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An Independent impact evaluation study of four projects on Faecal Sludge Management and Urban Sanitation across 4 cities supported by HDFC Ltd.

Independent Impact Assessment

Sanitation & Waste Management Infrastructure

Prepared By

#aShTaG PerCapita

Prepared For

HDFC

WITH YOU, RIGHT THROUGH

This report has been developed under the scope of a consulting service provided by the team at Hashtag PerCapita Pvt. Ltd to HDFC Ltd. Hashtag PerCapita Private Limited is an engineering & planning advisory firm, focused on lifestyle and livelihood analytics for enabling sustainable settlements.

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List of Acronyms

AMRUT	Atal Mission for Rejuvenation and Urban Transformation
ASCI	Administrative Staff College of India
CEPT	Centre for Environment Planning and Technology, Ahmedabad
CPHEEO	Centre for Public Health Environmental and Engineering Organization
CSR	Corporate Social Responsibility
CWAS	Centre for Water and Sanitation
DMRC	Delhi Metro Rail Corporation
FS	Faecal Sludge
FSSM	Faecal Sludge and Septage Management
FSTP	Faecal Sludge Treatment Plant
HDFC	Housing Development Finance Corporation Limited
HH	Household
HMWSSB	Hyderabad Metropolitan Water Supply and Sewerage Board
HPC	Hashtag Per Capita Pvt. Limited
HTPF	H T Parekh Foundation
ICT	Information & Communication Technology
KII	Key Informant Interview
KLD	Kilo Liters per Day
KVS	Kachra Vechak Sangha
MCC	Metro Customer Care
NOC	No Objection Certificate
O&M	Operation and Maintenance
PPE	Personal protective equipment
SBM	Swachh Bharat Mission
SHE Teams	Sanitation and Hygiene Education Teams
SMC	Satara Municipal Council
SoP	Standard Operating Procedures
STP	Sewage Treatment Plant
TCC	Trichy City Corporation
ULB	Urban Local Bodies
WAVE	Women's Action for Village Empowerment
WC	Water Closet

1. Overview

Through two decades of reforms implemented under the course of the Jawaharlal Nehru National Urban Renewal Mission (JNNURM)[1] and Atal Mission for Rejuvenation and Urban Transformation (AMRUT)[2], there have been major progress made in the sanitation sector in India. The country-wide campaign of Swachh Bharat Mission (SBM) was initiated by the Government of India since 2014 (which is currently in its second phase) to eliminate open defecation by improving access to sanitation and addressing the treatment of effluents generated from toilets. While the first phase of SBM particularly saw improvements made at the user interface with increased implementation of household sanitation, the new areas for focus that remained were sanitation in public spaces and effluent treatment[3].

HDFC Ltd, through its CSR initiatives, works across the sanitation value chain from constructing individual, community and public toilets to desludging, treatment and reuse. The Environment – Sanitation and Waste Management Project has set up Faecal sludge treatment plants in Satara and Hyderabad, public toilets in Delhi and community toilet blocks in Trichy to improve the access to sanitation and scientific treatment of faecal sludge (FS).

The total grant support amounted to Rs 10.99 crore and the interventions were implemented from FY 2020-21 to FY 2021-22:

- **Citywide Urban Faecal Sludge and Septage Management (FSSM)**: a 30 Kilo Litre (KLD) Faecal Sludge Treatment Plant (FSTP) for the Indian city of Satara in Maharashtra was commissioned to the Centre for Water and Sanitation (CWAS) of Centre for Environmental Planning & Technology (CEPT), Gujarat
- **FSSM as a solution for a peri-urban setting:** a 40 KLD Faecal Sludge Treatment Plant (FSTP) implemented at Nalla Cheruvu Lake in the outskirts of Hyderabad, project commissioned to the Administrative Staff College of India (ASCI), Hyderabad and Collective Good Foundation (CGF)
- **An operating model for community toilets:** Community Toilet installation in Trichy, Tamil Nadu. Project commissioned to the Gramalaya; and implemented in 2 phases to renovate 195 community toilets across 65 wards of Trichy corporation area.
- **A solution for public toilet complexes:** 5 Public Toilet installation near Delhi metro stations: project commissioned to Sulabh International.

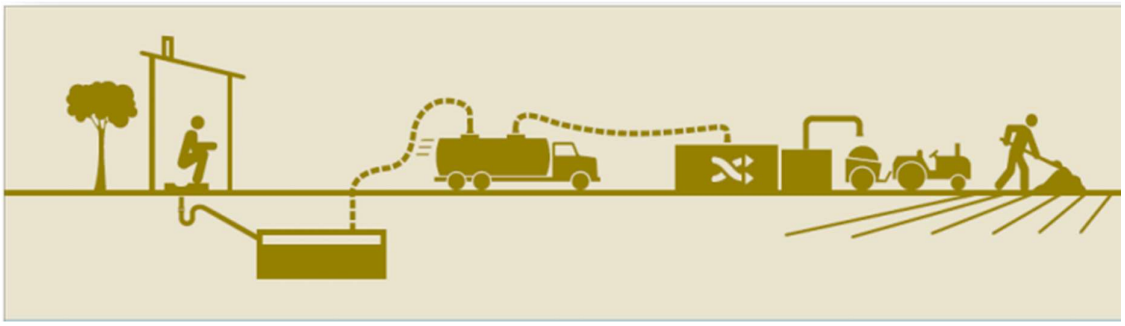


Figure 1: Illustration of Sanitation Value Chain

[1] (Ministry of Urban Employment and Poverty Alleviation, 2012)
[2] (Ministry of Housing & Urban Affairs, 2022)
[3] (Government of India, 2021)

2. Key Outputs

Table 1: Overview of the Project Interventions undertaken by HDFC Ltd. in the four cities

FSSM Intervention in Satara	
Infrastructure created	• 30 KLD FSTP using Decentralised Wastewater Treatment Systems (DEWATS) technology • 1 Truck of 3KL capacity procured
Faecal Sludge (FS) Treated	• 1200 KLD of faecal sludge treated annually
Online Monitoring systems introduced	• SaniTRACK app is used daily for recording and monitoring scheduled desludging.
FSSM Intervention in Hyderabad	
Infrastructure created	• 40 KLD Moving Bed Biofilm Reactor (MBBR) based FSTP
FS Treated	• 3049.5 KLD from August 2021 up until December 2022
Separate cell within Hyderabad Metropolitan Water Supply & Sewerage Board (HMWSSB)	• Creation of Metro Customer Care with a hotline for desludging requests
Community Toilet Intervention in Trichy	
Infrastructure renovated	• 195 Community Toilets
Population Benefited	• 85,000+
Operating Model for O&M	• Sanitation, Hygiene and Education (SHE) Team and Women's Action for Village Empowerment (WAVE) Federation maintains the renovated CTs
Public Toilet Intervention in Delhi	
Infrastructure created	• 5 Public Toilet Complexes built
Footfall per day	• 70-100 for 3 toilets • 300 for Nehru place toilet complex • 450-500 for Hazrat Nizamuddin toilet complex
Operating Model for O&M	• The operation & maintenance is done by Sulabh

The project has provided access to clean and hygienic sanitation facilities and essential infrastructure to make cities sustainable.

3. Approach & Methodology

3.1 Assessment Methodology

The assessment focused on 'lessons and improvements to consider for new interventions' as well as undertaking a 'critical review of current interventions'

- A gap assessment alongside stakeholder consultations in Satara to identify issues and best practices for FSSM project interventions undertaken across all aspects of the service chain with focus on scheduled emptying pilot implementation in the city
- Evaluating the technology and its associated operation and maintenance of the FSTP in Hyderabad.
- Stakeholder consultations so as to evaluate the backward and forward service linkages from the FSTP.
- Assessing the capacity building interventions done for officials associated to the project intervention, i.e.:
- An olfactory and visual assessment of physical condition of the community and public toilets, gauging the usage patterns, monitoring systems and gaps observed from implementation

3.2 Key Assessment Areas

The methodology adopted entailed field observations, Key informant Interviews and Sample Surveys:

- All 4 locations were visited twice
- Evaluate the working condition in terms of operation and maintenance of infrastructure assets created
- Observing desludging operation and KII with the operator
- Consultations with implementation partner teams
- Meeting with government depts- FSSM Cell at HMWSSB, Sanitation dept of Satara Municipal Council (SMC)
- Detailed review and data analysis was done for the Log book of the FSTPs, footfall data for one week was collected at Delhi Metro toilets
- Sample survey of households and users- A sample survey of 50 households in the pilot intervention zone of Satara was conducted to understand the user's perspective
- Stakeholder consultations to gauge issues/gaps, value and overall impact of intervention

Project Intervention 1
Faecal Sludge and Septage Management in Satara, Maharashtra

4. Faecal Sludge and Septage Management[4] in Satara, Maharashtra

4.1 About the Intervention

The citywide planning and management of faecal sludge and septage has assumed great importance considering its relevance to small and medium towns in India where households mostly depend on on-site sanitation systems. The city of Satara is representative of a large number of cities in India that rely on such on-site sanitation system, characterized by toilets connected to septic tanks. This is prevalent in small and medium sized cities as well as parts of larger cities with sewerage. In these cities, it is estimated that over 70% of the faecal waste is not collected and treated[5]. This may cause faecal contamination which may have consequences on public health and the natural environment.

The Centre for Water and Sanitation (CWAS), CEPT University has been supporting the Swachh Maharashtra Mission for Urban Areas in developing strategies, building capacity of ULBs and supporting implementation, since 2015. It also supports cities in Maharashtra on city-wide sanitation planning and implementation of Open Defecation Free (ODF) and FSSM plans. To scale up these interventions and support the cities, the HDFC Ltd. through its CSR initiatives provided a grant of INR 24.8 million to support strengthening of FSSM activities in the cities of Satara and Kolhapur in Maharashtra.

4.2 Key Findings

4.2.1 Integrated citywide sanitation planning

FSSM was proposed strategically based on an overall evaluation of managing sewage and septage in Satara. A comprehensive assessment supported in gauging the baseline and **identified FSSM as the immediate strategy and developed a comprehensive city-wide plan for the same**. The plan suggests cost effective solutions considering limited availability of funds and their effective utilization. In addition, capacity building interventions have been proposed in the plan to train and handhold ULB and external stakeholders (such as truck operators) associated with FSSM.

Stakeholder engagement and buy-in: CWAS team was instrumental in building buy-in for the **FSSM plan which was approved by the SMC General Body** and was adopted for implementation. The grantee was also successful in obtaining necessary **council resolutions for piloting the scheduled desludging/emptying** of containment systems in the pilot zone, which shows a positive and high level of engagement by CWAS with SMC leadership (which was also evident in the key informant interviews that were conducted by the HPC team). The elected representatives, ULB officials and operators were well aware of FSSM and its importance and relevance for Satara as a smaller but rapidly expanding city in terms of population and size.

4.2.2 Capacity building

The CRDF team have conducted training workshops to enhance the capacities of various **city officials, operators and community-based organizations** in the city which were focused on:

- Technical know-how for effectively operating and maintaining new cesspool truck
- Technical trainings for effective O&M of FSTP at Satara
- Trainings on the use of online data and monitoring tool (SaniTrack) and data management at FSTP

[4] FSSM
[5] (CEPT University, 2021)

- Exposure visits to Wai for demonstrating a successful citywide FSSM planning and demonstration related activities including scheduled emptying

These programs were focused on technical know-how for effectively operating and maintaining the new cesspool truck and the exiting FSTP, use of online data and monitoring tool (SaniTrack) and data management at FSTP which included:

- Training and Sensitization of SMC officials
- Training of sanitation workers, FSTP operators etc.
- Awareness program with citizens
- The city officials were also finally taken for an exposure visit to Wai[6] city to witness the scheduled emptying and other FSSM related activities.
- A detailed Training[7] was also done for the O&M[8] of FSTP

5 training and awareness activities were conducted, 80 city officials were sensitized and 180 sanitation workers were trained on various topics related to sanitation. These interactions have **strongly indicated the improved technical know-how on FSSM**. The Sanitation staff of SMC were well aware of the technical aspects of O&M of cesspool trucks and the FSTP and were managing the data and monitoring operations using the SaniTrack tool. Kachra Vechak Sangh were operating and maintaining the FSTP to effectively treat the faecal sludge (FS) collected and are also producing good quality compost through co-composting of organic waste and dried sludge (at the rate of 100 kg per day which is shared to farmers). **A flower garden has been developed within the FSTP campus by using the well-treated greywater**.

4.2.3 Improved Awareness

CWAS team conducted an **exclusive awareness program on scheduled emptying in the pilot zones** (wards 2, 3 and 4) before its implementation on-ground to ensure that the households are aware of this initiative and are well prepared to facilitate the scheduled emptying operations. Relevant pamphlets were disseminated to the households through a **door-to-door campaign**. These pamphlets were smartly used in high visibility events at SMC and in social media to reach citizens across the city. A high level of penetration with respect to the scheduled emptying has been observed among the households surveyed in the pilot zone by HPC. Of the **households surveyed, 3 out of 4 were aware of the scheduled desludging introduced in the city** as a pilot initiative in their wards. However, beyond collection, it has been observed that most of the respondents were unaware of the scientific treatment and reuse of faecal sludge emptied from their onsite containment systems; this remains an area for further improvement.

4.2.4 Scheduled desludging

Scheduled emptying operations were commenced in the pilot zone in Satara from December 2021. A comprehensive strategy and route maps were developed by SMC with technical support from CWAS to plan and implement scheduled emptying. All the operations in the pilot zone were undertaken by the new cesspool truck. CWAS team was instrumental in supporting SMC officials in procuring the new truck and facilitating technical training to the operator to ensure effective and right utilization of the

[6] Another city where the FSSM implementation was done successfully by CRDF team
[7] On 5th of August 2021, the CRDF team conducted detailed training for FSTP O&M. All components of FSTP were explained in detail with 1.) operational and maintenance details, 2.) PPEs to be used.
[8] Operation and Maintenance

asset. Data of emptying operations carried out by the new cesspool truck was recorded using the online application, SaniTrack. The dataset made available for the period Nov 2021 to Nov 2022 from the SaniTrack application was analysed to evaluate the incoming load to the FSTP and thereby the treatment efficiency of the FSTP.

Some of the key highlights after the introduction of the scheduled desludging process are as follows:

- Around **1250 kilo litres (250 water tankers trucks) of faecal sludge from 600 households and establishments was safely emptied and transported to the Faecal Sludge Treatment Plant (FSTP)** for scientific treatment and reuse (from November 2021 to November 2022).
- An average of **4 emptying operations** collecting more than **8 kilo litres of sludge** were carried out **on a daily basis** by one truck.
- About **5% of the emptying operations were to cater to an emergency emptying request from households and public toilets in the city** and not necessarily scheduled emptying in the pilot zone.
- The **emptying operations were majorly from residential buildings (94%)** and the remaining from a commercial properties, public buildings and public toilets as well.

The table below depicts the month-wise data on the number of emptying operations carried out and the quantity of faecal sludge collected by the cesspool vehicle.

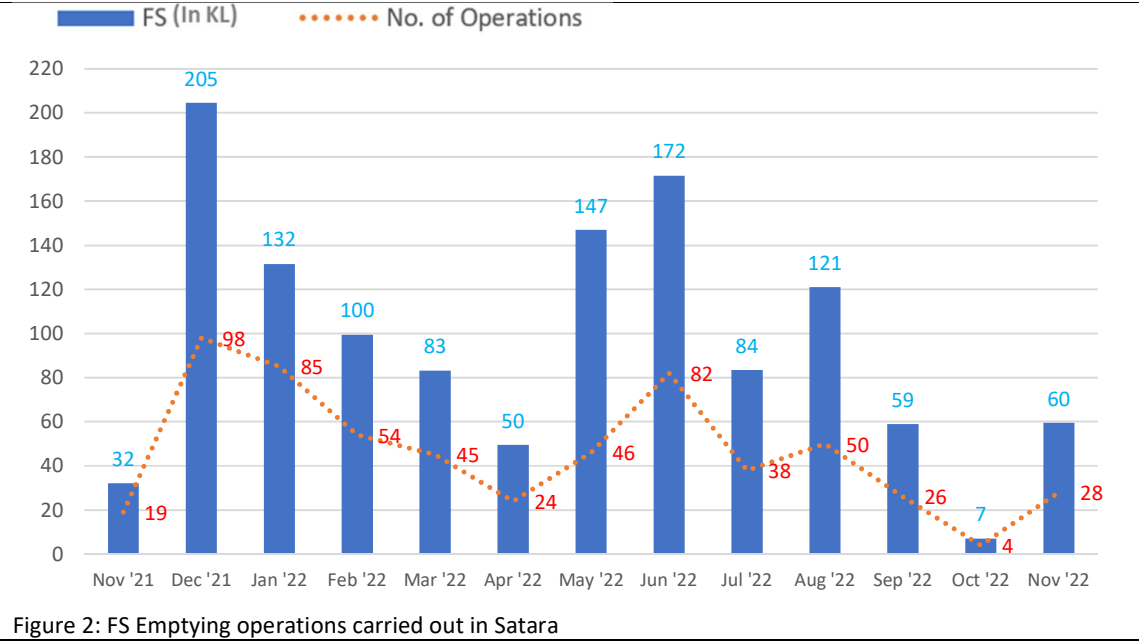


Figure 2: FS Emptying operations carried out in Satara

Some of the key inferences from the data on month-wise emptying operations are:

- Despite the emptying operations being scheduled we observe considerable variation in the number of operations conducted each month. Few of the reasons would be:
    - There are various instances of households not cooperating with the pre-decided schedule for undertaking the desludging operation.
    - Some (about 5% of the total operations) of the variation could be attributed to the diversion of the cesspool truck to attend several need-based emergency desludging requests in the other parts of the city other than pilot zone, which was validated during our key informant interviews and discussions with the CRDF team.
    - The FSTP was also shut down for a few days during the month of October due to major repairs: In the month of October, a major choke up was reported in the pipeline system. Also, due to rains at Satara, the settling tank was full and sludge drying beds

were not drying. This drying pace was reduced in the solar powered sheds because of lower solar intensity during this period.

- Since the SaniTrack platform was used to capture details from pilot zone only and not used to capture the details of need-based operations, the details on number of need-based operations were unavailable.
- There are 4 private trucks which cater to collection duties also could be attributed as a reason for reduced load received at the FSTP

4.2.5 Convenience for Households

The users (households) of the pilot scheduled operations in Satara are satisfied with various aspects of the system introduced by SMC with technical support from CWAS team on the ground. The **Error! Reference source not found.** below shows the average values of the ratings given by respondents of the household survey conducted by HPC on various aspects of the scheduled emptying pilot in the city.

- **70% of the respondents (26 out of 37) who are aware of scheduled emptying have said that they see value in this initiative** with major reason being **ease of access to service** followed by a few mentioning the economic value (cheaper) and convenience of the service.
- Regular service to urban poor, without user fees, enables them to get their septic tanks desludged and avoid any overflows. The O&M cost of the service for the scheduled desludging is proposed to be covered through existing sanitation/sewerage or property tax.

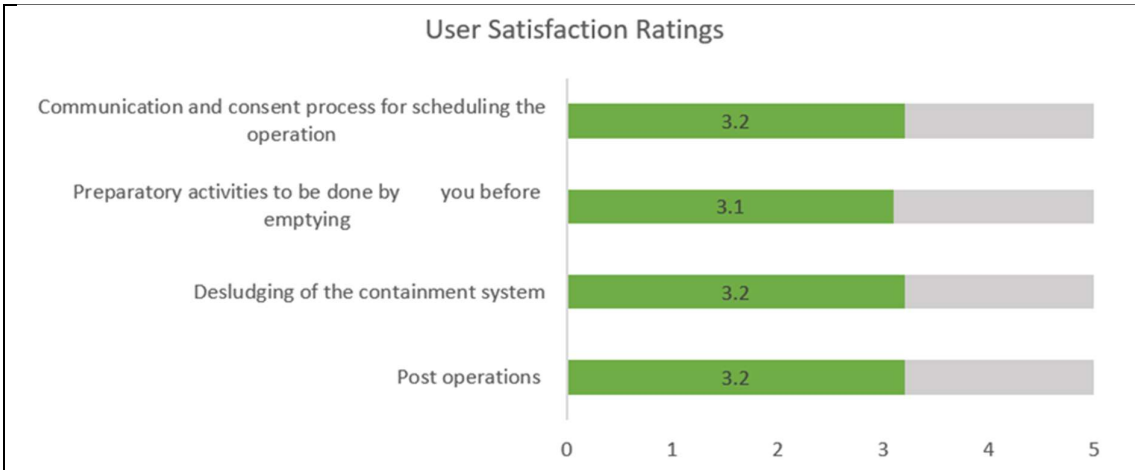


Figure 3: User satisfaction ratings on scheduled emptying operations[9]

4.2.6 Scientific Treatment of faecal sludge

The FSTP in Satara originally had a treatment capacity for 20 KLD which was expanded **by 30 KLD** through the grant received from HDFC CSR. As such the overall treatment capacity is currently 50 KLD. A field visit to this facility was undertaken by the HPC team, along with SMC officials. The technology that is being used currently for treatment of sludge is solid liquid separation using an anaerobic digester, solar drying of sludge and treatment of wastewater (separated from sludge) through **DEWATS technology**. The FSTP is operated by sanitation workers from waste pickers organization 'Kachra Vechak Sangh'.

The treatment plant was able to treat more than 1200 kilo litres of faecal sludge in the span of one year (SaniTrack data). The **choice of technology is simple and apt for the size of the town**. It has been observed that the FSTP is being operated and maintained well as per the standard operating

[9] Post operations in the data provided

procedures set in place. The existing **FSTP is not operating below its optimal[10] capacity of 50 KLD**. Analysis of FSTP logbook data (last 6 months, Aug '22 to Jan '23) shows that the **daily average quantity of sludge that is being treated by the plant is in the range of 6-15 KLD on low load receiving days to as high as 25 KLD**. On an average, 4 to 6 truckloads of faecal sludge are being treated every 2-3 days.

Figure 4: The regulated solar-dryer based drying beds at Satara FSTP

An average of 100 kg of sludge is generated as a treated by-product daily **which is being reused for sustaining and improving plantation in and around the FSTP site** resulting in saving the use of fresh water. When 5 tonnage worth of sludge is amassed generally every 2 months, it is sold at the rate of Rs. 3 per kg (or 2000 per trolley). The income collected from this sale is collected by the Kachra Sevak Sangh (KSS).

4.2.7 Sustainability of effluent management services in Satara:

The following developments are noteworthy developments in the interest of effective implementation and future sustainability:

- One third of the densely populated core area of the city is being provided with sewerage connection (which is under implementation and the overall execution is delayed due to fund availability). While it is expected that both sewerage and FSSM would co-exist, even in areas covered by sewerage, there would be requests for desludging by households due to lack of sewer connection as well as the unwillingness of households to connect to a sewer system.
- **More than 50 officials and staff member of SMC were trained on FSSM to enhance their technical and managerial capabilities**. These programs have helped in seamless operations across the FSSM value chain. Also, an **awareness campaign on scheduled emptying was undertaken in the pilot zone covering about 5000 households**.
- Solar panels were installed at the treatment facility and connected to the grid system. Plantation is being developed around the FSTP to increase the green cover and reuse the treated wastewater and sludge from the FSTP, also an additional 15kld capacity of dewatering unit has been added to increase capacity of the FSTP.
    - The online data collection cum monitoring tool, **SaniTrack, has information on 800+ emptying operations in Satara** covering details of the existing on-site sanitation systems, emptying operations and citizen feedback. This data can be used in effective planning and implementation of FSSM interventions in the future

[10] $Optimal\ Treatment\ Efficiency = 100 * {Daily\ incoming\ Load}/{50}$

4.2.8 Exemplar for others

Satara FSTP has become a resource centre and a demonstration site for citywide FSSM treatment and till December 2022, it has had over 200 visitors from across different groups, such as college students, government officials, other NGOs.

Figure 5: Students from Government Nursing College participating in a site visit at the Satara FSTP

4.3 Recommendations

4.3.1 Updating FSSM Plan to include the extended limits of SMC

The current plan is limited to the old city limits of SMC covering only about 8 sq. km. Since the city boundary has been delineated to 26 sq. km. It is essential to update the FSSM plan to integrate the newly added areas as well.

4.3.2 Improved strategy for scheduled emptying

The current strategy adopted for undertaking the scheduled emptying is based on a route plan and sequential emptying of properties in the pilot wards. It has been observed that the households within the pilot zone had instances of emptying their septic tanks in less than a year. Considering the availability of baseline data, these household may be prioritized for scheduled emptying over the ones which have a longer time span for filling up.

Figure 6: Site desludging demonstration conducted at a household in Satara

4.3.3 Inclusion of public and community toilets in scheduled emptying

A considerable portion (about 10% of the population) of households in Satara, especially urban poor settlements, are still dependent on public toilet infrastructure. Therefore, it is essential to include the public and community toilets in under scheduled emptying after thorough assessment of the existing onsite systems connected to them. This will ensure uninterrupted functioning of these public toilets and also ensure effective treatment of wastewater generated by them.

4.3.4 Scale-up the use of SaniTrack platform for collecting information on all emptying operations in the city

Currently it is being restricted to the operations conducted in the pilot zone and specific to the emptying operations of the new cesspool truck procured by SMC through the grant. However, this needs to be scaled up phase-wise, i.e.

- capturing data of the new truck conducting any operations (emergency/need-based ones)
- Data from other cesspool trucks owned by SMC
- Data from other private operators in Satara.

This will help integrated approach to FSSM by understanding the existing containment systems, the existing emptying practices and the volumes of FS generated in the city for better future planning.

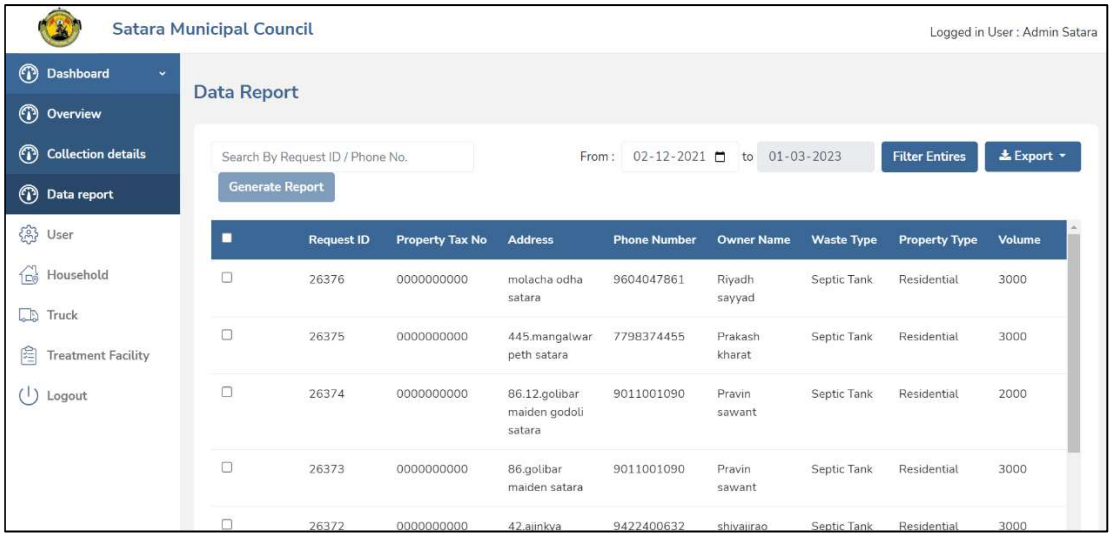


Figure 7: A visual illustration of the SaniTRACK Platform

4.3.5 Minor Interventions to FSTP Module Design

A few minor issues[11] were observed in design of the screening chamber and the vent pipe for the anaerobic digester was of shorter length. The solids are passing through the inlet chamber and are getting settled at the bottom of anaerobic digester. This has resulted in the FSTP being shut down few

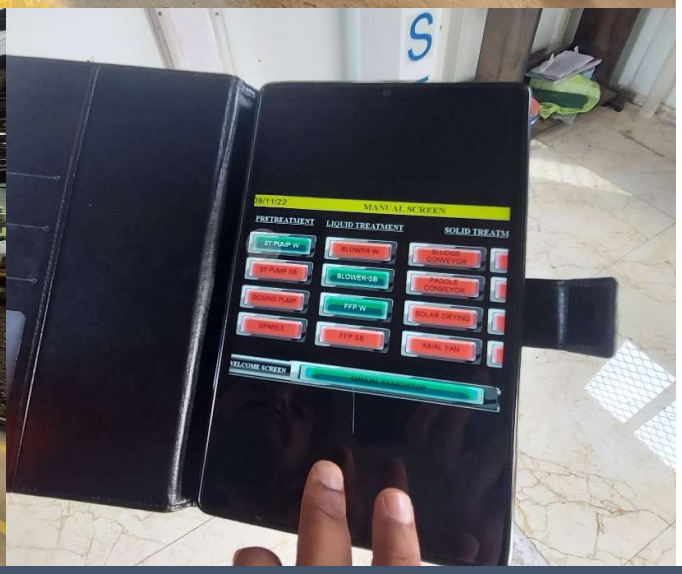
[11] These inputs have been shared with CEPT

hours every week to remove solids manually. What is perhaps needed is to introduce a medium/fine screen in the inlet chamber. These minor issues can be easily rectified to improve the operations.

4.3.6 SMC[12] to revise sanitation tax to cover the cost of FSSM

The O&M cost of the desludging service is proposed to be covered through existing sanitation/sewerage or property tax. However, the operating costs of the FSTP should be covered, otherwise, the operations could become unsustainable. Considering the long-standing experience of the CWAS team in FSSM, it would be ideal if the CEPT-CWAS team do an evaluation of the cost of delivering FSSM service in the pilot zones (and translate this as a load on the municipal budget) and thereafter push the SMC to devise and charge a tariff as opposed to providing free service.

[12] Satara Municipal Council



Project Intervention 2
Faecal Sludge and Septage Management in Hyderabad, Telangana

5 Faecal Sludge and Septage Management in Hyderabad, Telangana

5.3 About the Intervention

The planning and management of faecal sludge and septage is relevant as a solution for peripheral urban areas as it is for small and medium towns in India. In most metros, sewerage networks extend only to the core area while peripheral areas remain unserved. Even in the case of Hyderabad, 98% of the core/old city has a sewerage network for collection and conveyance wastewater, the peripheral high growth areas have a coverage ranging from 0-30%[13][14]. The faecal waste in these non-sewered areas is disposed in water bodies and open areas causing significant risk to public health and environment.

As such, an intervention was supported to explore a peri-urban FSSM demonstration with a grant from HDFC Ltd.'s, as part of which an FSTP of 40 KLD capacity was installed in Uppal region which is the peripheral part on the eastern side of the city. The plant is adjacent to Nalla Cheruvu Lake which is currently facing the burden of indiscriminate disposal of untreated faecal sludge from the 80,000+ households in the vicinity.

5.4 Key Findings

5.4.1 Stakeholder engagement

This project intervention was **undertaken in partnership with Hyderabad Metropolitan Water Supply and Sewage Board (HMWSSB), Samhita Social Ventures (belonging to the Collective Good Foundation) and ASCI (the Administrative Staff College of India)** with an aim to demonstrate a solution for treating faecal sludge in the non-networked (i.e., no sewerage connection) region of Uppal in Hyderabad. To **build, operate and maintain** the treatment facility, ASCI engaged **Meliorate Engineers Private Limited**. Meliorate currently has been outsourced the responsibility for overall operation and maintenance by HMWSSB.

5.4.2 Separate Cell created

HMWSSB constituted **a separate cell for sustaining the FSSM activities** in the city called H-FSSM Cell, headed by Chief General Manager. The members of the cell include Manager (Engineer), Manager (IEC), Manager (IT). ASCI is extending technical and knowledge management support to the cell. In this regard, ASCI has deputed a dedicated resource person to support HMWSSB in the process.

- A MCC (**Metro Customer Care Service**) was instituted within HMWSSB which employs 26 staff members (12 for the morning shift, 12 for the afternoon shift and 2 for the night shift). Staff were trained **to direct all desludging requests** amongst the other general requests (booking water tankers; Clearing chokage; low water pressure issues; polluted water supply etc.) that are received through the 155313 hot line **to the FSSM desk** which is supported by services from ASCI

[13] (ASCI, 2021)
[14] (NIUA, 2018)

Figure 8: Stakeholder consultations at the Hyderabad FSTP

- The dial-a-septic tank cleaner system is housed at Water Board. The requests for desludging are received by the MCC (Metro Customer Care) team at HMWSSB. Later, the H-FSSM cell member will assign the same to the proximate desludging operator and will monitor the entire process.
- **Since the inception of the FSM intervention in Uppal, a new desludging extension was introduced into the existing HMWSSB hotline number, i.e., 155313. About 100 out of 700+ private trucks operating in Hyderabad were empanelled** by HMWSSB to benefit from the hotline service provided by HMWSSB that would help link the trucks to potential customers. While there may be arguments on the pricing regulation that is part of FSM services offered by the empanelled desludging operators, nevertheless market linkages have certainly been facilitated through the empanelment process.

5.4.3 Introduction of a Pro-Poor Tariff

HMWSSB introduced a pro-poor tariff structure to benefit the most vulnerable populations not just in the vicinity of the project site but throughout the city. This tariff allowed the truck operators to charge a maximum fee of only 1700 INR per trip.

There have been instances reported where the trucks are not willing to undertake a trip because of the limit on them to charge higher than 1700 INR (which is the pro-poor tariff). This could be attributed to the fact that when the cost of a trip is actually much higher, the additional burden of that cost is not borne by the govt./HMWSSB but by the truck operator in question.

This was done in line with HMWSSB's pro-poor approach and to encourage timely desludging in the low-income settlements/slums where subsidized rates were envisaged for the households living in these areas, as follows:

Table 2: The pro-poor tariff pricing structure defined by HMWSSB

Establishment	Price for 3000 Liters in INR	Price for 5000 Liters in INR	Price for 7000 Liters in INR
Slums - Residential	500	800	1000
Residential/Multi-storey buildings – (Ground + 2)	1000	1400	1700
Commercial/Institutions/gated communities/multi-storeyed buildings – (Ground + 3)	1800	2200	2700

- The problem specifically appears to be in the price segment of Rs.500-1000 tariff for slum settlements which is very low a price threshold for truck operators.
- As per the prevailing tariff regime, commercial establishments are charged higher to cross-subsidize desludging activity in slum areas.

5.4.4 Evaluating customer experience

A customer feedback system has been enabled through the 'dial-a-septic tank' service in order to both monitor the services and also to gauge the service provided to customers. **It is important to mention that, for the call log provided between July 2021 and July 2022, the satisfaction gauged within the customer feedback was 95.7%.**

5.4.5 Improving awareness

For informing the citizens**, IEC Campaigns were organized at ward level**. Self Help Groups, Slum Level Federations, Residents Welfare Associations etc. were the target groups for the IEC activities. Various modes like video presentations, door to door pamphlet distribution, leaflet distribution, focussed group discussions (FGD), articles in print media were used. The **empanelled truck operators** were also provided inputs to:

- Incorporate **the use of PPE kits** during their daily service provision
- Enable support to operators through **GPS enabled location discovery** to link them to customers

The 'dial a septic tank service' was introduced since August 2021 within the 155313 hot line. It was marketed through banners, impressions created over water tankers (as illustrated in photo below) and other HMWSSB trucks. Also, on the water bill, the provision was marketed.

Figure 9: The dial-a-septic tank service illustrated over an HMWSSB truck to market the service

Figure 10: The above image illustrates a poster advertising the 'Dial-a-Septic tank cleaner' service which is handheld by ASCI and organized by the team at HMWSSB

5.4.6 Building market linkages

The key benefits offered by the introduction of HMWSSB's back-end metro customer care services have been two-fold

- **The previously privately run trucks can now get their locations discovered by a needy customer.**
- **Customers can also get their demand met by a proximately located desludging operator**

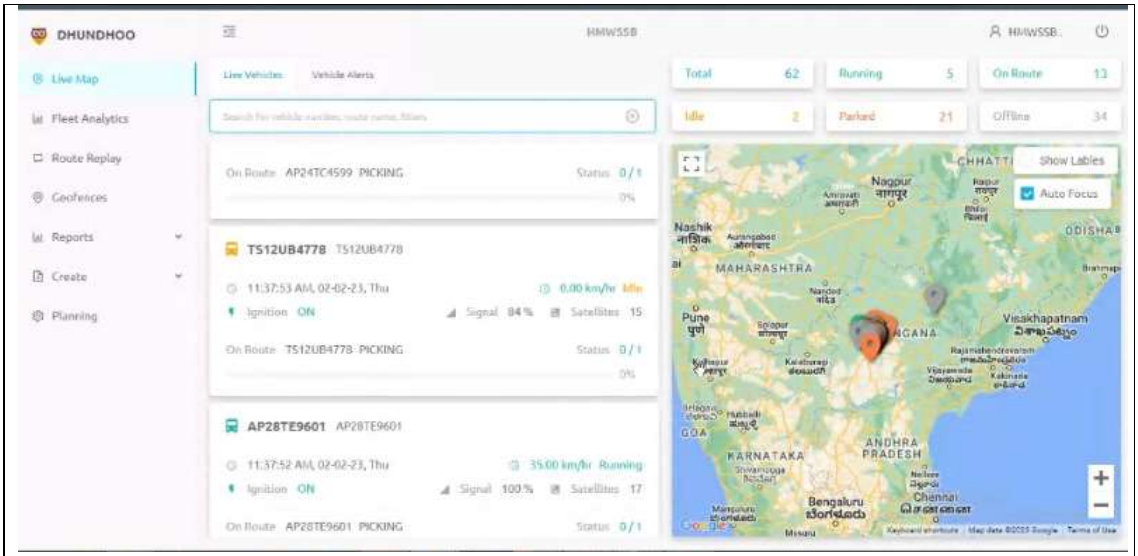


Figure 11: An illustration of the Application which is used to locate the GPS enabled desludging operators.

- For every triggered desludging request, there is a corresponding interception of a desludging operator by the FSSM desk operator who may or may not accept the trip assigned to them. If

unassigned, the trip gets routed back to the FSSM desk operator who tries to find another operator close to that location.

- The trip allotment frequency is generally observed every half and one hour by the person manning the FSSM desk. The desludging operations are currently not evenly distributed across the truck operators within the region

5.4.7 Efficient technology for scale

This FSTP serves as a demonstration to adopt the MBBR[15] technology for treatment of faecal sludge at scale.

- High treatment efficiency: MBBR technology provides a high level of treatment efficiency due to the large surface area of the biofilm carriers, which supports the growth of microorganisms that break down pollutants in wastewater.
- Flexible design and operation: MBBR systems can be designed and operated to be easily adaptable to changing wastewater loads and flow rates.
- Compact size: MBBR systems are typically smaller than other biological treatment systems, which can be advantageous in situations where space is limited or where retrofitting an existing wastewater treatment plant is necessary.
- Reduced sludge production: The use of MBBR technology can result in reduced sludge production compared to other biological treatment systems, which can help to reduce the costs associated with sludge disposal.

Figure 12: The image here shows the MBBR's main treatment module from front side view

5.4.8 Energy Efficient Operations

The FSTP energy consumption is optimized and energy efficient (115 KWH per month which translates to 4 units per day) because power consumption is currently optimized based on process requirement.

- For instance, the air blower working hours within the treatment facility would depend on the MLSS (MLSS are the concentration of suspended solids in mixed liquor, usually expressed in grams per litre) and minimum required Dissolved Oxygen (of 2 mg/l) is maintained to facilitate the bacteria for aerobic treatment. Currently, based on the demand of wastewater treatment, aeration rate will vary (and thus optimized).

[15] Moving bed biofilm reactor

- While treatment is optimized as per demand, the availability and reliability of electricity if compromised will affect treatment efficiency and increase time for treatment thereby affecting optimal utilization of treatment capacity. In June 2021, it was noted that there was an outage for the pumps of the plant and it was shut down as such for some days.

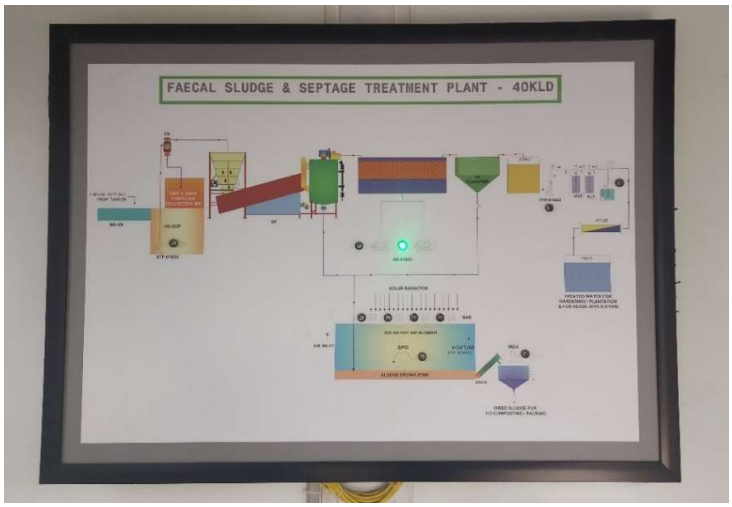


Figure 13: The above image shows the dashboard to run and operate all modules of the plant. Different features of each module over this dashboard will light up when each are remotely switched on and off

5.4.9 Low Operating Capacity

Since the inception of operations, the FSTP has **processed** approx. a quantity of **3049.5 KLD from August 2021 up until December 2022 of septage** which has emerged from **547 desludging truck trips**.

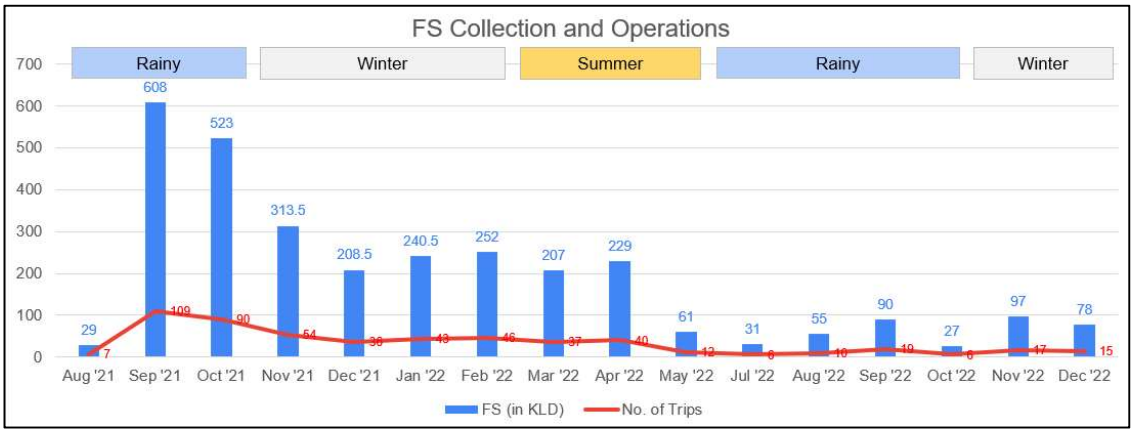


Figure 14: Data made available on trends of FS Collection Operations to the FSTP in Uppal

- The treatment efficiency at the FSTP has fallen to 0.9 – 2.6 KLD from as high as 17 – 20 KLD. As such, currently the FSTP is operating at a lower capacity due to reduction in the number of loads arriving.
    - The reason for the graph going down after the initial phase was the lack of vigorous IEC campaigns (after April 2022). After that, there was no IEC campaigns because of no fund availability and the requests also decreased.
    - There also is a nearby FSTP located that caters to the Boduppal municipality (and Peerzadiguda municipality). As private operators are generally more concerned with distance, this could also be one reason affecting incoming load

- It should be noted that during June, there was a functional issue for pumps at the FSTP and as such the plant was shut down for close to 20 days. As such, the desludging requests were then routed to the nearby co-treatment facility (or the FSTP located in Boduppal).
- While there is a GPS enabled system that is used to spot and link trucks to customers, there is currently no work flow organized to monitor the final disposal of sludge at the FSTP. This is currently done manually as per the understanding between the FSSM desk and the concerned desludging operator who gets a desludging request assigned.
- **85% of the trips emerging are from residential establishments**. It was noted during discussions that in case a commercial entity contacts the operators through the 'dial-a-septic tank service', there is the scenario of future orders getting directly negotiated between the operators and the establishments. This could also be the reason for decreasing trips.

5.4.10 Exemplar for others

This FSTP has been serving as an example for systemic and institutional innovation to other city functionaries, practitioners, officials from state departments and development organizations, who keep visiting the plant for learning and exposure to potentially replicate.

Figure 15: The image here shows drying area within the FSTP, particularly the infra-red drying unit

5.5 Recommendations

5.5.1 Strengthen internal competencies and reduce dependence on ASCI

While the introduction of the 'Dial-a-Septic Tank' service is an innovation in the context of improving linkages between emptying operators to residents with desludging requests for their on-site systems, the assignment of trip by the FSSM desk is currently done manually. While manual allocation is not the issue, the system is heavily reliant on the assistance and support[16] provided by ASCI within

[16] ASCI bears the cost of the FSSM personnel that support HMWSSB's FSSM Cell

HMWSSB's FSSM Cell. As such, **it is an imperative to identify inhouse technical FSM resource persons to be available across two shifts for the FSSM related technical assistance across all operations undertaken by the metro customer care.** Currently the remaining resources are all personnel focused on operations.

It is imperative for ASCI to begin developing an exit plan with respect to their technical assistance to HMWSSB which has now lasted almost 2 years. While there is the plan to initiate scheduled desludging in Uppal and this region can serve as a laboratory to learn about desludging operations, **it is also important that ASCI supports in organizing a database of all households and their tank sizes after one round of desludging is conducted at a facility. This way, they can populate their database to initiate the scheduled desludging efforts and ASCI can handhold HMWSSB to get independent.**

5.5.2 Create process efficiencies

Also, in case a desludging request is made for a future time and day (the general situation is to seek the service during weekends), the FSSM desk generally allots the task to a particular operator to take up the activity on a future date. While the general prevalence is that such trucks do follow up on the assigned trip, in case the truck is unavailable, a reassignment of the trip needs to be done by the FSSM desk from scratch. **Providing the desludging operator's name to the customer at the point of triggering the activity and generating the token could be an appropriate solution to avoid trips from getting cancelled and facilitating a follow up between the customer and operator.**

5.5.3 Continue IEC activities

While the IEC activities that have been conducted so far are focused on household access to wastewater management and sanitation, **it would help if the public are communicated the public health impact of open disposal of faecal sludge and its contribution to vector borne diseases. Moreover, the value proposition of intermittent marketing and IEC cannot be understated and investment should be allocated by HMWSSB towards the same; this is a systemic requirement to sustain consistency in operations.**

5.5.4 GPS enablement for sludge disposal

Currently the GPS enabled in trucks supports the linkage of customers and operators but this is not administered for sludge disposal. It would also help that once sludge is collected from a household, an automated ticket should get raised, and this ticket should only get closed once that collected sludge reaches the FSTP. As pointed out by ASCI, alerts can be generated for every entry and exit of the vehicle in the treatment plant. Standby time of the vehicle can also be gauged on the application dashboard of the GPS. As such, vehicles on standby with their engines kept on, can be specifically monitored for practicing any indiscriminate dumping.

5.5.5 Consider to modify Tariff Structure

Based on Key Informant Interviews (KIIs), it was noted that the 'Pro-Poor Tariff' threshold has been defined (at 1700 INR) by HMWSSB based on consultations with truck operators, there is a hurdle inadvertently created in the market. There have been instances reported by the FSSM desk where truck operators are dissuaded to proceed with the pro-poor tariff when the cost for delivering the service is on the higher side (say due to distance). **The recommendation in this regard would certainly be for the government to cross-subsidize the extra measure of cost in addition to 1700 INR for the truck operators. If maintaining a pro-poor tariff is a priority for low-income households, the burden of that cost cannot be borne by the service provider. In transferring the risk of that cost to the truck operator, such operators are being disincentivised from being part of the empanelled fleet.** Another option would be to marginally charge higher prices to commercial entities and higher income apartments (the proxy for higher income being the building typology) and use the surplus money to cross subsidise the poor households (as is being done for water tariffs)

- While the pro-poor tariff may be well intentioned, there is the perceived harm caused to the economic objectives of desludging businesses operating in the region. For instance, the

current pro-poor tariff is set at 1700 INR. Now, if the actual cost including a margin of profit for the operator adds up to 2500 INR, and if they are not allowed to charge this amount, it can dissuade operators from being empanelled. What we have noted from consultations is that private operators who are not empanelled, actually charge higher while also preventing registered operators from entering their service areas. As such, while the systemic innovation (of having a call centre-based model) to establish market linkage cannot be denied, there is a limitation caused by the restrictive pricing model currently instituted through this FSSM service scheme. The focused target of the FSSM cell has to be three-fold:

  - To serve as a platform that maximizes opportunities for truck operators to access desludging requests
  - To incentivize operators so as to maximize the utilization of the 40 KLD treatment capacity of the FSTP
  - To use the GPS-enabled tracking not just for trip assignment but to gauge safe disposal practices. A longitudinal evaluation of truck activity in the zone can help gauge motivations and plan better.

- **The currently operating private trucks which are not empanelled and are informally operating are reported to be coercive towards empanelled trucks serving in their regions. There also is a speculation that these informal operators currently earn more than the empanelled trucks.** As such, **enabling (and incentivizing) rather than regulating (through tariff restrictions) could be seen as the more appropriate long-term strategy.** Also, private trucks which are not empanelled need to be nudged (by using persuasion and law) to get empanelled.
- **Another recommendation would also that the 'HMWSSB trucks' focus on service of slums while the empanelled operators serve the remaining citizen groups.**

Project Intervention 3

Community Sanitation Interventions in Tiruchirappalli: Refurbishment of 195 Community toilets

6 Refurbishment of 195 Community toilets in Trichy

6.4 About the Intervention

Community toilets are an important component of sanitation infrastructure in India, particularly in urban areas where many low-income category households do not have access to individual household toilets. Community toilets are relevant to the Indian context to address open defecation and to facilitate the needs of low-income settlements apart from providing safe and clean sanitation to women. Community toilets can help to address the social exclusion of marginalized communities from sanitation services, by providing a shared resource that is accessible to all members of the community, regardless of their background. Overall, community toilets are an important part of India's efforts to improve sanitation and public health, particularly in urban areas where the need for sanitation infrastructure is high. In the context of Trichy, there are more than 412 Community Toilets (CT) in the 65 wards of Tiruchirappalli City Corporation (TCC) for use by slum dwellers.

By effective refurbishment of Community Toilets, people who use them can avail of affordable sanitation services under Pay and Use system maintained by the SHE team of the respective slums. Gramalaya provides the technical support while renovation of CTs is underway. The renovation of CT includes some part of the civil structure, Flooring, Toilet pans, Doors, Tiles, Renovation of Child Friendly Toilets, bathing place, plumbing, connecting with drainage, renovation of Septic tank with soak pits, provision of water by renovation of borewell, painting and branding etc. Restoration of CTs would encourage 100% usage, followed by maintenance by the existing SHE teams.

In order to ensure the sustained ODF, **HDFC CSR and Gramalaya had renovated 95 Community Toilets of Tiruchirappalli City Corporation (TCC) between December 2019 to November 2020 amidst Covid 19. Based on the request from the Commissioner, TCC, retrofitting of additional 100 CTs was sanctioned from March 2021 to March 2022 in 4 zones of Tiruchirappalli across 65 wards.**

6.5 Key Findings

6.5.1 Usability with comfort

Currently, Trichy is one of the cities with highest number of community toilets in India. There is a lot of buy in to the concept of community toilet in Trichy due to the intervention of Gramalaya. Most community members do rely only on the community toilet as they do not have an individual toilet in their homes. Hence the refurbishment of community toilets was need of the hour and has created a positive impact among the communities due to its **improved usability with comfort**. Funding the refurbishment of 195 community toilets was very relevant because of the number of lives it has touched in a **positive way** in terms of **beneficiaries (about 50,000)**.

6.5.2 Maintenance

Most refurbished toilets are being effectively used by the beneficiaries and had a standard operating procedure for its management that was set up by Gramalaya Trust with the support of WAVE federation and SHE team.

Gramalaya trust set up a WAVE federation and SHE team in Trichy. Both the organizations were set up to manage the community toilets in Trichy. User fees are collected by the SHE team at the toilet and the amount is deposited at the WAVE federation every day. City corporation Trichy owns the land on which all the community toilets are set up. Further the corporation also pays the electricity charges of all the community toilets. Most toilets use pay per use model for collection of fees. However, one out of 20 toilets that were surveyed used monthly pass system for collection of fees. Wages for the SHE teams along with any O&M related to community toilets were taken up by the WAVE federation. Further, the project intervention is assessed to be highly relevant.

- There are Standard Operating Procedures (SoPs) present for daily maintenance of toilets. These SoPs are being followed in most of the toilets and SHE team member maintains the toilet clean by

cleaning them regularly. If there are more than 200 persons a day in a community toilet, then the SOPs are closely followed such as opening time, two times cleaning, maintenance etc. **Average rating given by the users to the community toilet during sample survey is above 4 out of 5**.

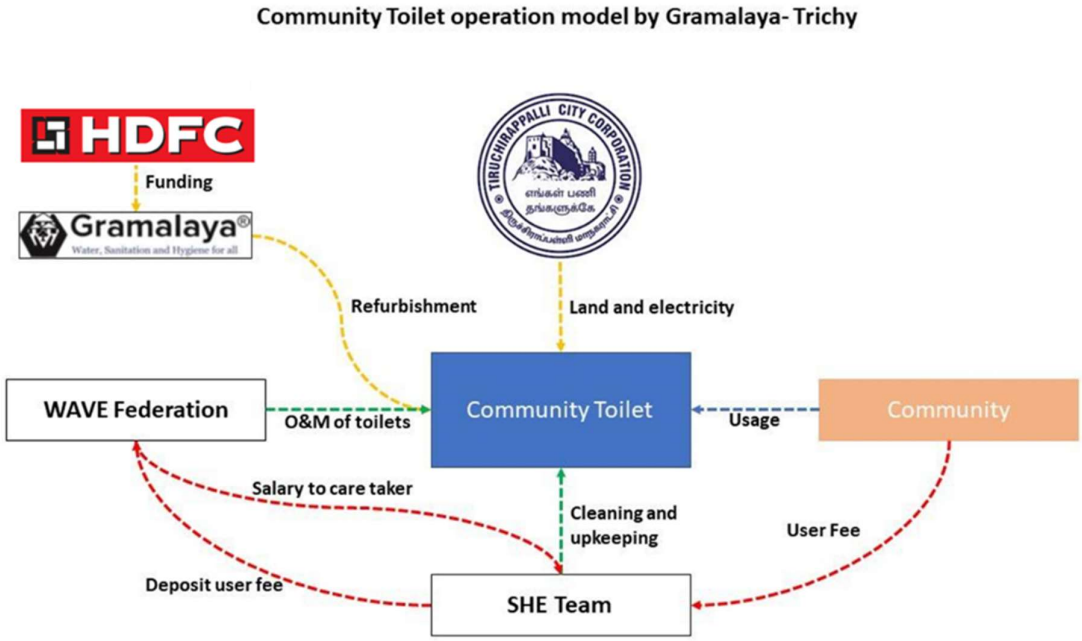


Figure 16: Showing the operational model of community toilets in Trichy

- WAVE federation ensures that the **minor repair and maintenance is carried out** by contributing financially and giving directions to the SHE team members.
- Some of the toilets refurbished in first phase have been damaged or deteriorated, mainly because:
  - High footfall and intense use in some of the toilets.
  - Usage of toilets by male members that consume alcohol and tend to break the infrastructure intentionally (vandalism).
  - Lack of awareness in the community on using the western toilet resulting in breaking or misuse of such toilets.

Figure 17: Display of the SOP adopted by SHE-Team and Wave Federation for maintenance of the toilet

6.5.3 Training and IEC

Training and IEC programme for SHE team are being conducted by Gramalaya. It is being conducted with the support/funding from the Indian Institute of Human Settlements.

Associates of WAVE federation organize regular training and sessions on the menstrual hygiene management programmes in the community.

6.5.4 Health and Hygiene

All the users and the community members (generally the users of the toilets also include the general public) are aware of the refurbishment of community toilet carried out by the Gramalaya trust which has improved the comfort of the usage. Most of the toilets are **open during the late hours in the night**. Hence there is **no practice of eating or drinking less food and water** in any of the communities to avoid usage of toilet. **Incinerators** were installed in all the toilets refurbished in the phase 2. Hence, there has been improved menstrual hygiene practices among women and girls.

6.5.5 Effectiveness of refurbishment

All the users and the community members (generally the users of the toilets also include the general public) are aware of the refurbishment of community toilet carried out by the Gramalaya which has improved the comfort of the usage. Most of the toilets are open during the late hours in the night. Hence there is no practice of eating or drinking less food and water in any of the communities to avoid usage of toilet. Further, there has been no record or occurrence of urinary tract Infection or any other similar infections among women and girls. Incinerators were installed in all the toilets refurbished in the phase 2. Hence, there has been improved menstrual hygiene practices among women and girls.

There are Standard Operating Procedures (SoPs) present for daily maintenance of toilets. These SoPs are being followed in most of the toilets and SHE team member maintains the toilet by cleaning them regularly. If there are more than 200 persons a day in a community toilet, then the SOPs are closely followed such as opening time, two times cleaning, maintenance etc. The average given by the users to the community toilet during sample survey is above 4 out of 5.

Some of the toilets[17] refurbished in first phase have been already damaged or deteriorated, mainly because:

- High footfall and intense use in some of the toilets.
- Usage of toilets by male members that consume alcohol and tend to break the infrastructure intentionally (vandalism).
- Lack of awareness in the community on using the western toilet resulting in breaking or misuse of such toilets.

6.5.6 Sustainability of Community Toilets

More than 95% of the toilets are maintained by the SHE team members. Rest of the toilets are taken care by the councillors of that ward. Most SHE team members have an average of 10-15 years of experience in the same job role. The reason for this long association is observed to be:

- Good hand holding support to SHE team from WAVE federation.
- Incentives for carrying out good work by SHE team members.
- Regular bi-weekly or monthly meetings and trainings on sanitation related topics to SHE team members

[17] Through the course of this project, 20 toilets were visited and taken as a representative sample for evaluation

- On time payment of salaries to the SHE team members

The user fees collected by the SHE team members is deposited in a WAVE federation bank account either every day or once in a week. This is further recorded in a ledger to ensure transparency in the transactions. Salaries and the payments are released to the SHE team members along with receipts. The **operation model** that is created by the Gramalaya trust through SHE team and WAVE federation has worked out to be **more economical and sustainable**, being demand and user driven.

6.5.7 Overall Impact

Trichy is one of the cities with highest number of community toilets in India. There is a lot of buy in to the concept of community toilet in Trichy due to the intervention of Gramalaya trust. Most community members do rely only on the community toilet as they do not have an individual toilet in their homes. Hence the refurbishment of community toilets was need of the hour and has created a positive impact among the communities due to its improved usability with comfort.
A total Rs. 46.04 million is funded to refurbish 195 toilets which is benefiting close to 50,000 people. Further, the operation model that is created by the Gramalaya trust through SHE team and WAVE federation has worked out to be more economical and sustainable, being demand and user driven.

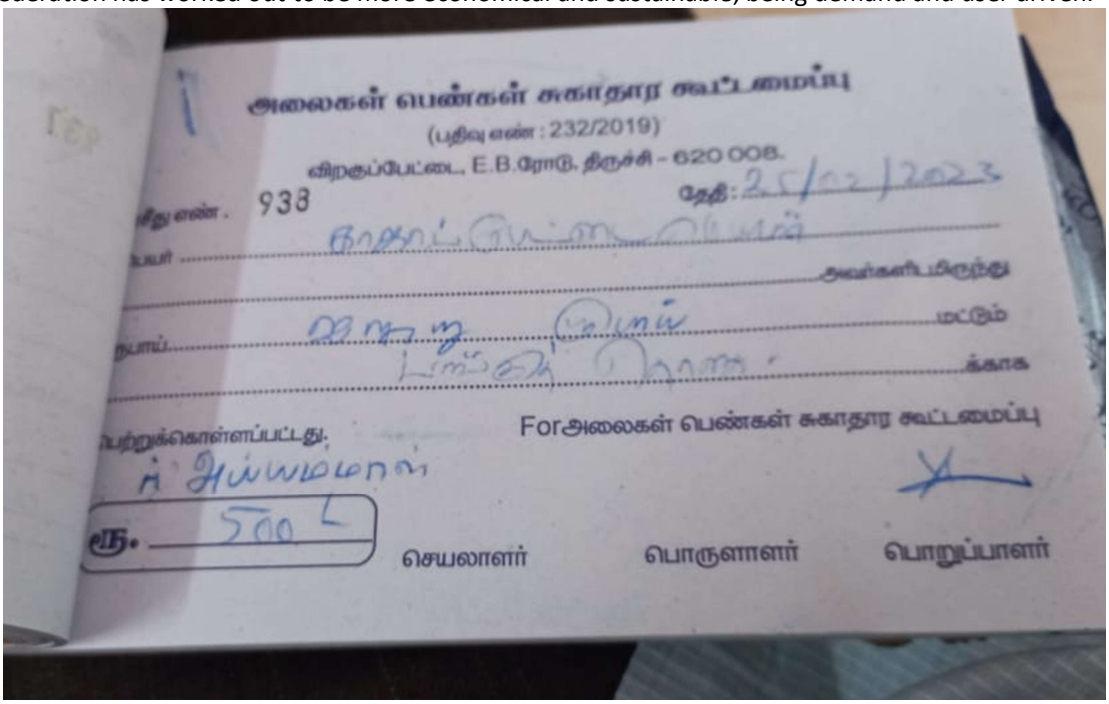


Figure 18: Showing the payment receipt- WAVE federation to SHE team member

6.6 Recommendations

6.6.1 Current situation and the impact

Few toilets refurbished in Phase-1 in 2019-20 are already in dilapidated condition due to high footfall being one of the main reasons. Hence, it is imperative to choose the right type or quality of construction materials in such situation along with good workmanship for long lasting infrastructure. Further, use of fixtures such as metal doors, plastic taps, stone cladding, and flooring etc. would also ensure long lasting of the infrastructure.

6.6.2 Operation model

Average age of SHE-team members is 53. Most SHE-team members are old, and this will affect the maintenance of the community toilets in long run. WAVE federation should start recruiting new and young SHE team members and train them for sustainable operation and management of the toilets.

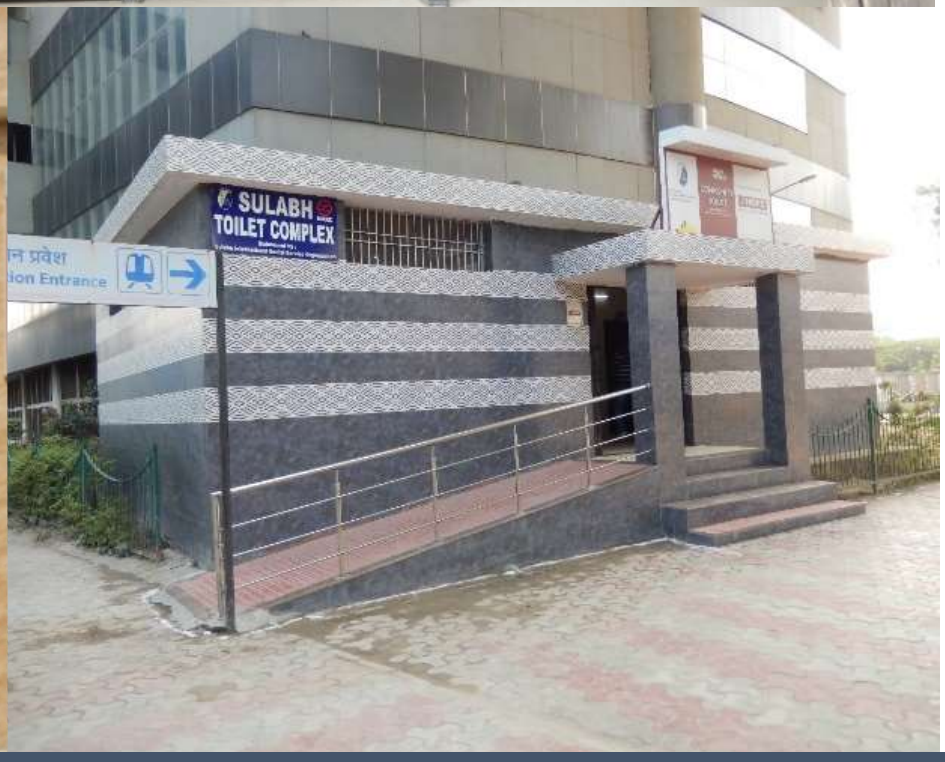
6.6.3 Engaging SHE team[18]

In a few toilets, where other local stakeholder groups are involved instead of the 'SHE team/Wave Federation' for supporting with operation and maintenance, the standard of maintenance was noted as compromised, with respect to cleanliness and its safety of usage. **One recommendation in this regard, is to avoid further *"funding to toilets where the O&M is not anchored by the SHE Teams and Wave federations".***

6.6.4 Due for next refurbishment

Though most of the toilets are in good condition, some of them already need some attention. After assessing the footfall and the behaviour of the community, it is suggested to take up next refurbishment work. It is recommended that during the next phase of refurbishment work, Gramalaya is encouraged to involve the community for a small financial commitment and carrying out the refurbishment work themselves, so that the toilets last for longer duration after the refurbishment.

[18] Gramalaya could also lobby with the Trichy City Corporation for handing over the toilet to the WAVE federation and SHE team so that there is sustained management and the community feels safe for using the toilets



Project Intervention 4

Public Sanitation Intervention of 5 Toilet Complexes in Delhi

7 Public Sanitation Intervention in Delhi

7.1 About the Intervention

Focusing on the issues of open defecation and to make the vision of Swachh Bharat realistic, a project was initiated to construct a public toilet complex under HDFC's CSR initiative. The project has been implemented by Sulabh International Social Service Organisation with the financial support from HDFC. In order to achieve the target of providing safe & hygienic toilet facilities where adequate toilet facilities are not available and to support "Swachh Bharat Mission" an initiative of Government of India, a project was launched to construct 5 nos. of public toilet complex near Delhi Metro Rail Corporation stations in New Delhi. All Five Locations are situated Near Parking Area of Metro stations:

- Karkardooma Metro Station
- Nehru Place Metro Station
- Samaypur Badli Metro Station
- Rohini sec 18, 19 Metro Station
- Nizamuddin Metro Station

The main purpose of program is to facilitate safe & hygienic toilet facilities in the selected area and to increase awareness among poor communities to use the toilet thereby making an area open defecation free. This project will help wide range of people and households to have access to safe, clean and affordable sanitation facilities in contrast with current situation

7.2 Key Findings

7.2.1 Standardized Design for Toilet Complex

The toilet complexes constructed at all the 5 locations are based on the standardised design[19] generally deployed in Sulabh (this is generally the case, considering the ease of approval and for speedy implementation). For men, four urinals, 2 Indian style commode toilets, one western style toilet commode, 4 urinals and three wash basins have been installed. For ladies toilets, one western style, one Indian style commodes and one wash basin have been installed. In case of physically challenged toilets, one western style commode with support hand rail along with one wash basin have been installed.

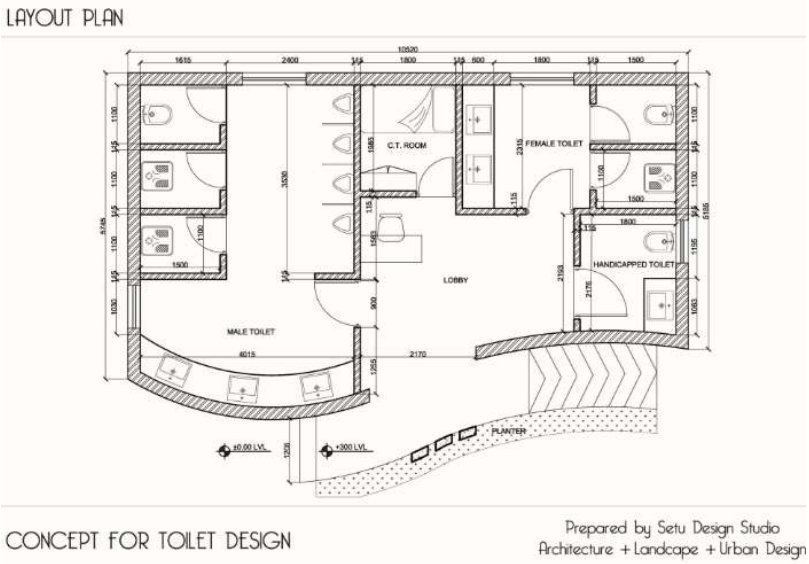


Figure 19: Layout Plan for the standardized Sulabh Toilet Design

[19] There was constrain of the space here. The reason to have a standard design is to ease the administration process of approvals from DMRC officials and there engineering team. If there are various designs then the time for approval increases and could have resulted in delay for construction of toilet complexes.

The toilets are constructed as per the design and specifications which was mutually agreed upon by DMRC and Sulabh. **All the toilet sanitary hardware in the toilet complexes are new and are well maintained without any damage**, there is **spit/paan/gutka stains**, the toilet complexes had **minimal odour**. The **construction quality** was found to be **good**. Glazed tiles, good quality sanitarywater/wash basins have been installed. Overall the toilet complexes have an aesthetic look both from outside as well as inside. Amenities (such as electricity, water supply, wastewater discharge) are provided at each toilet complex by DMRC. **Facilities such as handwashing basins, soap & soap dispensers, air freshners, clean mirrors, bins for sanitary pads are available** at each toilet complex. Facilties such as sanitary pad vending machines and hand dryers are not provided.

Figure 20: View of public toilet complex at Karkaduma metro station

7.2.2 Scope of MoU between Sulabh and partnering agencies

The project documents shared by Sulabh such as MoU between DMRC, HDFC and Sulabh, land allotment letter, project completion reports of the toilets, letter from DMRC for allocation of land and No-Objection certificate for constrcution of toilets, toilet complex design were perused to understand the implementation process adapted by Sulabh. The snapshots of the project documents received from Sulabh are summarised below:

1. All the agreements for toilet construction are tri-partite, wherein HDFC limited is the first party, followed by Delhi Metro Rail Coporation Limited (DMRC) and Sulabh International being the second and third parties.
2. Sulabh runs operation and maintenance (O&M) of the facilities through their pay and use model (Rs. 2-5 per use). The O&M contract is signed between DMRC and Sulabh for 20 years. The maintenance of the toilets will be adhered to the 'DMRC standards[20]' as agreed by Sulabh.
3. DMRC which owns the land, provided clearance for the construction of toilet blocks to sulabh.

[20] DMRC standards are in alignment with the current 'Advisory on Public & Community Toilets' issued by the CPHEEO, and developed under the aegis of the Ministry of Housing and Urban Affairs, Government of India

4. The electricty connection and charges, water supply connection and charges, permission to connect of wastewater from toilet to sewerage system is provided by DMRC.

7.2.3 Operations and maintenance modalities

Table 3: Operations details of each toilet complex

Name of the toilet	Hazrat Nizamuddin	Nehru place	Karkardooma	Rohini 18/19	Samaypur Badli
Number of hours opened	5 am to 11 pm	5 am to 11 pm	5 am to 11 pm	5am to 9:30pm	5am to 9:30pm
Charges for urinary (Rs/time)	2	2	2	2	2
Charges for toilet (Rs/time)	5	5	5	5	5
Number of people using the toilets per day	**450-500**	**300-320**	**90-100**	**70-80**	**90-100**
Source of water	DMRC	DMRC	DMRC	DMRC	DMRC
Number of operators	2	2	2	1	1
Salary of operator[21] (INR/month)	15000	15000	15000	10500	10500

Sulabh has entered into an agreement with DMRC for operation and maintenance of the toilet complexes post construction. As per the agreement mutually agreed by both the parties, Sulabh has taken over the **operation and maintenance** of toilet complexes from DMRC for a period of **twenty years (20)** and renewal further for next four (04) years. Sulabh will operate and maintain the toilet blocks on **'Pay and Use' basis** and will clean regularly the toilets and urinals.

- There are **dedicated operators** who work at each of the toilet complexes and are stationed there. Overall, the toilet complexes are well maintained and are free from strong odour.
  - Operational hours: All the toilet complexes are open at 5 am and the closing time of three toilet complexes at Nehru place, Karkardooma and Harzrat Nizamuddin is 11 pm and the toilet complexes at Rohini sector 18/19 and Samaypur Badli close at 9:30 pm.
  - Salaries: There are two operators for toilet complexes at Nehru place, Karkaduma and Harzrat Nizamuddin, these operators are paid salary of Rs.15000/month. There is one operator each at Rohini sector 18/19 and Samaypur Badli who are paid Rs.10500/month.

Figure 18: Operators at Rohini 18/19 and Samaypur Badli metro stations

[21] The operators are on the payroll of Sulabh International

- Wastewater discharge: The wastewater from all toilet complexes is connected to a sewer system (underground drainage system). The sewer system connection was handled by DMRC.
- Water usage: The water supply is from DMRC, each toilet complex has 2 tanks of 1000 liters each and the water required depends on the usage. The toilet complexes at Nehru place and Hazrat Nizamuddin have high water usage and on an average 3000 to 4000 liters of water get consumed per day as compare to the others.
- Supplies: Sulabh provides the cleaning supplies to operators for cleaning the toilets, Cost of cleaning supplies ranges from Rs. 5000 to 8000 per month (as per table 5). Operators say they clean and mop the toilet blocks every 3-4 hours.
- Monitoring: Sulabh has fleet of coordinators, whose main responsibility is to monitor the cleanliness and collect the user fee at the end of day from each toilet complex. They are also responsible for supplying the cleaning equipment & products (such as mops, brooms, disinfectants, hand wash, air fresheners etc.). There is user feedback record[14] maintained at the toilet complex for noting any issues arising.

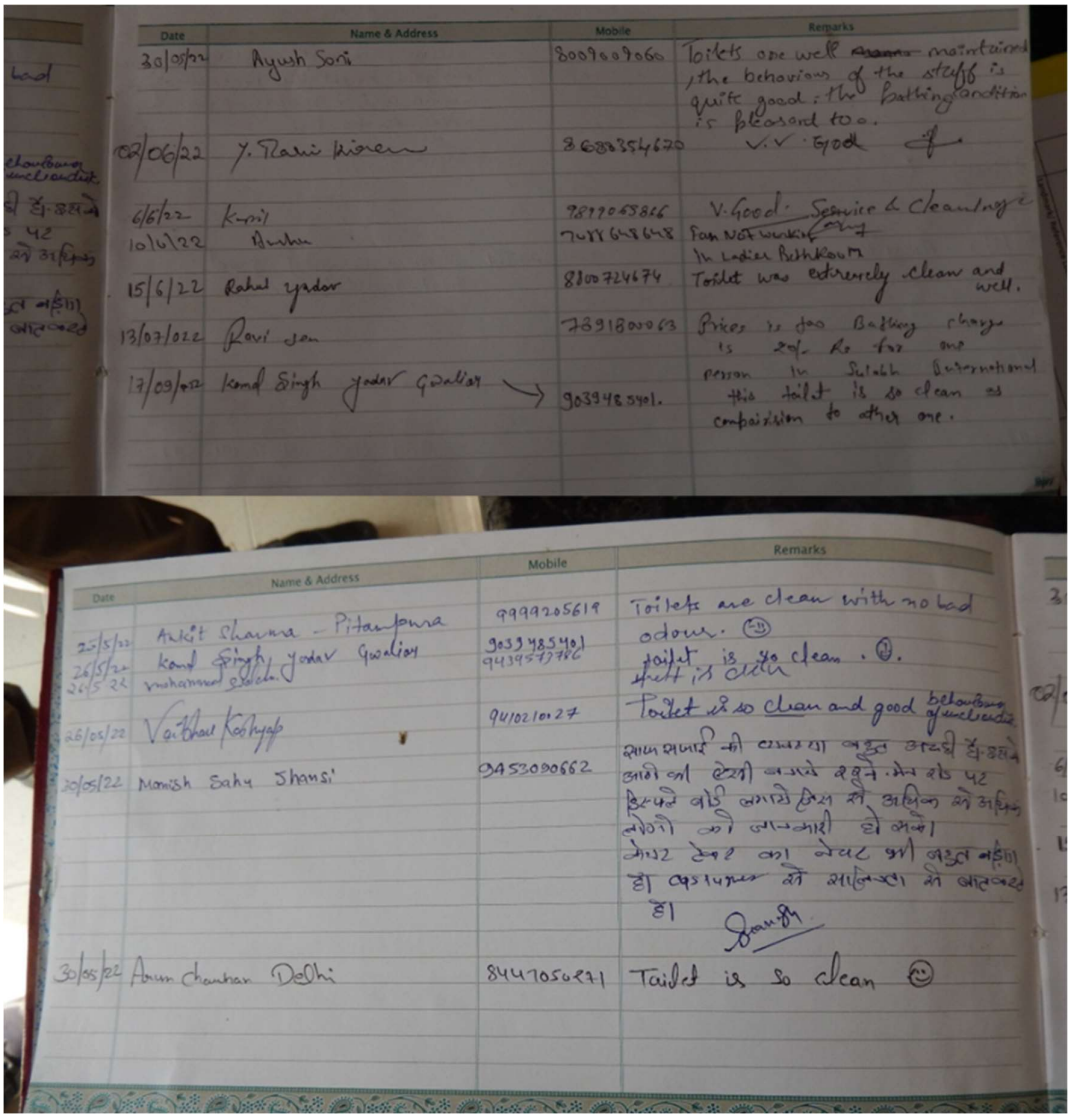


Figure 19: Pictures of the feedback notes placed at public toilet complexes.

7.2.4 Accessibility and inclusivity

The toilet complexes are well designed to cater to all the genders. There are facilities such as **ramps, grab bars** to make the toilet accessible by **physically challenged** users. **The Hazrat Nizamuddin metro station has a separate toilet for transgender community**.

Figure 20: View of PT at Hazrat Nizamuddin metro station with transgender toilet

7.2.5 Value Proposition for Users

The project added tremendous value for the people from poor communities, local street vendors, cab drivers and daily commuters to metro station. It was noted from customers of the service that the initiative is highly appreciable (as per inputs and consultations done with users), considering the benefits accrued by the footfall in the public settings where the toilet complexes have been created. These toilets have reduced the open urinating spots prevalent before the construction.

7.2.6 Locational Relevance

The toilet complexes are **located within 500 meters** of metro station entrance. The selection of location for toilet complexes at Nehru place, Harzrat Nizamuddin and Karkardooma metro stations is commendable. These metro stations are generally busy and see high number of commuters per day. The toilet complexes have **reduced the burden on existing public toilets which are inside the metro stations** as the main users of these toilets are cab drivers, auto drivers, rickshaw pullers, local street vendors, etc. This has **minimized the chance of these users urinating in open**. This is the most essential impact created through identifying the right location for construction of these toilets. The toilet complexes near to Rohini Sector 18 and Samaypur Badli have less footfall. This is due to the fact that these are the last metro stations towards the northern part of Delhi falling under yellow line of the metro connection. There is an existing toilet complex within the metro station at Samayapur Badli which is last station just after Rohini sector 18, this could be a reason for less usage. The most common users at these two toilet complexes are e-rickshaw drivers, which are very common to this place. The toilets are built near to metro stations and can be accessed by common public (vendors, cab drives, etc) along with the metro commuters.

7.2.7 Assessment of Footfall & Usage

Footfall data for each toilet complex was collected for a two-week period. This was done by giving a form to be filled to the Sulabh operator at the toilet. The table 2, below provides the average number of users. The footfall data was compared with norms for Sanitary facilities in public toilets (source: CPHEEO, MoUD, 2013); which prescribes **one Water Closet (WC) for 100 users** and one Urinal for 50 users. The comparison reveals that all **the toilets are well within the usage capacity** the standards

prescribed. The usage of urinals is very high in Hazrat Nizamuuddin and Nehru place metro station. This indicates the potential need for expansion if the footfall continues to increase in the future.

Table 4: Average footfall per day at each toilet complex

Toilet usage average number per day					
Toilet complex	Men		Women	Handicapped	Transgender
	Urinals	Toilets	Toilets	Toilets	Toilets
Hazrat Nizamuddin	240	113	75	17	9
Karkardooma	44	46	5	2	NA
Nehru Place	191	79	42	4	NA
Rohini Sector 18/19	40	24	12	2	NA
Samaypur Badli	115	34	32	3	NA

Table 5: User per urinal and water closet

User per urinal and water closet					
Toilet complex	Men		Women	Handicapped	Transgender
	Urinals	Toilets	Toilets	Toilets	Toilets
Hazrat Nizamuddin	60	38	38	17	9
Karkardooma	11	15	3	2	NA
Nehru Place	48	26	21	4	NA
Rohini Sector 18/19	10	8	6	2	NA
Samaypur Badli	29	11	16	3	NA

7.2.8 Sustenance of toilet complexes

Sulabh has constructed and maintained over 10,123 public toilets in India (data acquired from Sulabh International). They are currently operating and maintaining more than 400 toilets in the city of Delhi (as acquired from Sulabh's Operations Manager in Delhi). Their 'pay and use' model of sustenance is a success due to the scale of service they offer across each city they operate in.

Users of the toilet complexes pay for using the facilities (Rs. 2 for urinals and Rs. 5 for toilets). The fee is collected by an attendant who is at the entrance of the toilet. The payment is through cash. There was no digital payment method seen from the site visits. The revenue generated by these complexes are able to cover the operating costs of the complex.

7.3 Recommendations

The project added great value, especially for people from the poorer communities (who have relatively lower access to such basic need services), local street vendors, cab drivers and daily commuters to metro station. The initiative is highly appreciable and its benefit cannot be overstated (as per inputs and consultations done with users). These toilets have reduced the open urinating spots prevalent before the construction.

7.3.1 Consider the adoption of design templates for typified site characteristics

The toilet design for construction of toilets was replicated across all the five locations. Sulabh International actually were restricted from the point of view of available space as well as considering the cumbersome administrative approval process. The most efficient way for them was to get approval for one toilet design and start the implementation at all the stations. The rationale seems right in terms of approvals, design, time required, and monitoring aspects. But, in reality the need is not sufficed; for instance, in the case of Hazrat Nizamuddin and Nehru Place, the usage across toilet complexes will increase and the toilet complex will be over used requiring extension in future or construction of new toilet complex, which will be more expensive and time consuming. Therefore, it

is recommended to assess the need as per the demand assessment of footfall and accordingly design and implementation has to be pursued.

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