

FSM

INNOVATION

Dakar: Organising the Faecal Sludge Market

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EXECUTIVE SUMMARY

Sanitation in Senegal is managed by the National Sanitation Office (ONAS), which in 2011 initiated the Faecal Sludge Market Structuring Programme in the peri-urban areas of Dakar, as it started to assume greater responsibility for on-site sanitation, in addition to sewerage and drainage. The programme is wide-ranging and includes: rehabilitation and delegation of the management of Dakar’s faecal sludge treatment plants to the private sector; upgrading of the dilapidated fleet of vacuum tankers owned by the private sector through the establishment of a guarantee fund to facilitate repairs and the purchase of newer vehicles; increasing service quality by certification and regulation of vacuum truck operators; and streamlining of the faecal sludge collection and transport market with a call centre, all backed by a promotion and marketing campaign.

The programme resulted in the transfer from using manual emptiers (who serviced almost half of the total market) to vacuum truck operators, and, by operating online bidding through the call centre, further resulting in reduced emptying prices by about 20 percent. The faecal sludge treatment plants (now managed by the private sector) are operating well and producing a profit for ONAS and the delegated private sector managers, as compared to their highly degraded status prior to the programme. They are also selling dried sludge to the agricultural market. The loan guarantee fund facilitated the purchase and import of 26 vacuum tankers, significantly improving service quality for the city. Current challenges include establishing a sustainable business model for the call centre after external funding is withdrawn. Important lessons from the experience include the importance of a strong partnership with the faecal sludge collection and transport service providers, and the need for continuous sanitation promotion and active dialogue with the service user communities.

CONTEXT

Dakar, the national capital, is home to almost half (49.6 percent) of Senegal’s urban population. Dakar Region is 96.4 percent urban and has a population of

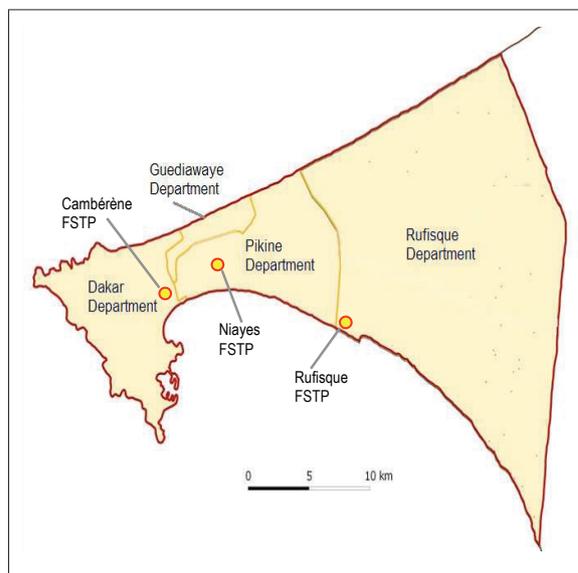


Figure 1: Faecal sludge treatment plants and departments in Dakar region

3,137,196. Senegal’s gross national income per capita is estimated at USD 980¹, with one in four residents of Dakar falling below the poverty line. Much of the work reported here was focused on Pikine and Guédiawaye (marked with a dashed line on the map), two of Dakar region’s four administrative subdivisions or departments, which have a combined population of 1,421,060 (Senegal National Census, 2013). To the west lies the department of Dakar, which includes the city centre, and to the east the department of Rufisque, consisting of the urban fringe and a few rural communities.

OVER 75 PERCENT OF DAKAR’S TOTAL POPULATION USES ON-SITE SANITATION FACILITIES FOR THE MANAGEMENT OF DOMESTIC WASTEWATER

Over 75 percent of Dakar’s total population depends on on-site sanitation. In Pikine and Guédiawaye, 96 percent are served by on-site systems, while in



Figure 2: Manual emptying

the city centre, about 60 percent are connected to sewerage. The production of faecal sludge is estimated at 1,130 m³/day for Pikine and Guédiawaye and about 1,500 m³/day for the whole city (Tounkara, 2007).

Sanitation in Senegal is managed by the National Sanitation Office (ONAS). Its major focus was on sewerage and drainage, but it has gradually been taking on responsibility for on-site sanitation as well. In 2011, ONAS initiated the Faecal Sludge Market Structuring Programme (PSMBV) in Pikine and Guédiawaye, where the majority of poor people and on-site sanitation users are concentrated. This includes making the faecal sludge collection and transport market more efficient, improving service quality and upgrading faecal sludge treatment.

FSM SERVICES

Prior to the PSMBV, just over half of the faecal sludge was collected by about 150 ageing vacuum trucks in an unregulated market, and dumped at three poorly functioning treatment plants or directly into

the environment. The rest (43 percent) was emptied by informal manual emptiers and buried or dumped nearby.

Due partly to the high water table, on-site household sanitation facilities in Dakar are typically emptied once or twice per year. Manual emptying remains the cheapest option and continues to be widely practiced despite serious health and environmental implications. The high prevalence of manual and informal emptying means that a substantial proportion of the faecal sludge produced is not safely treated and disposed of. It also reduces the potential for economies of scale in the re-use market. The manual emptying market is estimated to have an annual value of about USD 2.3 million². The low affordability of mechanical emptying is aggravated by weak competition between emptiers in the market, and to the mismatch between the prices charged (about USD 50.00 per emptying) and the incomes of a large segment of the population (the majority earn less than USD 2.00/day). By comparison, manual emptying costs about USD 20.00.

Most (68 percent) of the vacuum truck operators have a single truck, mainly due to difficulties mobilising financial resources. Renewing their trucks, most of which are old (the average age is 25 years) and unfit for business, is not easy. Thus, in addition to the health and environmental hazards posed by these trucks, their operating costs are high, with repairs and maintenance accounting for 7–12 percent of operating costs, and fuel for 34–41 percent.

The operators have great difficulties accessing bank credit. Bank loans are subject to officially declared incomes adequately covering loan costs or a guarantee equivalent to at least twice the amount of the loan.

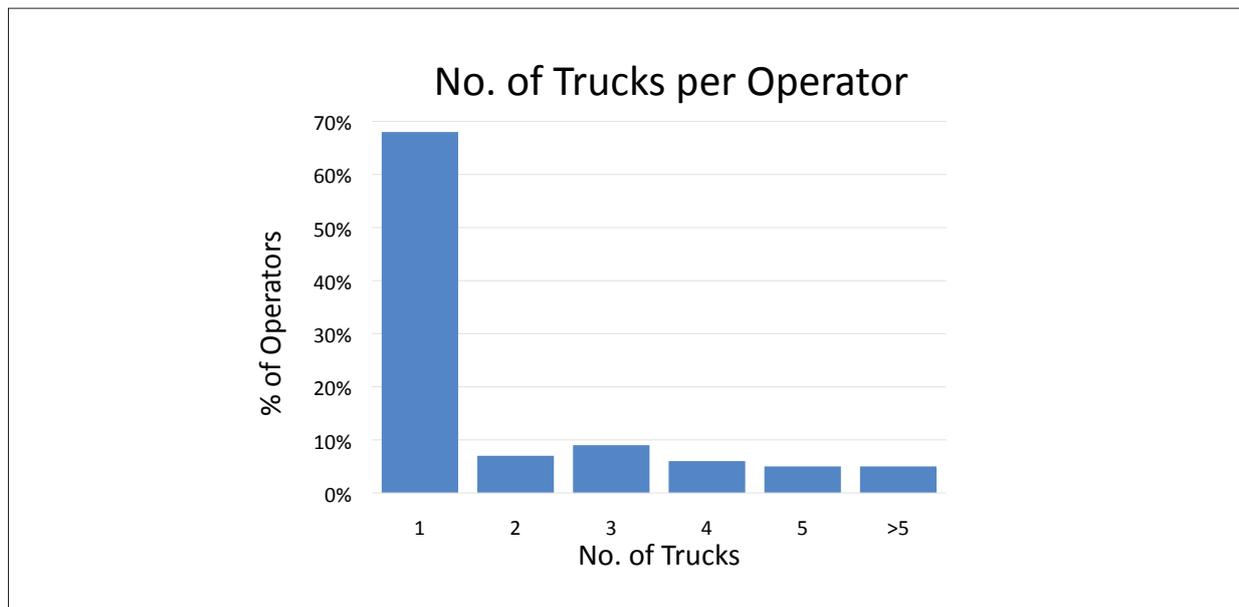


Figure 3: No. of trucks per operator



Figure 4: Damaged cover, Cambérène FSTP



Figure 5: Damaged drain, Rufisque FSTP

However, as most of the operators work in the informal sector, they cannot meet these criteria. About 91 percent of trucks are purchased using the operators' own resources, or through operations combining equity financing and borrowing from a third party (relative, friend, business associate) based on trust or debt agreements signed by both parties. Only three percent of trucks was purchased entirely with a bank loan, and six percent with a partial loan.

ONAS has three faecal sludge treatment plants (FSTPs) designed for a total aggregate flow of 220 m³/day and built within the Cambérène, Niayes, and Rufisque wastewater treatment plants (see map). Prior to the PSMBV the three FSTPs were in a state of advanced deterioration (see figures 4 and 5), and seriously overloaded, receiving about 530m³/day. Under the direct management of ONAS, the FSTPs had virtually no systematic management, little maintenance, a general lack of staff personal protective equipment (clothes, gloves, helmet, boots, masks, etc.), obsolete and broken down electromechanical equipment, and no offices and equipment for basic administrative tasks.

In 2013, prior to the introduction of delegated management by the private sector, receipts across the three FSTPs totalled USD 113,288. These were derived almost entirely from tipping fees, with a trivial

USD 623 from the sale of dried sludge. Their net profit of USD 7,100 was relatively meaningless given the very poor state of the FSTPs.

INTERVENTIONS IN THE FSM MARKET

In 2000, the Government of Senegal set up an extensive programme to improve sanitation in the peri-urban districts of Dakar (PAQPUD). The CFA 20 billion (USD 35 million) programme financed by the World Bank covered 32 peri-urban communities, reaching 22 percent of households not served by the sewerage system. A total of 66,732 individual facilities, 16 public toilets, 76 school sanitary blocks, three FSTPs and 130 semi-collective systems were built.

Following on from PAQPUD, in June 2011 ONAS, which is responsible for all urban sanitation (both sewered and non-sewered sanitation), organised a workshop to define a project to achieve universal access to mechanical emptying services. The operators and other sector stakeholders at the workshop formulated priority actions to improve performance in this sector, which ultimately resulted in the PSMBV, managed by ONAS with financial support from the Bill and Melinda Gates Foundation. The project addressed all of the issues outlined above, focusing on the departments of Pikine and Guédiawaye, which account for most of the on-site sanitation in the city. It consists of a set of complementary actions contributing to two apparently incompatible (but actually mutually reinforcing) objectives: (i) to provide a good mechanical emptying service at the lowest possible cost to low-income urban residents; and (ii) to help increase the incomes of the mechanical emptiers. The structure of the program is presented in figure 6.

ONAS ORGANISED A WORKSHOP TO DEFINE A PROJECT TO ACHIEVE UNIVERSAL ACCESS TO MECHANICAL EMPTYING SERVICES

Call centre

The call centre is both an intervention and a research tool, with the dual purpose of streamlining the mechanical emptying market in Dakar and identifying effective strategies that can be replicated elsewhere. Specific objectives of the call centre are to:

- Establish healthy competition between the emptiers, thus reducing the cost of mechanical emptying
- Facilitate the relationship between the emptier and the household, and improve the quality of service

- Increase the mechanical emptiers' market share, so as to increase their incomes and reduce manual emptying
- Serve as an action research tool in support of the above objectives

The call centre was implemented in three stages as outlined below:

Preparatory activities

This phase lasted 20 months and included the following activities:

- Identifying emptying companies in the Dakar region, their staff, and their trucks. The emptiers have been fully involved in the process
- Registering the GPS coordinates of the on-site facilities of 60,000 premises in the target area
- Identifying (name, phone number) of people involved in making decisions on pit emptying in the 60,000 premises surveyed
- Geo-referencing primary and secondary reference points through their GPS coordinates. These points are used to help emptiers easily locate the household
- Designing and pre-testing the call centre platform
- Training of the vacuum truck operators to promote their effective participation in bids mediated by the call centre

- Physical establishment of the call centre (premises and equipment)
- Recruiting and training call centre supervisor and operators.

Operation of the call centre

The system links the customer and the emptier, and works via SMS on any mobile phone. Customers wishing to empty a septic tank or pit call the centre, provide key information about the household and the pit, and confirm the date and time it is to be emptied. The call centre then invites the emptiers by SMS to submit quotations for the job. At the end of the bidding period (typically about two hours), the centre notifies the customer the lowest bid, for the customer to accept (or not). After the service has been delivered, the call centre carries out quality monitoring by phone with the household and the emptier.

This bidding for emptying services through a call centre is highly innovative and has since been replicated in other countries. The service model – ordering a service using a mobile phone – is unfamiliar to the majority of Senegalese. To reduce the risk of failure, the call centre was put into operation in three successive phases: beta, pilot, and going to scale.

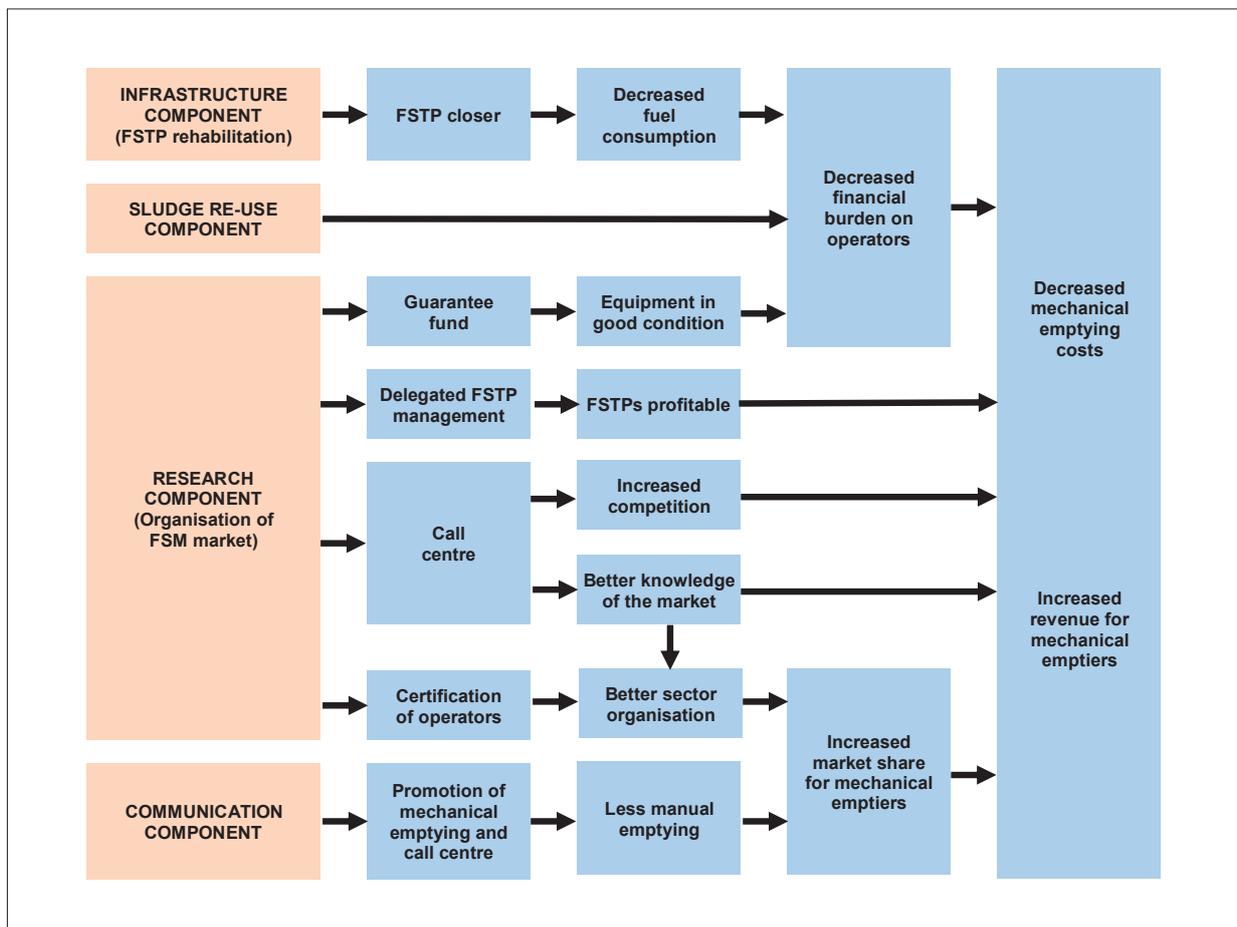


Figure 6: Components of the Faecal Sludge Market Structuring Programme (PSMBV)

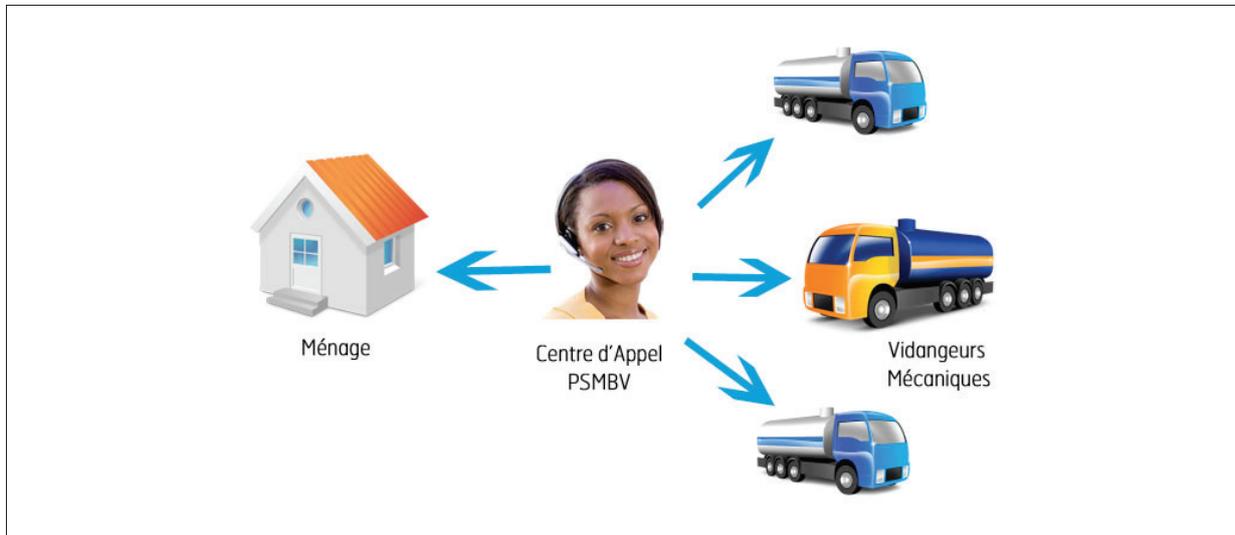


Figure 7: Call centre

- **Beta phase:** This lasted approximately one month, and consisted of technical testing of the call centre tools on a small scale, and the initial training of the call centre staff. To generate demand for services, the centre was actively promoted in 150 households through posters, SMS and home visits.
- **Pilot phase** This was a five-month practical test of the operation of the call centre tools targeting a specific and favourable population, still on a small scale, but in a larger area than for the beta phase. Training of the call centre staff was completed, and preliminary information was collected on the impact of the call centre on emptying prices. During this phase, the call centre was actively promoted to 2,000 target households.
- **Going to scale:** This twenty-month stage expanded the call centre services throughout the program area (Pikine and Guédiawaye), with information and awareness campaigns actively promoting the call centre, and mechanical emptying in general. Lessons learned in the beta and pilot phases were used to improve the service and prepare for the at-scale operation.

THIS BIDDING FOR SANITATION SERVICES THROUGH A CALL CENTRE IS HIGHLY INNOVATIVE

In addition, daily monitoring of call centre activities was carried out, to inform the gradual improvement of its platform and procedures. A business model was developed at the end of the scaling stage in order to clarify, among others, issues related to the management of customers, emptiers, and customer/

emptier relations, and the feasibility of covering the operating costs of the call centre.

Support activities

Support activities aimed at reinforcing the effectiveness of the call centre were carried out simultaneously through other components of the PSMBV, including:

- Gradual improvement of the call centre platform based on daily monitoring
- Communication campaigns to promote mechanical emptying and the call centre
- Establishment of a guarantee fund to promote the renewal of emptying equipment
- Real-time GPS tracking of emptying trucks
- Initiation of the certification process for emptying companies

These supporting activities acted as catalysts and contributed significantly to developing the emptiers' ownership of the call centre.

Preliminary impact of the call centre

The call centre has given a touch of modernity to the Senegalese faecal sludge sector. It has also enabled many households to access mechanical emptying services and established healthy competition among the emptiers. A rapid assessment shows a downward trend in the prices offered through the call centre. The average price of an emptying by an 8m³ truck has decreased from USD 50.00 before the programme started to USD 40.00 after three years' implementation.

In total, between 2013 and 2015, more than 3,537 auctions were held, of which 972 (31 percent) resulted in an emptying operation. The number of calls peaked in 2014 at 2,282, which is attributed to the communication campaign in 2014. It should also be noted that the 2014 rate of 21 percent of calls

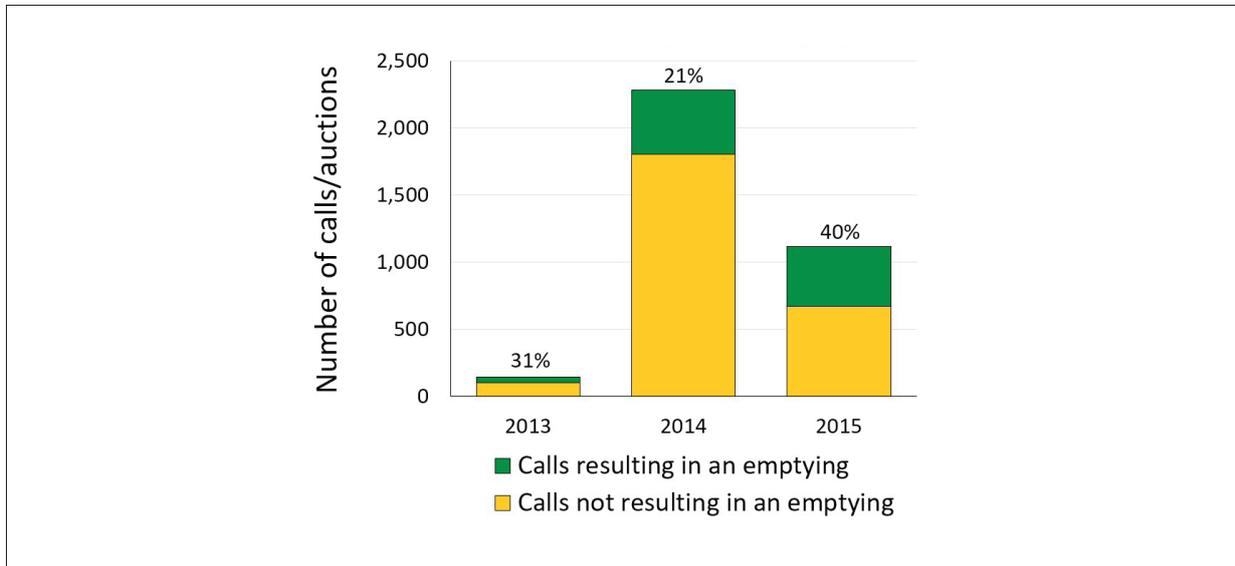


Figure 8: Calls leading to emptying

resulting in an emptying is low compared to the 2015 rate of 40 percent, when there was less promotion of the call centre. The target population appears to have adopted the call centre by 2015, but it is clearly important to continue with an active communication campaign to maintain their interest and increase the volume of calls.

The call centre database covers the 60,000 premises surveyed and 138 vacuum trucks. All registered trucks were invited to join the network and therefore available to bid for emptying services, and all actively adopted the system. Between October and December 2015, 449 tenders were offered through the call centre in 38 communes of Dakar, 186 (41 percent) of which resulted in an emptying in 31 communes, thus demonstrating the wide coverage of the call centre. Eighty-four percent of all activities were located in Pikine and Guédiawaye area.

It is also possible that customers might be using the call centre as leverage in their bargaining with vacuum truck operators in their area. A telephone poll of call centre clients for whom an auction was launched, but after which they did not accept the price, indicates that 60 percent end up contracting a vacuum tanker directly, independently of the call centre. Thus, although a customer may not end up contracting a desludging operation through the call centre, its influence is nevertheless beneficial.

Ninety-nine percent of customers gave a positive rating to the service provided by the call centre. Specifically, they appreciated the ease of contacting an emptier, compliance with commitments made by the call centre, the punctuality and quality of the emptiers' services, and the quality control follow-up calls made by the call centre after each emptying. Similarly, 94 percent

of the emptiers expressed a positive opinion about the call centre. They especially appreciated the facilitation of contacts with customers and the simplicity of the procedure for invitation and bidding by SMS.

With the high rate of participation by emptiers, competition has increased and resulted in price reductions. The call centre has thus had a positive impact on both customers and emptiers – the former benefit from lower mechanical emptying prices and the latter from higher demand for their services.

THE CALL CENTRE HAS THUS HAD A POSITIVE IMPACT ON BOTH CUSTOMERS AND EMPTIERS

Guarantee fund

The Guarantee Fund aims to promote the development of emptying companies by facilitating access to credit for the renewal of emptying trucks and/or acquisition of spare parts to enable them to:

- Obtain an emptying licence, as required by the certification process
- Increase income by reducing operating expenses

The Guarantee Fund is based on the following principles:

- Risk sharing between the three parties concerned (Guarantee Fund, bank, borrower [emptier]) on the following basis:
 - The guarantee provided does not replace normal loan requirements (deposit, collateral, personal securities, transfer of income, etc.)

- The security provided benefits the bank and the Guarantee Fund in proportion to their respective share of risk, because they share liability for any loss associated with a bad loan
- The guarantee is a fixed percentage of any bad loan. This provision is intended to prevent the bank and/or borrower shirking its responsibilities;
- Use of the Guarantee Fund for compensation applies to bad loans only after all legal steps have been taken to recover the funds, according to normal bank practice
- A loan interest rate lower than usually applied by the bank

A commercial bank was selected by competitive bidding and the guarantee funds deposited with them. The negotiated terms and conditions of the Guarantee Fund are as follows:

- Guarantee rate equal to 25 percent of the loan amount. In other words, the amount made available for lending by the bank is four times the value of the Guarantee Fund
- Annual percentage rate (APR) lower than or equal to 12 percent, including a one percent charge
- Maximum loan of USD 33,000 for trucks and USD 8,000 for spare parts
- 60-month tenor with a six-month grace period for trucks
- 24-month tenor with no grace period for spare parts

IN TWO YEARS OF OPERATION, THE GUARANTEE FUND HAS FINANCED THE PURCHASE OF 26 SECOND-HAND VACUUM TANKERS FROM EUROPE

The Guarantee Fund is overseen by a Steering Committee comprising:

- The PSMBV project Coordinator, Financial Manager and Monitoring Specialist;
- Representative of the Ministry of Water and Sanitation;
- Representative of the ONAS Administration and Finance Directorate;
- Representative of the Association of Sanitation Actors in Senegal (AAAS);
- Two representatives of the bank.

The Steering Committee meets at least once per month and, in fulfilling its assignment, may call on

any relevant person or organisation for advice. It is responsible for:

- Assessing the financial and economic viability of the borrowers
- Assisting the borrowers (most of whom are illiterate) to prepare their applications
- Assessing and selecting applications to be financed
- Ensuring compliance with the commitments made by borrowers to the bank
- Reporting to the ONAS Director General on the status of the Guarantee Fund
- Allowing the bank to use the guarantee in the event of unpaid debts, after all remedies provided for in the agreement are exhausted.

Further conditions for loans established by the Steering Committee are that:

- The bank puts a lien on the vacuum truck
- The borrower signs an agreement with the emptiers' association, whereby it may repossess the truck and hand over its operation to another emptier, if more than three repayments are in arrears.

Applications must include:

- Financial statements covering the last three years, audited if possible
- Projected trading account over the term of the loan
- Legal status of the operator
- Financing plan
- Opening an account at the lending bank and depositing its income there.

Legally established companies must also provide a 12-month cash flow plan and a presentation of the company's business.

In two years of operation, the Guarantee Fund has financed the purchase of 26 second-hand vacuum tankers from Europe.

Delegated management of the FSTPs

The objectives of this component were to make faecal sludge treatment profitable through the efficient management of the FSTPs, and to encourage the private sector to invest in them. A private sector operator was recruited by ONAS with the aim of introducing management methods to maximise:

- Technical efficiency
- Financial viability, including the sale of products from faecal sludge treatment as a significant component in making the FSTPs profitable
- Compliance with environmental legislation

The public private partnership (PPP) agreement with Delvic, the selected contractor, includes the provisions set out in table 1.

ONAS	Delvic
<p><u>Rights</u></p> <ul style="list-style-type: none"> • Receive information from the concessionaire (Delvic) • Monitor and control the operation • Apply sanctions or terminate the contract due to reasons of general interest, fault of the concessionaire or unforeseen circumstances 	<p><u>Rights</u></p> <ul style="list-style-type: none"> • Exclusive rights to operate the service in the geographical area specified in the contract • Direct collection of tipping fees • Receive reasonable compensation from ONAS if unforeseen circumstances arise
<p><u>Obligations</u></p> <ul style="list-style-type: none"> • Plan and execute major investments in the renewal of facilities and equipment 	<p><u>Obligations</u></p> <ul style="list-style-type: none"> • Pay ONAS for an annual operating licence • Pay 50 percent of net profits to ONAS • Ensure the cleanliness and proper functioning of the FSTP • Maximise value from by-products. • Make any small investments necessary for the continued effective operation of the facilities • Ensure the continuity and adaptability of the service and the equal treatment of users

Table 1: Essential provisions of the PPP for delegated management of the faecal sludge treatment plants

After three years' operation, the FSTPs have been rehabilitated in accordance with the mutual obligations specified in the contract, but with an extra USD 25,000/year investment by Delvic in lieu of some of the profits to be shared with ONAS under the contract. For the 26 staff, salaries have been increased, working hours and holidays are properly observed and pension contributions and health insurance are paid for. As a result of these measures:

- The FSTPs are fully operational and their environments clean and healthy
- The dumping of sand removed alongside faecal sludge is now permitted

- Opening hours have been extended by 8.5 hours per week to facilitate tanker operations, thereby reducing illegal dumping and increasing tanker availability
- Dried sludge is being marketed
- Financial results have improved, with the annual operating surplus rising to USD 33,300 in 2016 (see graph below)

DRIVERS OF CHANGE AND LESSONS LEARNED

The PSMBV is a major applied research project which has gathered a lot of useful information as well as improving FSM in Dakar. Some of the principal lessons learned are highlighted below.

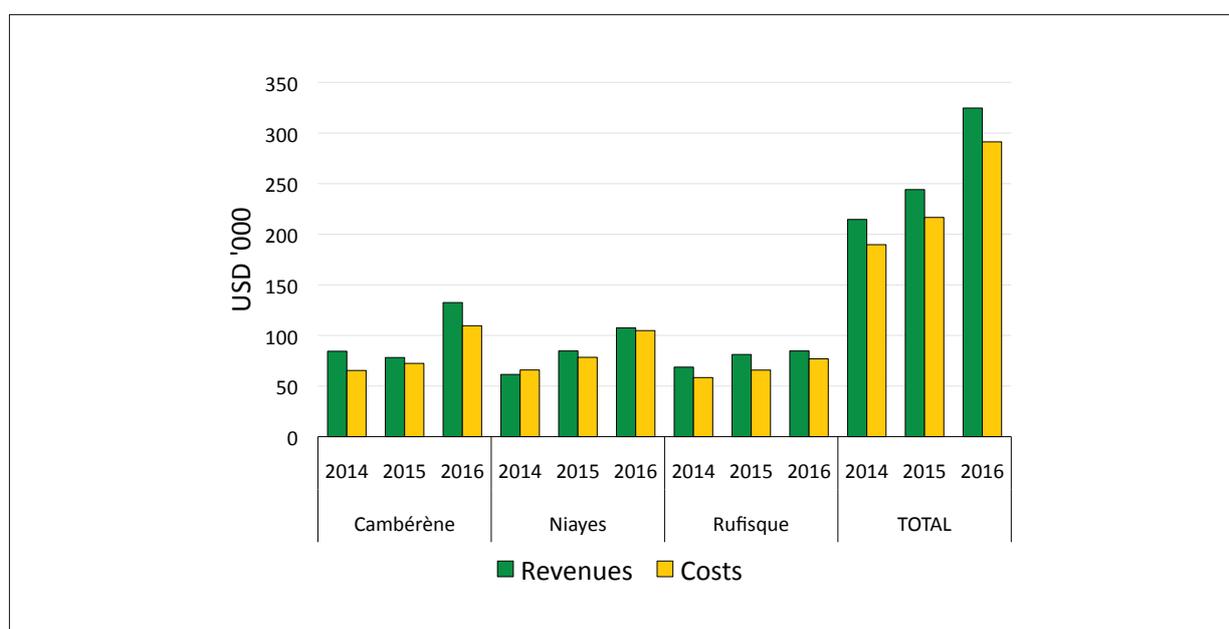


Figure 9: Financial performance of faecal sludge treatment plants

Call centre

Call centre operations

The gradual development of the call centre from test to pilot to city scale allowed for the development of a reliable service and the database on on-site facilities. Daily monitoring of the call centre by an experienced team was instrumental in delivering an effective scaling up process. The call centre requires robust technology in order to be able to process and follow up calls regardless of their volume.

Partnership with the emptiers

Involvement of emptiers in the process of establishing the call centre was crucial to their adopting it, and was facilitated by previous work to get them organised, formalised and committed to modernisation of their businesses. This also helped in ensuring the regular updating of the emptier database to take into account the constant changes in this highly dynamic sector. Training and ongoing supervision of the emptiers on their participation in the bidding process was necessary, especially as many of them are illiterate and are not at ease with the bidding process. Another important catalyst was the support provided through the Guarantee Fund, which promoted the emptiers' ownership of the program and, in particular, helped them to meet certification requirements.

Marketing and communication

The performance of the call centre clearly showed that effective and continuous communication to both households and emptiers on the available FSM services and their advantages is an essential ingredient for success.

Guarantee fund

The high capital cost of serviceable vacuum trucks and, to a lesser extent, spare parts, creates a huge business financing need. However, the informal nature of the sector (at least until the introduction of the PSMBV) and the fact that the banks are completely unfamiliar with the FSM business makes them very reluctant to lend. The establishment of the Guarantee Fund was therefore crucial in unlocking credit for the operators, in this case to the tune of four times the value of the Fund.

It was necessary to educate the banks on the nature and significant growth potential of the FSM business. By doing so it was possible for them to offer loans against the operators' future incomes, taking on the majority of the credit risk and offering attractive interest rates. Another key element of this trust building between the banks and the FSM business was the formal organisation of the emptiers themselves, also supported by the programme, which enabled the

imposition of peer pressure on bad debtors, and, in the last resort, the opportunity for the bank to pass the equipment on to another operator who could run it profitably and pay the loan. The emptiers' organisation also facilitated information dissemination, training and support in the process of accessing funds.

Delegated management of the FSTPs

The introduction of delegated management by the private sector had an almost instantaneous effect on improving the management of the FSTPs. ONAS now has fully operational FSTPs as well as increased revenue, and is no longer seen by the private emptying operators as an obstacle, but rather as a partner, helping to organise the private sector and facilitate its work. Engagement of the private sector was clearly a win-win situation for both the private sector and the Government owned ONAS.

NEXT STEPS

Call centre

The call centre has been successful. However, work remains to be done on designing a business model for the sustainable operation of the call centre at an affordable cost which could be passed on to customers. Further simplification of the transactions, for both emptiers and customers would also be beneficial.

When replicating, it is important to consider the local situation taking into account the differences that exist in African markets. For example, even within the immediate region, Accra, Ghana is characterised by a more developed market with little manual emptying, whilst Ouagadougou, Burkina Faso has a less developed market, few trucks, and a lot of manual emptying.

Delegated management of the FSTPs

Technical and financial partners have shown considerable interest in this African experience on the delegation of FSTP management to the private sector, which is one of the first, and may support similar programs in other parts of Senegal or in other developing countries.

NOTES

¹ <http://data.worldbank.org/country/senegal>

² If 96 percent of a population of 1,421,060 inhabitants with an average household size of 10 has their pit emptied twice a year, there will be about 273,000 emptyings per year. If 43 percent of these are manual emptyings at a price of USD 20.00, the total value comes to $273,000 \times 0.43 \times 20 = \text{USD } 2,346,000$.

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ABBREVIATIONS AND ACRONYMS

FSTP faecal sludge treatment plant
ONAS National Sanitation Office
PSMBV Faecal Sludge Market Structuring Programme

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