customers and USD68k)
Years of operations	Newer emptiers (3 years or less) have medium level of clients (median 190) but highest revenue (median USD85k); older emptiers (more than 6 years) have fewest clients (median 128) and lowest revenue (median USD13k)	Newer emptiers (3 years or less) have medium level of clients (median 588) but highest revenue (median USD85k); older emptiers (more than 6 years) have fewest clients (median 240) and lowest revenue (median USD41k)

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- ⁴ Each pit emptier could select up to 2 motivations for starting their business.

2.c.1. Unit economics: what are levers to improve profitability? – overview

Key starting hypotheses	Key take-aways and remarks
Pit emptying is not a lucrative business	A majority of pit emptying businesses are profitable; among those, the median profit margin is 44% in Uganda and 36% in Malawi
To be viable, emptiers need to serve more customers	<p>The size of the jobs (quantity removed and average revenue per customer) seems to play a more important role than the number of customers. This makes sense as pit emptying has a lot of fixed, or semi-fixed costs (some salaries are fixed, the fuel is per trip, the vehicle loan or amortization is fixed, and in some cases the bay fees are partly fixed)</p> <p>There are a number of business models possible: e.g. serving a large number of clients but with smaller quantities of barrels (Sanitech example in Uganda), or serve a smaller number of clients who empty a larger volume of waste (PitCare example in Uganda). For each of these models, there are a number of enterprises following them, more or less successfully (i.e. while some models might help capture bigger margins, it is essentially the capabilities of the entrepreneur that make a difference)</p> <p>3 possible dimensions to price a service: service duration, quantity, distance. Quantity is the main pricing unit. Proxy for duration seems to be 'type of pit'; within each category of pit prices seem aligned, so distance does not seem to be accounted in pricing. Almost all pit emptiers report that distance factors into pricing, but we cannot quantify the impact of this because the revenue calculated for the analysis was based on standard pricing. In reality, when talking with the entrepreneurs, we saw that pricing is a matter of negotiation. Entrepreneurs always try to add a 'mark-up' of typically 5k USH (in Uganda) for far-away or unlined pits, but they do not always manage to have their way. All report taking jobs at cost or at loss.</p> <p>The market doesn't seem to properly correct for 'complicated' jobs (with waste or dry sewage), which are more common for poorer areas in Malawi but not in Uganda. This is typically due to the fact that one uncovers this type of complications when emptying the pit (i.e. when the price has already been agreed upon)</p>
The lower end of the market is less profitable due to lower ability to pay, more complicated to serve → need to provide customer vouchers	<p>In Malawi, the lower end of the market does seem less profitable (poor customers have more unlined pits which tend to be smaller jobs, taking longer and paid less), but this does not hold in Uganda (poor customers also have more unlined pits, but quantity and duration for these type of pits are similar to other segments, and customers with unlined pits pay more per barrel)</p> <p>Pit emptiers serving the higher end of the market (septic tanks, institutional clients, higher-income areas) tend to perform better in terms of size (number of customers and revenue), but often this does not translate to better profitability (as some costs are also higher, such as more staff, higher driver's pay, more fuel, bigger vehicle loans to pay back, etc.)</p>
Diversification of services/ revenue streams helps with business viability	Most pit emptiers also offer other services (latrine construction, latrine upgrade, and other services) although these make up a minor part of the revenues. Profit margins for other services are usually higher than pit emptying in Malawi, but lower in Uganda, where diversification might not make business sense. That said, entrepreneurs say they engage in these side businesses due to a mix of necessity (e.g. in low emptying season) and opportunity (e.g. customer asking for latrine refurbishment)
Transport/vehicles are a major cost driver Rental costs are a killer for pit emptying businesses, they must own vehicles to be successful → need to provide financing support to pit emptiers to facilitate ownership; facilitate mutualization of equipment or rental models for larger/ additional assets such as trucks/mobile transfer tanks/tricycles/gulpers	Vehicles are generally the second biggest cost driver (after staff), but there is significant variation across pit emptiers in what % of revenue and cost they represent. In Malawi owning vehicles seems to be more profitable, while in Uganda renting seems more profitable (businesses who rent have similar costs for vehicles but higher revenue). This might be because instead of being locked into a loan for a pickup truck, the utilization of which might be difficult to optimize, one has the flexibility to experiment with several different mixes of vehicles, or to hire a cesspool truck a few days per month to serve higher-margin clients, etc. However, when interviewing entrepreneurs on the renting vs. owning choice, many say that renting is not that optimal (as one gets also locked into mid-term contracts, which are (almost) as expensive as loans' repayment, and as the rental companies also adopt very predatory behaviors over time). Hence most entrepreneurs who rent or rented in the past are seeking to purchase the vehicles, thinking that – even if it will be difficult to repay, at least the vehicle will be theirs ultimately, and they have the flexibility of using it as they please.
The geographical dimension must play an important role on how businesses organize and deliver their service, and their profitability → need for geographical clustering; need	Geographical proximity (e.g., being closer to customers and/or dump sites, or being geographically clustered) does not seem to drive profitability (but data we have on this aspect is limited). This has probably to do with the fact that most entrepreneurs are actually quite opportunistic about their geographic coverage (i.e. they go where there is/they find business). What matters rather is how many barrels one gets in one trip, rather than if one had to drive a few dozen km more. In that light, the idea of installing transfer stations seems not that promising.

for scheduled/ rationalized deployment; need for distributed dumping stations	Other possible key drivers of differences in vehicle cost are the type and number of vehicles used and the geographical spread, but the limited sample does not allow to identify clear correlations. Also, fleet composition is typically driven by the business model, which also influences financials: an entrepreneur who focuses on doing small quantities might go for a fleet of tricycles; while those focusing on larger jobs will rather get pick-up trucks, or even cesspool trucks.
Better internal organization (e.g., more structured organizations of roles/tasks) can improve business performance	Staff cost are generally the largest cost driver, but there are significant differences across emptiers in what % of revenue and cost they represent. In Uganda the differences seem to be driven more by the number of staff, while in Malawi by how much staff is paid. The businesses with lowest staff costs are the ones with a balanced mix of permanent/temporary workers, while those with either zero or a high proportion of permanent workers tend to spend more. A more fluid organizational model is associated with better profitability. Other possible drivers are the type of vehicle/equipment used (which affects how many people are needed), the number and size of the jobs, and the geographical spread, but the limited sample does not allow to identify clear correlations. After talking with the entrepreneurs, it is clear that there are many different strategies to pay staff, depending on the specific circumstances of each entrepreneur and business model followed. While drivers and some back-office staff are typically paid monthly salaries (as they typically handle the money and should be persons of trust with no/ limited turnover of staff), operators can be paid per barrel, per trip, per day, and sometimes even a fixed (small) amount. These are all strategies to cope with the high variability of jobs, day-to-day, and season-to-season, while trying to keep the remuneration attractive enough to retain the operators over time and avoid all kinds of unwanted behaviour (e.g. not reporting barrels, illegal dumping, etc.). Given these strategies are highly dynamic, and overall do not concern a large amount of staff, it would be very difficult to propose better models for team organization which would hold for all.
Equipment: better equipment (e.g., gulper) leads to more efficiency/faster jobs → need to facilitate technology development and adoption	Emptiers who use a gulper (majority in both countries) tend to be more profitable than those who don't. This is perhaps driven by the type of latrines (i.e. guplers can mostly be used with lined latrines, which are faster and easier to empty), or perhaps by the level of sophistication of the entrepreneur (i.e. entrepreneurs 'taking care' of their staff by ensuring they use the gulper whenever possible, and using the gulper for higher efficiency, might be entrepreneurs more 'on top' of their business).
(No particular starting assumption on dumping fees)	Dumping fees are a relatively significant cost for businesses, with some variations in how much they weigh vs revenue. The variations are due to the pricing model in Uganda at the bay (initially a decreasing pricing scale for ranges of volumes, and now strictly fixed pricing per barrel)
(No particular starting assumption on admin cost)	Admin costs are normally a minor cost item, but it can be more significant for some businesses. The main driver for admin costs is renting an office (vs. not having one or using own property). Renting an office seems to be a bad strategy for most entrepreneurs, as an office is not required from an operational point of view, but is sometimes elected for 'personal' preferences by the entrepreneur

2.c.2. Unit economics: what are levers to improve profitability? – findings from end users

	Malawi	Uganda
Duration	On average, a pit emptying job lasts 4.32 hours. Septic tanks take longest to empty (5.23h on average, with 46% of customers reporting a duration above 6h, 46% between 2-6h, and 8% less than 2h), followed by unlined pits (4.20h on average, with 14% of customers reporting a duration above 6h, 58% 2-6h, and 29% less than 2h), while lined pits are the quickest (4h on average, with 12% of customers reporting a duration above 6h, 68% 2-6h, and 20% less than 2h). Average duration increases proportionally to average quantity of sewage removed. Average duration is similar between companies (3.77h on average) and informal laborers (3.80h), but the distribution is very different: for companies, the majority of customers cluster at the middle (59% report a duration between 2-4h), while for informal laborers, customers are split between the low and high end of the spectrum (40% report duration of less than 2h, and 50% report 4h or more).	On average, a pit emptying job lasts 2.07 hours. Septic tanks take longest to empty (2.42h on average, with 67% of customers reporting a duration between 2-4h and 33% less than 2h), while duration is similar for lined and unlined pits (1.94/1.90h on average, with 31/30% of customers reporting a duration between 2-4h and 69/70% less than 2h). No customer reported durations above 4 hours. Companies tend to be quicker (2.04h on average) than informal laborers (2.40h), and the distribution is different: for companies, 92% of customers report a duration of 3h or less (roughly equally split between less than 1h, 1-2h, and 2-3h), while for informal laborers, customers are split between the low and high end of the spectrum (40% report duration of less than 1h, 20% report 1-2h, and 40% report 3-4h).
Price	Overall, customers paid an average price of 0.040 USD per liter removed (6,294 MWK per drum). Variations are limited, with 74% of customers reporting a price between 0.038 USD per liter (6,000 MWK per drum) and 0.044 USD per liter	Overall, customers paid an average price of 0.044 USD per liter removed (26,757 UGX per barrel). Variations are limited, with 85% of customers reporting a price between 0.041 USD per liter (25,000 UGX per barrel) and 0.050 USD

	(7,000 MWK per drum). The average price is equal between customers using companies and those using informal laborers, but it varies slightly depending on pit type: customers with septic tanks paid on average the highest price (0.044 USD per liter or 7,000 MWK per drum), followed by those with lined pits (0.041 USD per liter or 6,638 MWK per drum) while those with unlined pits paid the least (0.038 USD per liter or 6,095 MWK per drum).	per liter (30,000 UGX per barrel). Customers using companies report a higher average price (0.044 USD per liter or 26,389 UGX per barrel) than those using informal laborers (0.039 USD per liter, or 23,611 UGX per barrel). Customers with unlined pit paid on average the highest price (0.049 USD per liter or 29,375 UGX per barrel), while customers with lined pits and septic tanks paid a similar lower average price (0.043 USD per liter or 26,028/26,250 UGX per barrel).
Challenges	28% of customers report having frequent challenges with pit emptying. The most common challenge, experienced by 13% of customers, is the presence of waste in the sewage, followed by bad service (7%) and presence of dry sewage (4%). The presence of waste in the sewage is linked to a significantly longer duration (5.47h on average vs 4.18h for those without this issue, with 44% of customers with waste in the sewage reporting a duration above 6h). Customers living in poor-very poor areas are more likely to have waste in the sewage than those in middle-rich areas (21% vs 7%); similarly for customers with pits (12% lined and 13% unlined) vs those with septic tanks (7%). There is no clear linkage between price paid and challenges encountered (e.g. presence of waste in the sewage).	57% of customers report having frequent challenges with pit emptying. The most common challenge, experienced by 36% of customers, is the presence of waste in the sewage, followed by bad smell (15%) and presence of dry sewage (15%). The presence of waste in the sewage is linked to a slightly longer duration (2.14h on average vs 2.03h for those without this issue), and more so when combined with the presence of dry waste (2.58h on average for customers with both issues). Customers living in poor-very poor areas are less likely to have waste in the sewage than those in middle-rich areas (26% vs 42%), but customers with pits are more likely to have waste (39% lined and 38% unlined) than those with septic tanks (11%). There is no clear linkage between price paid and challenges encountered (e.g. presence of waste).

2.c.2. Unit economics: what are levers to improve profitability? – findings from pit emptiers

	Malawi	Uganda
REVENUE DRIVERS		
Type of clients	Emptiers who also serve businesses have more clients (median 576) and higher revenue (median USD35k) than those who only serve households (median 96 customers and USK11k revenue), but are less profitable (median USD600 vs USD1.5k profit, and 2% vs 15% margin)	Emptiers who also serve businesses have more clients (median 654) and higher revenue (median USD179k) than those who only serve households (median 384 customers and USK58k revenue), but are less profitable (median USD-36k vs USD7k profit and -47% vs 20% margin)
Type of latrines	Emptiers doing mostly pit latrines have lowest customers (median 96) and revenue (median USD11k); the 1 emptier doing mostly septic tanks has most customers (1008) but intermediate revenue (USD33k), while those doing a mix have medium customers (median 441) and highest revenue (median USD99k). In terms of profitability, those doing a mix perform best (median USD47k profit and 26% margin), followed by those doing mostly pit latrines (median USD1.5k profit and 15% margin), while the 1 doing mostly septic tanks performs worst (USD600 profit and 2% margin)	Emptiers doing mostly pit latrines have lowest customers (median 288) and revenue (median USD41k); the 1 emptier doing mostly septic tanks has medium customers (720) and highest revenue (USD341k), while those doing a mix have most customers (median 1008) and highest revenue (median USD58k). On profitability, those doing a mix perform best (median USD 47k profit and 26% margin), followed by those doing mostly pit latrines (median USD1.5k profit and 15% margin), while the 1 doing mostly septic tanks performs worst (USD 600 profit and 2% margin)
Customer income	The 1 emptier who serves mostly high-income areas performs the best (1k customers and USD33k revenue), followed by those serving mostly low-income areas (median 184 customers and USD14k revenue), while those doing a mix perform the worst (median 80 customers and USD7k revenue). However, the latter are the most profitable (median USD6k profit and 58% margin vs USD600 and 2% for high-income and USD1k and 10% for low-income)	The 2 emptiers who serve mostly high-income areas perform the best (median 1.7k customers and USD174k revenue), followed by those serving mostly low-income areas (median 856 customers and USD107k revenue), while those doing a mix perform the worst (median 384 customers and USD41k revenue). This holds true for profits (median USD136k for high-income, USD31k for low-income and USD-1.5k for mix), while in terms of margin emptiers serving low-income areas perform better than those in high-income areas (median 32% vs 19%), with those doing a mix perform the worst (median -4%)
Average nr barrels per manual customer	The median number of barrels removed per manual customer is 10.3. Emptiers removing on average 10 barrels or less per customer are less profitable (median USD500	The median number of barrels removed per manual customer is 11. Emptiers removing on average 10 barrels or less per customer are less profitable (median USD5k

	profit and 8% margin) than those removing on average more than 10 barrels (median USD3.7k profit and 15% revenue).	profit and 12% margin) than those removing on average more than 10 barrels (median USD46k profit and 55% revenue).
Average revenue per customer	The median revenue per customer is USD93. Emptiers earning more than USD100 per customer have highest profit (median USD6.4k) but intermediate margin (median 15%); those earning between USD50-100 per customer have intermediate profit (median USD5.9k) and highest margin (56%), while those making less than USD50 per customer are the least profitable (median USD400 profit and 2% margin)	The median revenue per customer is USD86. Emptiers earning more than USD100 per customer have highest profit (median USD25k) and margin (median 33%); those earning between USD50-100 per customer have intermediate profit (median USD6k) and margin (23%), while those making less than USD50 per customer are the least profitable (median USD-4k profit and -44% margin)
Other services	Emptiers that only do pit emptying (20% of total, vs 60% when they started their activity) have more customers (median 548) and higher revenue (median USD22k) than those that also offer other services have fewer customers (median 184 customers and USD14k revenue). However, those offering other services are more profitable (median USD3k profit and 14% margin vs USD1k and 9%). Among emptiers that also offer other services, the revenue from those is always much smaller than pit-emptying revenue (1-10% of total among “typical” profitable emptiers, with only 1 exception where it’s 29%). The margin tends to be better for other services than for pit-emptying.	Emptiers that only do pit emptying (33% of total, vs 20% when they started their activity) have more customers (median 2.1k) and higher revenue (median USD128k) than those that also offer other services (median 384 customers and USD41k revenue). They are also more profitable (median USD32k profit and 21% margin vs USD-1.5k and -4%). Among emptiers that also offer other services, the revenue from those is always much smaller than pit-emptying revenue (5-12% among “typical” profitable emptiers). The margin tends to be worse for other services than for pit-emptying.
COST DRIVERS		
Staff	Pit-emptying staff is the second biggest cost driver, representing in median 26% of total costs and 16% of revenue (among “typical” profitable emptiers). The spread across businesses is significant, reaching up to 50% of costs and 27% of revenue. These differences seem to be driven mainly by the level of compensation (cost per staff), and less by the number of staff. Other possible drivers are the type of vehicles/ equipment used (which affects how many people are needed), the number and size of the jobs and the geographical spread, but the limited sample does not allow to identify clear correlations. Pit emptiers that have a more fluid organizational model for their permanent staff have better profit margin (median 31%) than those with an organized structure (median 15%) and those with no permanent staff (median 4%).	Pit-emptying staff is the biggest cost driver, representing in median 51% of total costs and 25% of revenue (among “typical” profitable emptiers). The spread across businesses is significant, reaching up to 73% of costs and 65% of revenue. These differences seem to be driven mainly by the number of staff, and less by the level of compensation (cost per staff). Other possible drivers are the type of vehicle/ equipment used (which affects how many people are needed), the number and size of the jobs and the geographical spread, but the limited sample does not allow to identify clear correlations. Pit emptiers that have a more fluid organizational model for their permanent staff have better profit margin (median 36%) than those with an organized structure (median -50%) and those with no permanent staff (median -5%)
Vehicles (own vs rent)	Vehicles are the biggest cost driver, representing in median 34% of total costs and 15% of revenue (among “typical” profitable emptiers). The spread across businesses is significant, varying between 22-51% as % of costs, and 5-38% as % of revenue. Emptiers who own all their vehicles spend less than those who only rent, both as % of costs (median 25% vs 29%) and as % of revenue of costs (median 10% vs 14%). This is true despite the median per-vehicle cost (for a pick-up truck) is lower for a rented vehicle than for an owned one. Emptiers who own all their vehicles (20% of emptiers) are also much bigger (median 657 customers and USD99k revenue) and more profitable (median USD48k profit and 30% margin) than those who only rent vehicles (50% of emptiers) (median 88 customers, USD10k revenue, USD1.5k profit and 15% margin). Other possible key drivers of differences in vehicle cost are the type and number of vehicles used and the geographical spread, but the limited sample does not allow to identify clear correlations	Vehicles are the second biggest cost driver, representing in median 24% of total costs and 10% of revenue (among “typical” profitable emptiers). The spread across businesses is significant, varying between 7-41% as % of costs, and 6-27% as % of revenue. Emptiers who own all their vehicles spend less than those who only rent as a % of costs (median 20% vs 28%), but more as a % of revenue (median 17% vs 12%). This is true despite the median per-vehicle cost (for a pick-up truck) being higher for a rented vehicle than for an owned one. Emptiers who own all their vehicles (23% of emptiers) are similar in terms of number of customers to those who only rent (median 720 vs 688), but have lower revenue (median USD58k vs USD95k), profit (median USD5k vs USD54k) and margin (median 12% vs 57%). Other possible key drivers of differences in vehicle costs are the type and number of vehicles used and the geographical spread, but the limited sample does not allow to identify clear correlations

Distance office-customers	Among emptiers with an office, the average distance between office and farthest customer is about 100km. Those with customers within 100km from their office are less profitable (median USD600 profit and 4% margin) than those with customers beyond 100km (median USD51k profit and 57% margin). This can be possibly explained by the fact that those going to more remote areas do so for larger/ more lucrative / institutional jobs.	Among emptiers with an office, the average distance between office and farthest customer is about 70km. Those with customers within 70km from their office are less profitable (median USD4k profit and 11% margin) than those with customers beyond 70km (median USD28k profit and 13% margin). This can be possibly explained by the fact that those going to more remote areas do so for larger/ more lucrative / institutional jobs.
Distance office-dump site	Among emptiers with an office, the average distance between office and dump site is 15.6km. Those with dump site within 15km from their office are less profitable (median USD600 profit and 4% margin) than those with dump site further away (median USD51k profit and 57% margin)	Among emptiers with an office, the average distance between office and dump site is 6.7km. Those with dump site within 6.5km from their office are less profitable (median USD-2.5k profit and -19% margin) than those with dump site further away (median USD4k profit and 20% margin)
Dumping	Dumping fees represent in median 7% of total costs and 3% of revenue (among "typical" profitable emptiers), but can reach up to 19% of costs and 7% of revenue. Possible drivers are different tariffs for different types of vehicles, extra charges for 'problematic waste', or illegal dumping	Dumping fees represent in median 9% of total costs and 6% of revenue (among "typical" profitable emptiers), but can reach up to 22% of costs and 9% of revenue. Possible drivers are different tariffs for different types of vehicles, extra charges for 'problematic waste', or illegal dumping
Admin costs	Admin costs are normally a minor cost item (median 4% of total costs and 1% of revenue among "typical" profitable emptiers), but can be more significant for some businesses, reaching 11% of costs and 11% of revenue. This is mainly driven by renting an office (vs own office or no office)	Admin costs are normally a minor cost item (median 1% of total costs and 0.5% of revenue among "typical" profitable emptiers), but can be more significant for some emptiers, reaching 18% of costs / 16% of revenue. This is mainly driven by renting an office (vs own office or no office)
Office	20% of emptiers own an office, 30% rent one and 50% don't have any office. Those with own office have largest profit (median USD51k) and margin (57%) by far, followed by those without any office (median USD600 profit and 13% margin), while those renting an office are the least profitable (median USD600 profit and 4% margin)	29% of emptiers own an office, 43% rent one and 32% don't have any office. Those with no office have largest profit (median USD46k) and margin (median 55%), followed by those with a rented office (median USD32k profit and 21% margin), while those with own office are the least profitable (median USD900 profit and 3% margin)
Equipment	Emptiers who own a pick-up truck are less profitable (median USD500 profit and 3% margin) than those who don't (median USD4k profit and 36% margin). Results are similar for cesspool truck and tricycles. Emptiers owning a gulper are more profitable (median USD4k profit and 15% margin) than those who don't (median USD600 profit and 7% margin) (Note: this analysis simply compares those with and without a given kind of equipment, without accounting for the number of pieces and for what other kinds of equipment are owned).	Emptiers who own a pick-up truck are less profitable (median USD5k profit and 12% margin) than those who don't (median USD25k profit and 20% margin). Results are similar for cesspool truck, while emptiers owning tricycles are more profitable (median USD7k profit and 12% margin vs USD500 and -5%). Emptiers owning a gulper are more profitable (median USD7k profit and 29% margin) than those who don't (median USD-500 profit and -17% margin) (Note: this analysis simply compares those with and without a given kind of equipment, without accounting for the number of pieces and for what other kinds of equipment are owned).
Free vehicles/ free equipment/ financial support	20% of emptiers received free vehicles, 50% free equipment and 40% financial support. These are ranked 1 st /2 nd most useful support. 50% of emptiers prioritized free equipment for future support, and 50% access to credit to acquire vehicles. Link with business performance is unclear: emptiers who received free vehicles do better in terms of customers and revenue but not profitability compared to those who didn't, while the opposite is true for free equipment. Emptiers who received financial support perform worse on all metrics than those who didn't	Nobody received free vehicles. 38% of emptiers received free equipment and 15% financial support. These are ranked 1 st /3 rd most useful support. 15% of emptiers prioritized free equipment for future support, and 77% access to credit to acquire vehicles. Emptiers who received either free equipment or financial support perform better on all metrics (customers, revenue and profitability) than those who didn't

Section 3: Findings from the Blantyre field visit

3.a Blantyre pit emptiers' performance and operations according to category

Cesspool Tanker Operators

These are pit emptiers who form the highest level of the pit emptying business with more assets are compared to the rest. All emptiers under this category own offices specifically for this business and they operate as an independent entity. They have permanent employees; drivers and operators depending on the number of cesspool tankers. Owners of these businesses operate from the office and field work is mostly left for the employees. The driver is also entrusted to collect money from customers except in cases where they are working on contract basis and money is transferred directly to the business' bank account. The two (2) main reasons cited by Cess tank operators for turning down some jobs is hard to reach areas and unlined pits.

They serve big customers (in terms of volume), and the target market are big institutions including schools, hospitals, companies, and households with septic tanks. These customers form about 35% of the market in terms of numbers, but they contribute the largest volumes of sludge at the dumping site, which translates into more cash realised from this market. Stability of sales trends throughout the seasons for these businesses is catalysed by number of contracts they have with customers. The customers on contract are institutions and companies with less than 20% being households.

The main costs that these entrepreneurs incur are salaries for the employees whom they have maintained throughout the years. This means that charging prices according to the size of the tankers leaving equally important factors like specific salaries of team involved and distance covered (fuel) is risky and can easily lead to making losses. This is another aspect that differentiates emptiers under this category in terms of profitability. Additionally, these emptiers aspire to increase number of Cesspool tankers to serve more customers. However, this study revealed that the driver for profitability for the business is in increasing number of customers on contract. Considering they already operate efficiently, with maximum of 1 hour per customer, increasing customers served per day will boost the profits they make. Further lessons from one entrepreneur whose business made losses in subsequent years following procurement of an additional tanker without having garnered more customers, and/or with not enough extra customers, to cover the costs of the tanker.

Gulper operators with mode of transport

These are emptiers who operate using gulpers and they own pick-up trucks which they use to transfer sludge to treatment plants. The business owners themselves are drivers of the trucks and they support in the field though in their absence, they still hire a driver. They collect cash from customers themselves. They target both big customers (i.e., institutions, companies, and septic tank owners) and they also serve small customers in hard-to-reach areas. Despite their operational area being Blantyre, these emptiers can also serve customers in other surrounding districts. During busy days, they divide their operators into teams to serve more than one customer at a time.

Fuel and salaries are major costs thereby profitability is driven by volume they carry per trip and distance to the treatment plant. They can turn down jobs because of distance and low prices.

This therefore gives room for clustering as a strategy for increased sales. The clustering strategy is further extended to incorporate utilizing a single trip to serve more customers in the neighbourhood and/or on route to the treatment plant.

Gulper operators with no mode of transport / The budding entrepreneurs

Blantyre City Council (BCC) is the Service Authority mandated to offer the pit emptying service to its residents. This is according to the local government policy. In the recent years, the city has seen an ever-growing demand for the service, and this brought business opportunity as BCC could not manage to serve the whole market. This saw some entrepreneurs coming in and these were later incorporated/recognized by BCC on condition that they adhere to Standard Operating Procedures (SOPs). The focus was to ensure safe emptying and dumping is happening. Transportation of sludge emphasized on ensuring that they use sealed drums to transfer sludge to the treatment plants. This means that owning means of transport was not tied to the business as one of the requirements to operate the business.

Water For People has been working with BCC identifying and training individuals interested in the business. These include those who cannot manage to own means of transport for starters. The emphasis has been to ensure that they safely transfer the sludge to the treatment plants which means using hired means of transport. This therefore makes the third category of pit emptiers. As of January 2021, 60% of pit emptiers in Blantyre fall under this category, but with new entrants, the percentage must have changed. As much as occasionally these emptiers get to serve big customers (on average once a month), their main target market are the households in peri urban areas, mostly hard to reach areas who have their pit latrines lined or unlined. They are the ones with the highest operational costs such that for a single trip to the treatment plant to be profitable, the minimum they can empty, and carry is 5 drums.

As much as transportation remains the main challenge for this third category, The study has shown that these entrepreneurs have devised means for profitability/ sustainability of their businesses which includes the following.

- They have commission based temporary employees who they also use as agents for promotion and finding customers.
- The business owners are also operators, forming part of the team on the job and they are also agents for business promotion.
- They also work as temporary employees for other entrepreneurs from time to time. This boosts their income for the pit emptying service. One entrepreneur admits this has helped him survive in the business as much as he relies on his independent jobs.
- They take transportation of sludge to the treatment plant as an option which the customer must choose thereby attracting a higher price for the customer. The other option that they provide is for the customer to provide land nearby where the emptiers can dig and bury which saves the transportation cost and allows the customer a lower price. This has further been confirmed by the list of entrepreneurs frequenting the treatment plants which is on average 4 entrepreneurs per day, which does not match with the number of customers served per month as provided by the emptiers. The probability of illegal dumping is even high in cases where the customer has requested for emptying less than 5 drums which then does not cover transport costs of the entrepreneur unless serving more than one customer per trip and clustering.

Overall, the study has shown that all the pit emptiers are operating other businesses aside pit emptying just differing in terms of size of those other businesses and whether they are sanitation related or not. As much as it is easier for Cesspool tanker emptiers to separate other businesses from pit emptying, it is hard for these entrepreneurs to differentiate expenses and income from those other businesses to those of pit emptying. Therefore, as much as they are still profitable overall, there is need for further bookkeeping training for easy tracking progress of pit emptying as an independent business.

In terms of promotion, All the pit emptiers who participated in this study have at some point invested in certain demand creation activities. Conducting door to door campaigns and distribution of flyers ranking high amongst them all. This strategy does indeed drive sales even though the emptiers admit with economic crisis, this does not always translate into sales. In terms of ranking, this strategy works better for the small entrepreneurs who are ready to accept small jobs. This strengthens the idea of utilising cluster marketing to increase sales for these emptiers. A plan to accept small volumes for nearby households will lead to increased sales and possibly repeat sales for the small emptiers. It should be noted that when conducting promotion through door-to-door campaigns, the same people who do the actual pit emptying job are the ones who support in conducting the door-to-door campaigns on commission basis. This shows that in Blantyre, the pit emptying business has not yet reached a stage of attracting special middlemen as marketing agents, making it either still small and/or not yet attractive. Water for people once used Government extension health workers (Health Surveillance Advisors) to conduct awareness campaigns through road shows and door to door campaigns and connected this to a call centre line. This according to the entrepreneurs led to additional sales in the targeted areas but still cannot assure repeat sales. Additionally, Water For people and other WASH organizations previously supported the entrepreneurs with a voucher system as an awareness campaign to drive demand. As much as it was not a cost- effective marketing strategy, the respondents who took part in the campaign admit that it indeed increased their sales for the period that was provided but they say it was a one-off benefit as there has not been sales from the same customers afterwards. Follow-ups with those customers indicate despite their full knowledge that they were paying at a subsidized price then, that is the only price they can be comfortable to pay for the service and the real prices are deemed expensive. This proves that as much as the voucher system is used to trigger the market for increased demand, it is not a cost-effective marketing and/or business development strategy in the long run. All in all, With the other strategies having been tried and provided successful for the period, it is proven that continued sales for pit emptying business requires retaining current customers through building business relationship with them, and for big customers; striking contracts with them. Generally, in as far as current emptiers can find customers on their own through the low-cost promotion strategies, support from BCC and NGOs should be to enhance awareness campaigns on the legality of the pit emptying service and how it is done. Additionally, the stakeholders need to focus on bringing on board the illegal emptiers through enhanced capacity building to assure their safety and promote pit emptying service provision that make business sense for sustainability.

The study has shown that as much as the power of price setting lies in the hands of the entrepreneurs, existence of illegal emptiers affects their profitability as it gives the customers cheaper option for the service.

3.b Pit emptying as a service

With lessons from the effects of climate change i.e., Cyclones / heavy rains which leads to collapsing of poorly constructed pit latrines, there has been an increase in number of permanent latrines with lined pits constructed. On the other hand, with the existence of a more than 40-year-old sewer line system in the city of Blantyre, majority of the houses constructed afterwards are not connected to this sewer line and they have septic tanks. These two factors, aside of increase in population in the city have boosted up the pit emptying market with a possible 66% untapped market; other things constant and incorporating even those that might get the service from illegal emptiers (sanitation Market assessment Dawn consultants,2021). The willingness to pay which is pinned at 63% also gives confidence in sales for the pit emptying business.

The sanitation entrepreneurs work hand in hand with BCC as a regulatory body. They are also supported in capacity building by WASH NGOs operating in Blantyre. Progressively, the attractiveness of the business has been recognized through the number of new entrants who are joining without any support from either

BCC or the NGOs. The increase in the amount of sludge being dumped at the treatment plants is another sign of the need and acceptance of the business by the market.

In terms of the processes for service delivery, Payment of the dumping fees is done at Blantyre City Council (BCC) offices which means that for every trip to the treatment plant, the pit emptiers need to pass by the BCC offices and make their payment, then proceed to the treatment plant to dump. This process has further increased operational costs for the pit emptiers as much as it is not efficient. A proposal is made by the entrepreneurs to switch to mobile payment to speed up the process. Additionally, as much as the dumping fees is not a highly ranked cost for the entrepreneurs, it still takes around 15 to 20% of revenue from the emptiers, making it an equally heavy cost driver. This further affects small entrepreneurs' profitability thereby lowering chances of the entrepreneurs utilizing the treatment plants.

Although the study hasn't found the extent, all pit emptiers agree to the existence of illegal emptiers who offer lowest prices making it hard for competition. This they agree that the major threat to the sustainability of the pit emptying businesses are the illegal emptiers who are also known as "frogmen". It was not clearly ascertained during this study whether the registered pit emptiers have at some point in time practised illegal emptying and/or illegal dumping. As much as BCC conducts field visits to enforce adherence to standard operating procedures and once trained the emptiers on these, absence of enforced penalties to dodgers gives room for continuity of the practice.

All Gulper pit emptiers who participated in the study admit that the major complaint from customers is the issue of fluidization and time taken to complete pit emptying especially for the gulper emptying. This brings the issue of technology used to for emptying. As much as the entrepreneurs admit using the gulper when emptying (the extent to which they use the gulper is still a puzzle to be solved), bringing in complaints on the technology from customers indicates justification for the cases when possibly the gulper is not used. As much as it is promoted by both BCC and Water For people, there is need to fast-track the process of rectifying the challenges faced, for assurance of continued safe pit emptying.

Sanitation entrepreneurs in Blantyre formed an association called Pit Emptiers Association (PEA) with support from Water For People. The benefits of the association cited by the entrepreneurs include but not limited to access to trainings, renting equipment and knowledge sharing with 70% saying it is beneficial to be a member of the association. The remaining 30% feels their expectations are not fully met by the association, hinting at the need for more collaboration in lobbying for decreasing licence and dumping fees by the council. As much as it is recognized by BCC, operations of the association are not fully utilized by BCC to promote legalization of pit emptying in the city. This then leads to a situation of there being not much difference whether an entrepreneur is a member of the association or not. If stakeholders, including the entrepreneurs themselves give it the vibrancy it needs, it can be a channel to address some of the challenges being faced for example illegal pit emptying through working hand in hand with the Council.

3.c The Kampala and Blantyre pit emptying markets compared

This section compares the two markets in terms of operations and business performance as well as pit emptying as a service.

The Service authority

The presence of committed regulatory bodies in both Kampala and Blantyre plays a very important role in performance of pit emptying businesses. It is very clear how service authorities have made and/or still make an impact in ensuring sustainability of the pit emptying business by creating a good business environment. In Kampala, despite the dumping bay being operated by the GAU, it is clear that KCCA plays a bigger role in regulating the operations of the pit emptying business. It is further noted that they support

in different marketing strategies to increase demand for pit emptying business. With all the support the pit emptiers get from the service authority, it is good to appreciate that the market for the pit emptying business is well established. This assures KCCA to be more of a regulatory body than directly being involved in the performance of the pit emptying market. Similarly, BCC works hand in hand with other stakeholders in regulating the pit emptying business. Despite this, there is still a need for enhanced enforcement of regulation to ensure adherence to standard operating procedures. Additionally, there is need to enhance the process of identification, training and registration of all emptiers to increase levels of formality of the business.

The association

The roles of association of pit emptiers in both Kampala and Blantyre are clearly outlined and known by all the members. What differentiates the 2 associations apart from size in terms of membership (with Kampala having more members than Malawi), is the extra role of GAU in operating the dumping bay in Kampala. This makes it easier for them to enforce membership and adherence to standards for all gulper operators. On the other hand, this restricts new entrants into the market who could not have the capacity to acquire all the requirements at once. Differently in Malawi, despite PEA working hand in hand with BCC, it does not have any control of the treatment plants. On top of this, membership of the association is not enforced making it easier for new entrants on the market, while on the other side making it harder to fully formalise the sector.

Secondly, as GAU in Kampala only focuses on the gulper entrepreneurs, Blantyre's PEA membership involves all entrepreneurs in the pit emptying business from those using cesspool tankers to those who use gulpers. This allows sharing of knowledge and inspiration and allows coordination in addressing issues affecting their businesses. The challenge becomes commitment by all members when it comes to addressing problems faced by a single category of the pit emptying business. Members will be more committed to participate in issues that affect their business as compared to those that affect their competitors only. On the other hand, the GAU is a representation of all gulper operators giving them a common ground. As strong as it is, it brings together all emptiers and creates an environment that allows smooth operations of the businesses. For a coordinated and collaborative sector, there is need to still create a platform where all the pit emptiers will be able to meet and address at issues and inspire each other as a single unit.

Transport

In the sanitation value chain, transportation is the third step which involves transferring all the collected faecal sludge to the treatment plants. It is a requirement therefore for pit emptiers to figure out way in advance how they will conduct this transfer. Comparing the two markets, it comes out clearly that in Kampala, all pit emptiers own a means of transport, ranging from cesspool tankers, pick-up trucks and/ tricycles. In one way, ownership of these transportation means gives assurance of transfer of sludge taking place from where emptying has taken place to dumping site as the vehicle provides identity of the owners who are already known by the Council. This clearly ousts those individuals who can claim to be doing pit emptying business without mode of transport. This is not the case in Malawi where to begin with, tricycles have not yet been introduced into the pit emptying business leaving pick-up trucks and cesspool tankers as means of transport for the entrepreneurs. Furthermore, with only few entrepreneurs (40%) owning means of transport, the pit emptying service provision in Malawi involves those entrepreneurs who rely on hiring means of transport from elsewhere. Confirmation of these entrepreneurs not practising illegal dumping are the records at the treatment plants showing their names.

Promotion and power of price setting

It is agreed both in Blantyre and Kampala that one to one strategy of promoting pit emptying is more effective as compared to the billboards/ Television adverts. However, the study noted that in Kampala the pit emptying market has been introduced to middlemen (“brokers”) who support in finding customers and negotiating prices leaving the emptiers to only focus on providing the actual pit emptying service. This has somehow taken the power of price setting from the hands of the emptiers into the hands of the agents plus customers. The advantage of presence of the agents is that it takes some pressure off the shoulders of the entrepreneurs and assures them of availability of customers with a fixed cost of promotion. As long as the emptiers make profits out of the agreement, and the customer agrees and is satisfied with the service offered, continuity of the business is a guarantee. In Blantyre, the supply sector has not yet been introduced to special middlemen apart from the people already working with the emptiers as operators. This allows for room for a special business relationship between the customer and the entrepreneur.

Recommendations

From the study conducted, it is prominent to say that sanitation and hygiene stakeholders in Blantyre have managed to develop a market for the pit emptying service. The supply side of the market consist of diverse/ different business models/technologies which the customers can choose from mostly according to type of latrine(lined or unlined pit) and road access. It is also prominent also that all pit emptiers have the capabilities of making profits from the pit emptying business despite differences in the models, technology and size of business. This confirms the revelation of this study that there is no ideal profile of a pit emptier.

For business profitability, From this study, it is evident that the highest driver of profitability for the pit emptying business is number of customers. With this revelation, pit emptiers need to focus more on growing their businesses through increament of customers they serve. This means that growth in terms of equipment (more gulpers, additional tankers) and/or additional operating teams need to come into consideration only when the business is oversaturated with customers.

For demand creation, The study has shown that word of mouth, which is a low cost promotion strategy is the main channel that result into sale. Sanitation stakeholders in Blantyre have done a tremendous job in suporting he pit emptiers in several demand creation campaigns. It is good to invest in those that yield result than to focus only on those once off expensive strategies. it is good to emphasize also the need not to look at voucher system as a market development tool rather than a once off awareness campaign strategy for the not yet developed markets, of which Blantyre does not fall under. It is also a wake up call for the pit emptiers to invest more on result oriented marketing strategies as increase in customer is a profitability driver of their business

For operation costs, with transportation remaining a major cost driver for the pit emptying business and affecting mostly the gulper entrepreneurs who have no means of transport, It is imperative then to find out means of dropping down its impact. Firstly, BCC as a service authority will needs to support in terms of additional infrastructure (dumping sites) placed strategically, which apart from addressing the issue of high transportation costs might also be means of encouraging illegal emptiers to start dumping legally. Secondly, for a formal pit emptier, who does not engage in illegal emptying, it is necessary to ensure they always line up their work on daily basis in such a way that by the time they reach the dumping site, they have emptied enough drums to cover the operation costs. Clustering customers according to location could help in efficiency. Lining up customers on route to the dumping site is one effective way which will help ease down the transportation costs.

The PEA provides good opportunities for its members but moving forward, there is need for the association to work closely with the council in ensuring identification and registration of all pit emptiers operating in the city. This will help in easy follow-up and enforcement of the SOPs. As much as it cannot be determined to what extent awareness campaigns of the SOPs could enhance legal emptying, it is important to ensure households are aware of the availability of legal emptiers who work hand in hand with the council.

All in all, having setup a vibrant pit emptying market in Blantyre, it is good time for stakeholders (NGOs and Government) to note the next responsibility of investing more on structure development, to ensure a good environment for the business is provided, other than issuing out handouts which still compromises the already developed market. With the different models which have great chances of survival, the next steps of scaling pit emptying market development will need to focus more on system development, capacity building, awareness and availability of infrastructure rather than supporting entrepreneurs directly with handouts which does not ensure sustainability of the businesses.

Annexes

1. Pit emptying study - End users analysis FV.xlsx
2. Pit emptying study - Emptiers analysis FV.xlsx
3. Pit emptying study - Emptiers P&L FV.xlsx