CENTRE FOR POLICY RESEARCH

SCI-FI SCALING CITY INSTITUTIONS FOR INDIA WATER SANITATION

RESEARCH - ACTION - LEARNING NOTES

About Project Nirmal

The overall vision of Project Nirmal is the demonstration of appropriate, low-cost, decentralized, inclusive and sustainable sanitation service delivery solutions for two small towns (Angul and Dhenkanal) in Odisha leading to improved sanitation access for all households and integration of FSM in the sanitation value chain, through enabling institutional and financial arrangements and increased private sector participation.

The project is being implemented by Practical Action and Centre for Policy Research with support from Bill and Melinda Gates Foundation; Arghyam; Housing and Urban Development, Government of Odisha; and Municipalities of Angul and Dhenkanal.

The project aims to :

- Demonstrate State Government and ULB commitment towards sanitation service delivery in small towns;
- Capacity development of states and cities for effective sanitation service delivery;
- Increase in number of people in Angul and Dhenkanal with access to better sanitation services;
- Improve city-wide planning approaches for sanitation; and
- Demonstrate models for Faecal Sludge Management (FSM).

OPERATION AND MAINTENANCE (O&M) ASPECTS OF FAECAL SLUDGE MANAGEMENT IN SMALL TOWNS

BILL & MELINDA GATES foundation

Arghyam Safe, sustainable water for all

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Project NIRMAL

Background

A large proportion of urban households (45 percent) in India are connected to OnSite Sanitation (OSS) systems (including septic tanks and pit latrines)[1]. The dependence on OSS systems is higher in small and medium sized urban centres[2] (88 percent) as compared to Class – I[3] (72 percent) and Million Plus cities[4] (37 percent). Similar trends are observed in Odisha where 52 percent of urban households that had Individual Household Latrines (IHHLs)[5] were connected to OSS systems. Further, field evidence suggests that most of the 6.1 million IHHLs[6] constructed under SBM-U across the country's urban areas during 2014-19 are also connected to OSS systems.

OSS systems are essentially underground containment structures that collect, contain and partially treat faecal waste and wastewater and the faecal sludge accumulated in these systems needs to be periodically removed and treated before it can be safely disposed into the environment. While the responsibility of providing faecal sludge emptying and transportation services rests with Urban Local Bodies (ULBs),in reality these services are mostly being provided by private cesspool operatorsor through a mix of public (ULB) and private operators. In some cases, these services are also being provided manually. The facilities for treatment and reuse of faecal sludge are currently absent. Inadequate mechanisms and services for safe collection, transportation, treatment and disposal/reuse of faecal sludge,along with lack of regulation and monitoring, is leading to unsafe disposal of faecal sludge which is a health and environmental hazard. Unsafe disposal of faecal sludge is also undermining the benefits resulting from improved access to drinking water, sanitation, hygiene and health services.

In order to fully leverage the health, well-being and environmental benefits of improved sanitation access provision of safe, economical and sustainable emptying, transportation and treatment facilities for faecal wastebecomeimperative. The treatment of faecal sludge must be undertaken as close to the source as possible and it should be based on environmentally sustainable technologies that require low power and other inputs. Strategies that ensure reuse of all products and by-products of treated faecal sludge must be integrated to make the system sustainable and cost effective.

> One vacuum truck dumping faecal sludge indiscriminately is equivalent to open defecation by 5000 people
>
> *Source: S. S. Kone, 2007*

[1]Includes households with toilets based on septic tanks (38.2 percent) and pits (7.1 percent). The category defined as "pits" includes With Slab Improved Ventilated Pit (6.4 percent) and Without Slab / Open Pit (0.7 percent). Source: Census of India, 2011, "Houses, Household Amenities and Latrines - Availability and Type of Latrine Facility 2001-2011", available at http://censusindia.gov.in/2011census/hlo/Data_sheet/India/Latrine.pdf

[2]Defined as urban centres with a population of less than 1,00,000 people

[3]Class I cities have a population of 100,000 or more

[4]Cities with a population of 1 million or more

[5]65 percent of the urban households in Odisha had access to IHHLs, Source: Census of India, 2011, "Houses, Household Amenities and Latrines - Availability and Type of Latrine Facility 2001-2011", http://censusindia.gov.in/2011census/hlo/Data_sheet/India/Latrine.pdf

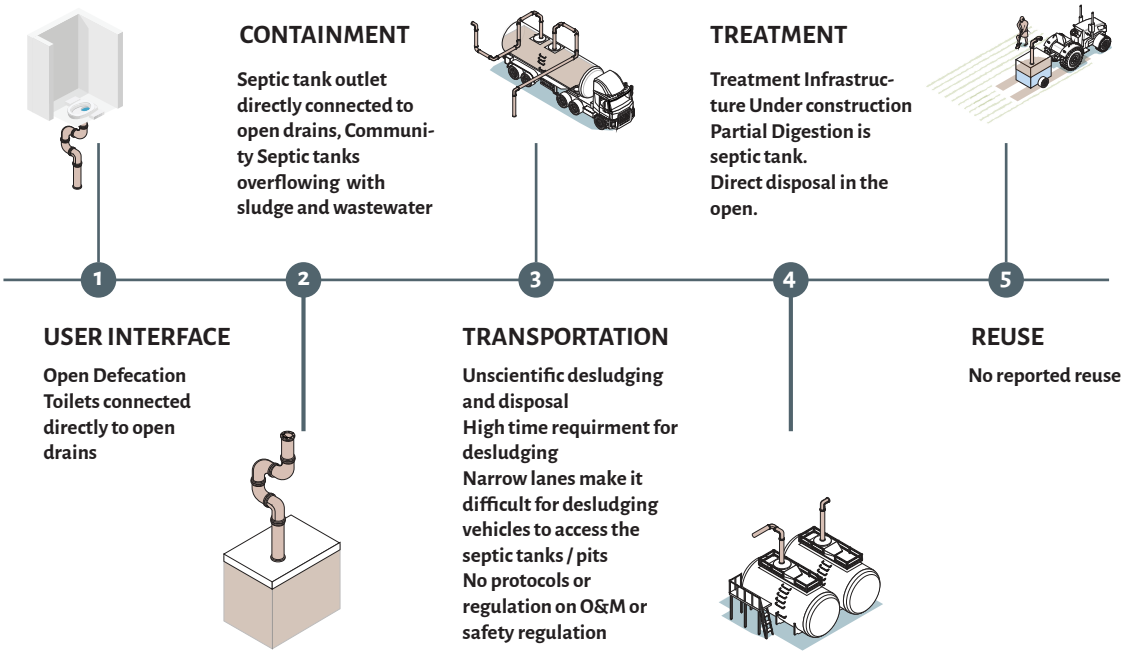
[6]Source: http://swachhbharaturban.gov.in/dashboard/; accessed on 12th December 2019

Inadequacies in the exiting management of faecal sludge in Anguland Dhenkanal – Findings from the baseline survey

The baseline survey,conducted as a part of Project Nirmalin Angul and Dhenkanal, revealed that different components of the FSM value chain, namely, user interface, containment, transportation, treatment and reuse were either completely absent or were being inappropriately addressed. Table 1 presents the findings of the baseline survey along the FSM value chain.

Table 1: Findings related to various components of the FSM Value chain in Angul and Dhenkanal

User Interface	Open defection (26 percent of non-slum households and 53 percent of slum households in Angul and 32 percent of non-slum households and 84 percent of slum households in Dhenkanal were defecating in the open)
Containment	Types of toilets and containment systems found were flush/pour flush latrines connected to septic tanks/pit latrine with slab/pit latrine with ventilated improved pits. The design and construction of most containment structures wasmostly unscientific and did not adhere to national standards. Further, most containment systems had their wastewater outlets directly discharging into open drains. Public toilets, in both towns, also had septic tanks as the containment systems.
Emptying	Households were emptying septic tanks and pits only when the structuresgotsaturated. Only one third of the households surveyed had ever emptied their septic tanks / pit latrines. Services for emptying of OSS systems were being provided by a mix of Municipality, private desludging operators and manual scavengers. In Angulprivate cesspool operators and manual scavengers were providing emptying services while in Dhenkanal these services were being provided by the Municipality, private cesspool operators and manual scavengers. The Dhenkanal Municipality had a functional cesspool vehicle and two more have been procuredwhich were yet to be pressed into service.
Transportation	The Dhenkanal Municipality was usinga cess pool vehicle. (the truck,on an average, was making one trip per day) Private operators use a tractor mounted desludging truck Manual scavengers transport the collected faecal sludge in buckets, trolley with drums or tricycles.
Treatment	Absent– there were no facilities for treatment of faecal sludge Construction of Faecal Sludge Treatment Plan (FSTP) with a capacity of 27 cu.m was constructed in Dhenkanal A FSTP of 18 cu.m capacity was proposed for Angul
Disposal	The collected faecal sludge was being disposed in low lands, open fields, water bodies, drains and ditches.
Reuse	Absent



On Demand Desludging Services: Pits/septic tanks are emptied only when the household places a request with the Municipality, and fees are paid either just before or when the service is provided. As pits and tanks are often very large and need to be cleaned infrequently (sometimes every 6-20 years), the frequency of truck trips is very low which reduces productivity and raises per-trip cost.

Scheduled Desludging Services: All pits/septic tanks are emptied on a fixed schedule, typically every 2-4 years depending on local conditions such as pit size, groundwater level, soil conditions, etc. A schedule is developed either by the ULB or the service provider and households are charged a nominal amount every year for this regular cleaning service.

Planning for periodic Operation and Maintenance (O&M) of desludging truck operations and Faecal Sludge Treatment Plant (FSTP)

In order to address the existing inadequacies in the FSM value chain, specific interventions were required to be implemented in both towns,in a time bound manner. Under the ambit of Project Nirmal, a Faecal Sludge Management (FSM) Plan was prepared in May 2018 with support from Consortiumfor DEWATS Dissemination (CDD) Society, Bengaluru. The FSM plan was based on the findings of the baseline survey undertaken in the initial stages of Project Nirmal and presents details on the periodic O&M requirements for desludging trucks as well as FSTPs. The FSM plan presents the operating costs, potential revenue sources and five business models for faecal sludge desludging trucks and FSTPs.

Operating Costs

There are two main categories of operating costs for an FSM system, namely,

a. Cost of operating the desludging trucks along with a customer service centre; and
b. Cost of operating the FSTP

The cost projections in the FSM Plan have been-worked out for a 10-year period for three trucks[7].

Two scenarios for desludging namely, on-demand and scheduled desludging serviceswere considered. (refer text box on the right)

The operating costs for desludging trucks includefive components, namely, pump maintenance/repair, engine maintenance, truck operations[8], technology/Global Positioning System(GPS) integration and operations of acall / customer service centre. Table 2 presents the estimated operating costs for year 1 and Year 10 for both scenarios (on demand and scheduled desludging).

The operating costs for FSTP include costs relating to human resources[9], operational activities[10], scheduled maintenance activities[11] and replacement of parts and machinery[12]. It was assumed

[7]In Dhenkanal of the three trucks one is already in operation while two more have been procured but were yet to be put into service

[8]Fuel, Driver / Operator Salaries, others
[9]Includes Expert Engineer visit (One visits per month); operator and labour
[10]Includes Power Consumption in entire plant (Lights/fan in office/any other relevant activity and Pumps for Sand & Carbon filter, CT, Bore well & UV), Diesel for operating tiller to the empty dry solids from drying beds, General Maintenance for Generator and Tiller, Lab tests for performance monitoring of FSTP (liquid sample and sludge sample), landscape maintenance and miscellaneous costs (including Personnel protective equipment, sludge height measuring device, meters etc.)
[11]Includes Periodic maintenance of pumps (repairs and replacement), Desludging of stabilization reactor, Desludging of integrated settler & Anaerobic Filter (AF) and Maintenance of Bore wells
[12]Includes Replacement or repair of polycarbonate sheets, replacement of filter material (cinder) in Anaerobic Filter (AF), replacement of screens in Screening chamber, replacement of PGF filter material, replacement of filter materials in Pressurized sand carbon filter, replacement / maintenance of UV lamps and Sand replacement in SDB.

Table 2: Operating Costs for desludging trucks based on two scenarios – On demand and Scheduled (Rs. in lakhs)

Scenario 1: On demand desludging	**Operating Costs (Year 1)**	**Operating Costs (Year 10)**
Truck 1 (already in service)	8.16	12.66
Truck 2	2.63	4.08
Truck 3	1.61	2.50
Scenario 2: Periodic Desludging	**Operating Costs (Year 1 First Cycle)**	**Operating Costs (Year 10 Second Cycle)**
Truck 1 (already in service)	8.96	13.90
Truck 2	7.62	11.82
Truck 3	7.62	11.82

that the FSTP will operate, at not less than 80 percent of its capacity, at all times. The annual operating costs (including depreciation) have been estimated to be Rs. 11.10 lakhsfor Year 1 and increasing to Rs. 43.19 lakhs in Year 10.

Revenue Sources

Identifying possible revenue sources was considered important for reducing cost for government agencies and to help make FSM services sustainable. 4Ts – Taxes, Tariff, Trade and Transfers were evaluated to assess potential revenue sources for the towns. Based on the evaluation exercise a set of six revenue sources were identified for on-demand and scheduled desludging services. These include: revenue from user fee for pit and septic tank cleaning for both residential and commercial units, revenue from sale of treated dry sludge, revenue from additional pit or septic tank emptying services, revenue from registration of private desludging operators and revenue from collection of tipping fee at the FSTP. (Table 3)

Table 3: Revenue sources evaluated by the FSM Plan – Dhenkanal

R1. Revenue from user fee for pit/septic tank emptying services (Residential units)
R2. Revenue from user fee for pit/septic tank emptying (Commercial units)
R3. Revenue from sale of treated dry sludge
R4. Revenue from additional open pit/septic tank emptying services (includes breaking open the systems)
R5. Revenue from registration of private desludging operators
R6. Revenue from collection of tipping fee at the FSTP

Cost and revenue projections for both on-demand and scheduled scenarios were elaborated upon in the FSM plan. Scheduled desludging services shows a steadier cash flow as compared to on-demand desludging services. Revenue generation from septic tank / pit emptying is higher and shows better cost recovery in scheduled desludging scenario over a short time span.

Business Models

The FSM Plan presents five business models, of which Angul and Dhenkanal Municipalities could choose a suitable option based on the current sanitation/FSM situation in theirtown. The suggested business models have been developed keeping in mind the following objectives: (a) to minimise the liability to the government and increased financial sustainability, (b) incentivising private players to provide services, and (c) ensuring that the local government plays the role of a regulator for delivering holistic sanitation intervention.

The five business models, include

a. the operations of the desludging trucks and the FSTP are to be operated by a single private operator, the operator would be paid for the full cost of services by the ULB and all revenue generated would be transferred to the ULB (Figure 1);

b. theoperations of the desludging trucks and FSTP would be operated by a single private

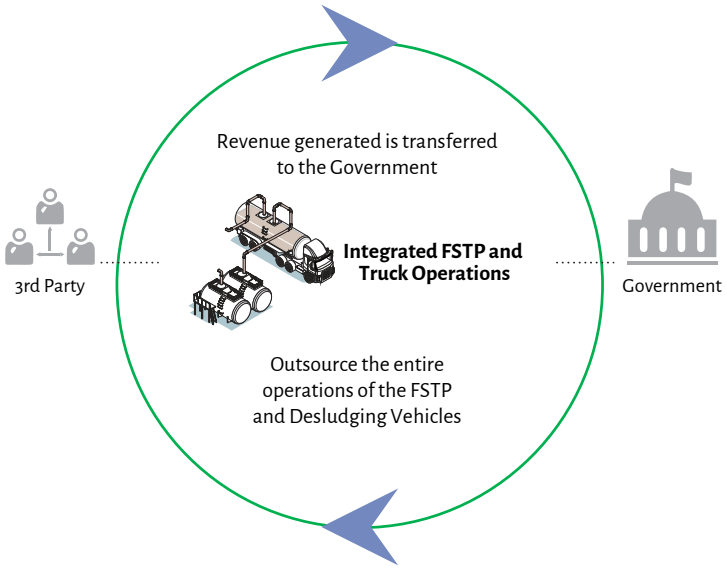


Figure 1: Business Model 1

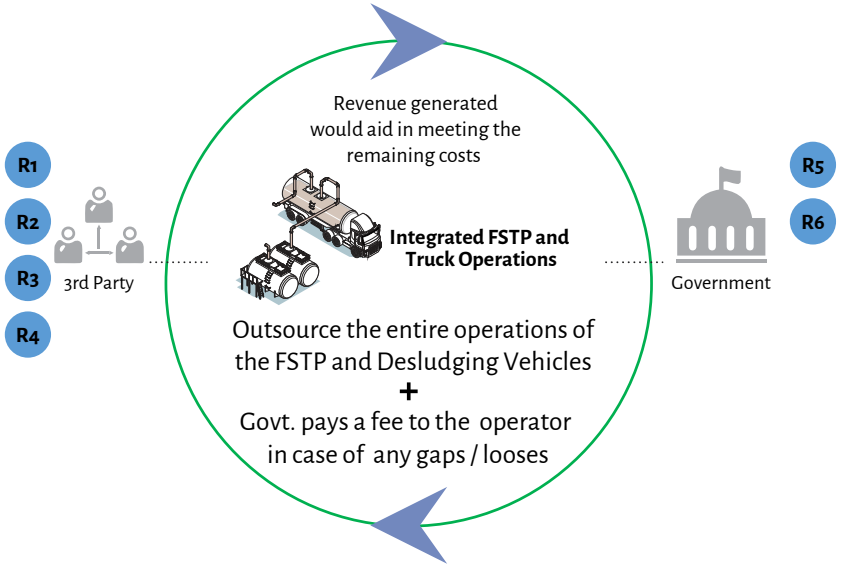


Figure 2: Business Model 2

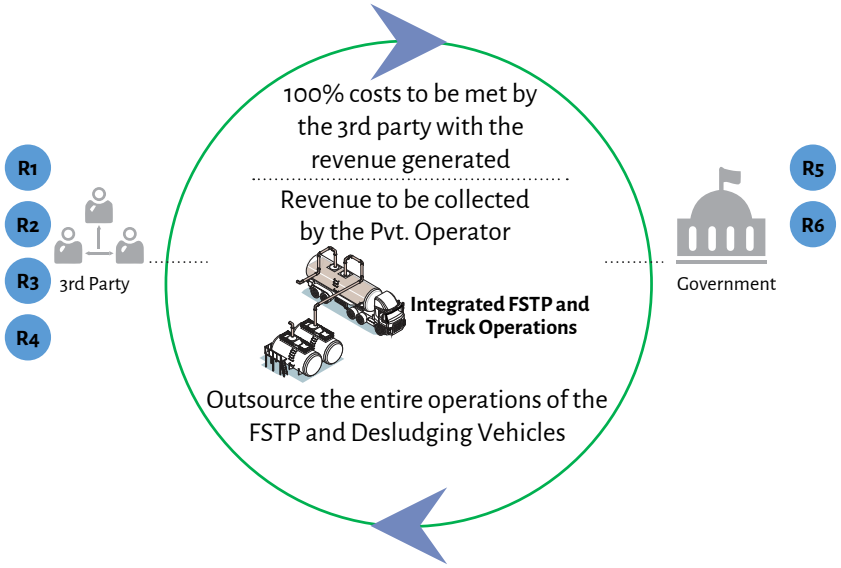


Figure 3: Business Model No. 3

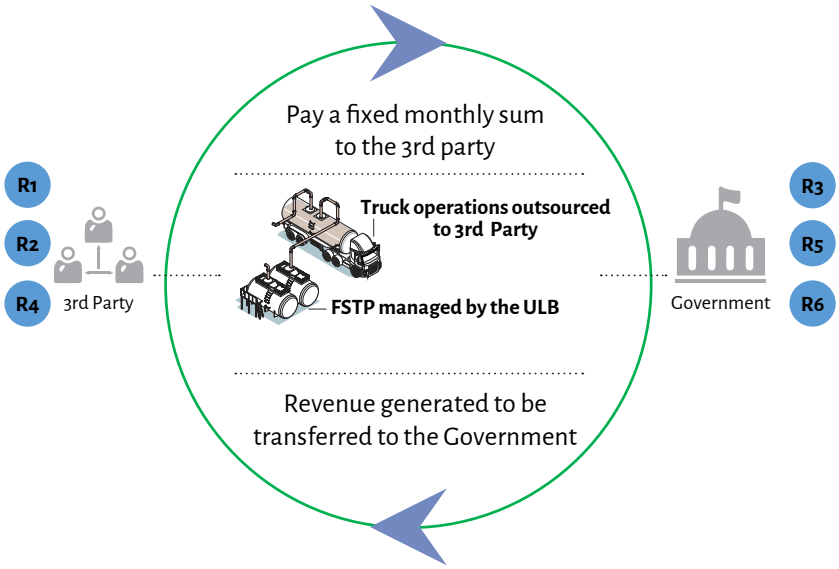


Figure 4: Business Model No. 4

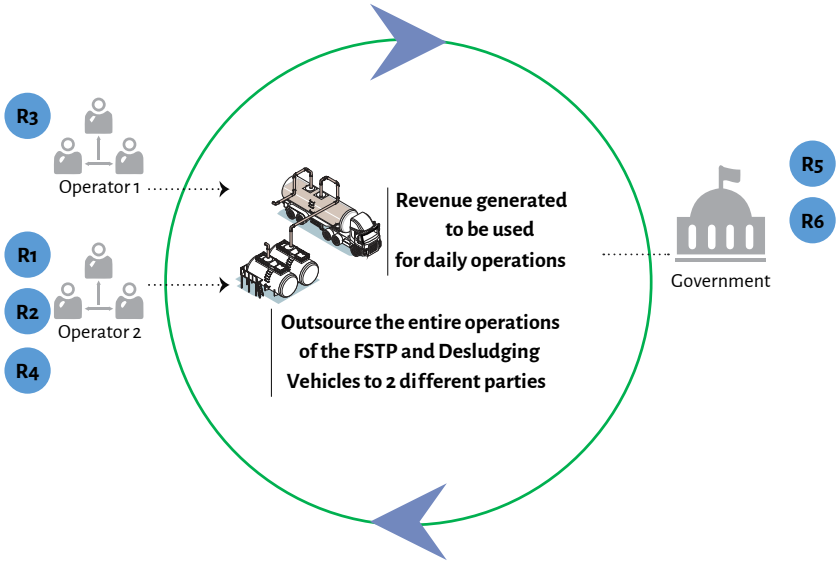


Figure 5: Business Model No. 5

operator, ULB would pay the private operator a part of the cost of the services (from the revenue streams R5 and R6), all revenue generated from services (R1 to R 4) would be retained by the private operator (Figure 2);

c. operations of desludging trucks and FSTP would be operated by a single private operator, revenue for the private operator would be only from services (R1 to R4) and no payment will be made to the private operator by the ULB, ULB will retain the revenue generated from R5 and R6 (Figure 3);

d. while the desludging trucks would be operated by a private operator the ULB would operate the FSTP, the private operator would generate revenue from the services provided (R1, R2 and R4) and no payment will be made to the private operator by the ULB, the ULB will earn revenue from the FSTP(R3, R5 and R6) (Figure 4); and

e. there would be two private operators, while one operator would manage the operations of the desludging trucks the other would operate the FSTP, the revenue for both operators is in the form of payment for services and no payment is made to the private operators by the ULB (Figure 5).

Table 4: Details of the business models proposed in the FSM Plan for Dhenkanal

Model	Desludging Truck operated by	FSTP operated by	Revenue to operator from	Other details
1	Private operator 1	Private operator 1	ULB	Operations of the desludging trucks and FSTP is outsourced to a single private operator. Government pays a fixed monthly fee to the private operator based on quotes in the tender. Any revenue generated from emptying pits and sale of end products are collected by the private operator and transferred to the government. Thus, the net cost to government is fixed fees less revenue earned.
2	Private Operator 1	Private Operator 1	ULB + Services	Operations of the desludging trucks and FSTP is outsourced to a single private operator. All revenue is collected and retained by the private operator. The operator bids for additional fees which the government will have to pay to the private operator, depending on expected deficit. Government can regulate charges for cleaning pits.
3	Private Operator 1	Private Operator 1	Services only	Operations of the desludging trucks and FSTP is outsourced to a single private operator. The lease would be for short term and will have to be renewed subsequently In this model 100% of the costs are to be met by the private operator from the revenue generated through the integrated operations. No payment is to be made by the government to private operator.
4	Private Operator 1	ULB	Services only	The private operator manages the operations of the desludging trucks while the ULB manages the FSTP. Government pays a fixed monthly charge to private operator The ULB earns revenue from the FSTP
5	Private Operator 1	Private Operator 2	Services only	Different private operators manage the desludging trucks operation and the FSTP. No payment is to be made by the ULB by ULB to the private operator

DCC meeting underway to discuss the various business models proposed in the FSM Plan

Selection of Business Model in Dhenkanal

The FSM plan was presented in May 2018 to the District Co-ordination Committee[13] (DCC) (a co-ordination mechanism that has been established as a part of the project monitoring structure under Project Nirmal). Chaired by the District Collector and with participation of all key stakeholders[14], the DCC deliberated upon the

[13]As per the decision of the 1st Project Steering Committee meeting held on 11th August 2015, a District Coordination Committee was to be constituted at the district level under the chairmanship of the Collector and District Magistrate of the district to guide, monitor and assist the sanitation programme(s) to be undertaken in the respective Municipality under Project Nirmal.

suggested business models and selected Model 1 to be suitable for Dhenkanal Municipality. The decision of the DCC was subsequently forwarded to the state government for approval. Further, in order to ensure allocation of financial resources for O&M of FSM services, the Dhenkanal Municipality submitted a proposal,through the District Collector, to the Housing and Urban Development (H&UD) Department, Government of Odisha, for creation of a budgetary head and yearly allocation for O&M of FSM services.

Faecal Sludge Management Agreement – O&M details

As per the decision of the DCC, Practical Action Foundation[15] (PAF) has been entrusted with the responsibility of managing the operations of the desludging services[16] along with FSTP[17] by engaging a private operator, Blue Water Company, as a part of its handholding support to the Dhenkanal Municipality under Project Nirmal.On 19th November 2018, a Faecal Sludge Management Agreement was signed between Dhenkanal Municipality (through its Executive Officer) and Practical Action Foundation, Bhubaneshwar. The agreement was for a period of one year (365 days) from the date on which it was signed.

Responsibilities of key actors

The FSM agreement details the roles and responsibilities of both PAF and Dhenkanal Municipality.

The PAF has been entrusted with the responsibility of

a. managing the operations of the desludging/ cesspool trucks and the FSTP for a period of one year (365 days) from the date of commissioning of the FSTP, by engaging a private operator;
b. Imparting training and undertaking capacity building ofMunicipality officials, with help from operator / contractor, to enhance their technical and managerial capacities for handling O&M of FSM services. A part of the training was to be on site at the FSTP;
c. Drafting a Tender Request for Proposal (RfP), before the expiration of the contract period, in order to assist the Dhenkanal Municipality in putting out a tender notification for onward FSTP and cesspool truck O&M through individual private operator / service provider;

The agreement provided that the desludging services are to be provided based on demand received from customers (households, commercial establishments and institutions). PAF is also required to pilot, in some wards of Dhenkanal, a methodological scheduled emptying process. Further,PAF is required to institutionalise an effective management and monitoring plan which will enable maximum utilisation of cesspool vehicles and minimisethe operating costs.The agreement also provides PAF access to the FSTP, even on expiration of the agreement, to enable them to conduct Research and Development (R&D) activities.

The FSM agreement directs PAF to undertake O&M of the FSTP as per the following terms and conditions:

a. The O&M is to be undertaken as per the Standard Operating Procedures (SoPs) developed by Practical Action with support from CDD Society, Bengaluru. PAF is to ensure that all preventive and curative measures outlined in the SoPs are followed.

[14]The DCC has as its members Collector and District Magistrate of the District; Chairperson, Municipality; Project Director, District Urban Development Agency (DUDA); Executive Officer, Municipality; Planning Member of Improvement Trust / Development Authority; Executive Engineer, Public Health; Representative, District Pollution Control Board, Chief, District Medical Officer; Representatives of District Water and Sanitation Mission; Tahsildar; Representatives of NGOs, Representatives of Corporate bodies; Representatives of Practical Action and Centre for Policy Research (CPR)

[15]Practical Action Foundation is a non-governmental organization which provides technical support for designing, building and managing decentralized wastewater management solutions including faecal sludge and septage treatment plants. PAF's goals are to work with local government, citizens and socially oriented organizations to help protect the environment and public health through the implementation of robust, appropriate waste water and faecal sludge management systems in urban areas.

[16]As per the agreement with the state government the PAF will operate and maintain the FSTP for a period of one year, through a private operator, from the date of commissioning of the plant, as a part of its hand holding support to the Dhenkanal Municipality under Project Nirmal.

[17]As per the decision of the DCC, PAF will manage the desludging operations in addition to the management of the FSTP through a private operator, from the date of commissioning of the plant as a part of its hand holding support to Dhenkanal Municipality under Project Nirmal.

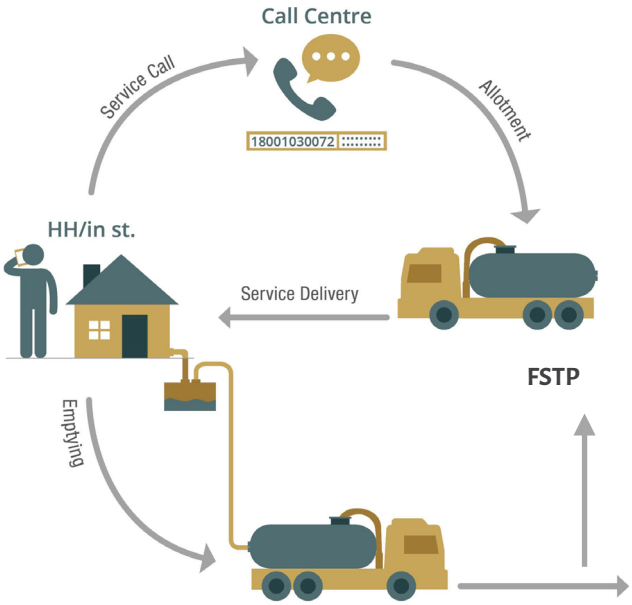


Figure 6: Process for receiving, routing and attending a service request

b. All O&M records are to be maintained and readily available for review by the Dhenkanal Municipality;

c. All by-products from the FSTP are to be made available to the Dhenkanal Municipality for use in public parks and gardens, if required;

d. Ensuring that the operations do not create any nuisance or disturbance to any neighbouring structures and inhabitants;

e. PAF will take care of the water and electricity costs, as well as any other costs while undertaking O&M of the FSTPduring the contract period (except for any capital or replacement costs, which are to be borne by the Dhenkanal Municipality)

With regard to the operation of the desludging Services (cleaning of septic tanks and pits and safely transporting faecal sludge to FSTP plant) the agreement makes PAF responsible for managing the entire process of scheduling and cleaning septic tanks and pits of any household, commercial establishment or institution in Dhenkanalas well as beyond in compliance with the standards set by the Municipality. PAF is responsible for the O&M of the cesspool trucks (two) for the duration of the contract, paying expenses limited to servicing, fuel, minor repairs and maintenance.

Obligations of the Dhenkanal Municipality, as outlined in the FSM Agreement, are as follows:

a. Appointment of a nodal officer who will oversee the service assignment and co-ordinate with PAF to address the issues associated with the same;

b. Make available two cesspool trucks (in operational condition with registration and insurance) to PAF for desludging operations within 7 days of the signing of the agreement;

c. Bear any capital or replacement cost associated with the cesspool trucks;

d. Provide space in the Municipality premises for establishment and operationalisation of the call centre;

e. Provision of 24X7 security at the FSTP; and

f. Providing additional staff and labour at the FSTP in times of emergencies

Process for receiving, routing and attending a service request

The agreement also details out the process by which desludging request would be received, routed and attended to. PAF is required to set up a call centre within the Dhenkanal Municipality premises. The call centre would be accessible through a toll-free number which would be displayed prominently on the cesspool trucks.All consumers(households, commercial establishments or institutions in Dhenkanal) are required to call the call centre to register their request

for desludging service. The FSM agreement provides that every customer will be given a date on which the cleaning will be done which shall be within 24 hours of registering the demand, unless the cleaning schedule is already booked, in which case the customer shall be served as soon as feasible. The customer will be sent aSMS reminder for reconfirming the appointment on the scheduled day of the appointment. Desludging services are to be provided between 8 am and 6 pm everyday while emergency services are to be provided at any time which is mutually convenient to the customer and the service provider. The service notice will be in triplicate – while the first copy is to be given by the cesspool vehicle staff to the customer, the second copy is to be filed with the call centre and must bear signature of the customer, and the third copy is to be filed with the Dhenkanal Municipality with a signature of the customer. An Interactive Voice Recording System (IVRS) is used to receive, record and monitor calls received at the call centre.

Customer interface mechanisms

PAF is required to undertake community consultations and interactions at regular intervals along with Municipality officials. Customers can call and request for cleaning services or register their complaints at the call centre which is operational from 10:00 am to 5:00 pm on all working days and is equipped with staff who can speak fluent Odiya, Hindi and English. The cesspool trucks are required to prominently display the helpline numbers of the call centre as well as the Dhenkanal Municipality.

Fees and charges for desludging services

There is differential fee for domestic and commercial/institutional consumers. For domestic consumers the fee is Rs. 1000 per trip while for commercial and institutional consumers the fee for desludging services is Rs 1500 per trip. The fee for breaking open man-hole of septic tank or pit has been fixed at Rs. 200. For the most marginalised households, including women headed households, differently able households, transgender households and those with members suffering from chronic diseases such as HIV, AIDs and cancer the fee has been fixed at Rs. 500 per trip. In the event of Force Majure[18], which requires free cleaning of septic tanks and pits, the cost will be borne by the Dhenkanal Municipality. The services charges / fees for areas outside the Dhenkanal Municipality vary based on the distance from the town and have been fixed at Rs. 1500 for a location within 10 kms and at Rs. 2000 for a location between 10-20 kms. from the town. The rates mentioned above are subject to revisions,following adequate consultations with Dhenkanal Municipality and PAF,and based on the demand. The fees are to be collected by the truck driver and deposited in the FSM fund bank account in a timely manner.

Creation of a dedicated fund for FSM

Within a week of signing the FSM agreement the Dhenkanal Municipality was required to set up anFSM account in a nationalised bank and all fees collected from the customers for desludging services are to be deposited in this account on a weekly basis. The funds available in the account are to be used only for the functions outlined in the agreement and these are: (a) deployment of security staff at the FSTP, (b) purchase of security gear for FSTP staff, (c) major repairs and maintenance of cesspool vehicles and their insurance, fitness and road tax, etc. related expenses, (d) maintenance of landscaped areas of the FSTP, (e) salary of helpers and additional labour employed for desludging services operation, (f) any other expenses related to O&M of the FSTP.

Specifications for the team (driver and helper) operating the cesspool trucks

The private operator (Blue water company) has to ensure that there is a team of driver and helper to operate the cesspool trucks. The driver must have a valid driver's license. The agreement provides

[18]Force Majure means any event or circumstance that adversely affects any party in the performance of its obligations under the FSM agreement, and the party has little or no ability to control such events or circumstances and the effects of the event or circumstance could not be prevented with reasonable efforts. Such events or circumstances include natural disasters; act of war, terrorism, sabotages, blockages or military action; civil unrest, labour unrest, strikes or actions by unions or unorganized groups; and any other event that disrupts the ability of the trucks and staff to safely move around and provide desludging services in the town.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that the truck driver and helper must be trained periodically to perform their tasks without causing any nuisance or inconvenience to the consumer or any damage to their property. The driver and the helper are required to wear uniforms with the name of the Municipality and the private operator displayed prominently and must also carry a valid photo identity card issued by the Municipality.

Record keeping protocols

The service provider is expected to maintain aregister providing details of the customer including the name of the owner, address, location, dimension of the septic tank/pit, date of desludging/ complaint redressal. By the 7th of every month the service provider is required to submit to the Municipality a list of consumers whose pits/septic tanks have been cleaned in the preceding month.

Safety protocols

The agreement also outlines a series of safety protocols to ensure the safety of customers, staff and the environment. The service provider has to clean and disinfect the cesspool trucksperiodically and ensure that they are properly maintained, do not leak, meet emission norms and operate without any malfunction at all times. The cesspool trucks are to be parked overnight at a location designated by the Municipality or at the FSTP and must leave the customer premises as clean and hygienic as they were when the truck had arrived. Further, the cesspool vehicles must carry the faecal sludge to the FSTP and not dispose it at any other location. In case the plant is not functional, the Dhenkanal Municipality will suggest an alternative place where the faecal sludge can be disposed. The service provider is also required to adhere to all regulations, Government Orders and notifications related to the provision of FSM servicesalong with the provisions of the FSM agreement. The Agreement also prohibits any person from entering a septic tank pursuant to the provisions of "The Prohibition of Employment of Manual Scavengers and their Rehabilitation Act, 2013". It is the joint responsibility of PAF, CDD Society and the operator (Blue Water Company) to ensure that the wastewater meets the approved national effluent standards.

Monitoring protocols

CDD Society has been entrusted with the responsibility of stringent monitoring of the FSTP.

Lessons Learnt

- A scientific and thorough approach to planning the O&M of FSM services has been adopted in Dhenkanal (and subsequently Angul) as a part of Project Nirmal. This approach has enabled a rigorous analysis of the various operational costs as well as potential sources of revenue for O&M of desludging services and FSTP and the development of various business models.
- The engagement of agencies which had prior experience of operating and managing FSM services/FSTPsin the preparation of FSM plan under Project Nirmal has ensured that the learnings in the sector from other locations have been meaningfully integrated.
- The engagement of key district and local government agencies,including the District Coordination Committee (DCC) and the Dhenkanal Municipality, in the process of selection of an appropriate business model for Dhenkanal Municipality has ensured high level of ownership of the selected model among local leadership.
- The partnership between the ULB (Dhenkanal Municipality) and the service provider (Practical Action Foundation, through Blue Water Company) was formalised through an agreement. The agreement was comprehensive and details out the roles and responsibilities of the two actors (PAF and Dhenkanal Municipality), the process for receiving, routing and attending to customer requests, mechanisms for customer interface, fees and charges for desludging services, creation of FSM fund, specifications for drivers and helpers and a set of record keeping and safety protocols to be followed by the operator. The detailed agreement ensured that the terms and conditions of the partnership were clearly articulated, presented and understood by both parties, leaving no scope for any ambiguity.
- The O&M plan considered two scenarios namely, on demand and scheduled desludging. While the financial modelling showed that scheduled desludging services would result in steadier cash flow and higher cost recovery

(due to higher revenue generation from septic tank / pit emptying) the DCC and Dhenkanal Municipality decided to implement on-demand desludging recognising that most of the existing containment structures are large and need infrequent desludging and consumers aren't habituated to frequent desludging. However, in order to test scheduleddesludging, the FSM service agreement provides that, PFA will pilot a methodological scheduled emptying process in some wards of Dhenkanal to test its feasibility for future implementation.

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