Chapter 12

# Institutional Frameworks for Faecal Sludge Management

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**Learning Objectives**

- Be able to identify important management aspects that need to be incorporated in an institutional framework.
- Understand regulations and contracts that can be used to to ensure effective faecal sludge management.
- Understand the strengths and weaknesses of stakeholders roles in institutional frameworks.
- Obtain an overview of potential institutional arrangements for the distribution of responsibilities in the service chain.
- Understand the main advantages and drawbacks of different institutional arrangements.



## 12.1 INTRODUCTION

For the successful implementation of faecal sludge management (FSM) systems, an institutional framework needs to be developed based on the specifics of the local situation (Ingallina *et al.*, 2002; Koné, 2010; Lüthi *et al.*, 2011). The focus of the FSM service chain in this book is collection and transport, treatment and enduse or disposal. This service chain depends on an effective management system. Laws and strategies need to be clearly defined, including regulating and enforcing the roles and responsibilities of each stakeholder throughout the entire service chain. This comprehensive approach incorporating multiple levels of institutional aspects requires a strong commitment by the government (Strauss and Montangero, 2003) that is linked to their sanitation policy, including onsite sanitation in the short-, medium- or long-term. Therefore, the FSM institutional framework requires dedicated funding and training strategies (Strauss and Montangero, 2003; AECOM and SANDEC/EAWAG, 2010).

Adequate attention to organisational aspects is rare and unfortunately many projects only consider one aspect of the service chain (e.g. subsidising septic tanks or only building a treatment plant). There are several examples where governments have focused only on the physical infrastructure and not the organisational or financial aspects, and as a result experienced failures of their FSM systems (Koné, 2010).

The institutional framework is defined by the laws, contracts and regulatory documents that determine the relationships between the stakeholders involved in FSM, and it defines the organisation of the entire service chain. This chapter focuses on institutional aspects that ensure the sustainable management of the service chain in the following three sections:

- Success Factors (Section 12.2);
- Enabling Regulatory Environment (Section 12.3); and
- Institutional Arrangements (Section 12.4).

This chapter presents a broad overview and introduction to the topic, and related information can also be found in Chapters 13 and 17. The selection of an adequate institutional framework is part of the planning process, and it requires a detailed assessment of the situation (Chapters 14 and 15), and participatory involvement of the stakeholders (Chapter 16).

## 12.2 SUCCESS FACTORS

The selection of a FSM institutional framework must be driven by local socio-economic, climatic and environmental contexts, taking into account existing sanitation infrastructures, institutions and planning procedures (Ingallinea *et al.*, 2002). Important factors for success that need to be considered when defining an institutional framework are discussed below (Klingel, 2001; Pybus and Schoeman, 2001; Bolomey, 2003; Jeuland *et al.*, 2004; Moe and Rheingans, 2006; Bassan *et al.*, 2014). These factors can be considered as objectives for the different stakeholders concerned (e.g. managers, politicians, practitioners). The implementation of these objectives depends on the local context. For example, the coordination of the local stakeholders will require more effort if several private companies are in charge of different activities than if they are represented and organised in association. All these objectives can be reached in a stepwise process, with more aspects being integrated as the local experience increases:

**Priority level given to FSM:** The political prioritisation of FSM and its implementation through regulations, financial resources, incentives and organisational efforts is the main enabling condition for the system's sustainability and efficiency. If it is not a priority of the national and/or local government as part of its overall sanitation program, then comprehensive, effective and safe FSM is unlikely to develop.

**Coordination of the stakeholders:** The identification and coordination of stakeholders is crucial to get their input and commitment. To ensure this happens, frequent meetings or workshops should be organised (e.g. with municipalities, the police, utilities, private sector companies, and customers). The incentive and enforcement strategies must also be clearly defined (e.g. requirement for monitoring by laboratories for resource recovery and penalties). Committees and associations can be created to simplify the communication between the stakeholders. For example, organising workshops for all the separate private collection and transport companies requires more time and investment than if they are represented by an association (Chapter 15). Incremental solutions can be adopted to facilitate the involvement of stakeholders. For example, based on the initial involvement and skills of the stakeholders, coordination committees can first be organised with the different departments of the government involved (e.g. public works, health, environment), and then expanded to include the private sector. The coordination work can be conducted by NGOs, governments, or through associations at each step in the service chain.

**Response to the needs of the whole area and population:** The system must address the sanitation needs of the entire population at affordable prices. Collection and transport services should be available for all types of onsite technologies and infrastructure in the entire city area, including in densely

populated areas such as informal settlements. Survey and field investigations are therefore needed to assess the existing and potential demand for collection and transport. The faecal sludge treatment plants (FSTPs) must be located and designed in order to serve the entire city (Chapter 17). The treatment and processing of endproducts also need to be designed so that they can be effectively transported. The provision of these services to the entire population can be included as a principle requirement in the regulation by the governments, who can then further distribute the responsibilities among stakeholders.

**Financial, environmental and social sustainability:** The institutional framework should ensure long-term financial viability. These aspects are discussed in Chapter 13. Two other crucial requirements for the institutional framework are to meet environmental protection principles and to be accepted by all local stakeholders. Therefore, provisions can be made to avoid uncontrolled discharge into the environment and incentives given to favour resource recovery. For example, transfer stations could be built if the FSTPs are far away. Financial mechanisms such as subsidies can be implemented to provide access to repair shops for collection and transport operators. This can be useful to ensure no spillage happens during the transportation. Also, agricultural areas can be established near the FSTP if compost is produced, or subsidies can be given to the industries that are able to use the treatment endproducts as fuel. Coordination committees or associations can be involved in the monitoring of these aspects.

**Awareness raising and information dissemination:** Efficient communication on the advantages of the FSM system on public health and the environment has a positive impact on public acceptance. Provision of information to all the stakeholders involved in FSM is crucial for demand generation, demand management and the long-term viability and acceptance of the system. Good practices should be encouraged. Raising the awareness of the population can help to increase willingness to pay realistic tariffs and commitment at all levels, including that of private companies and politicians (e.g. through visits, workshops and information campaigns) – this is discussed further in Chapter 16. NGOs, public or private utilities and governments can be involved at different levels for the awareness raising.

Figure 12.1 Project coordination meeting with universities and research institutes from five countries together with the national sanitation utility in Dakar, Senegal (photo: Linda Strande).

**Development of local expertise:** Collaboration with local universities, NGOs, research centres, and institutions from other countries will contribute to the emergence of local expertise. Specific curricula on FSM should be developed in training centres as part of sanitation courses. Training and exchange of information between the public and private stakeholders contributes to enhancing the global level of understanding on the requirement of the FSM service chain. Universities and governments should be involved in the implementation of new curricula. Trade associations can also be created to facilitate the exchange of practical skills and solutions.

**Capacity for monitoring and optimisation of the system effectiveness and efficiency:** Monitoring and evaluation of the technical operation, the financial balance and customer satisfaction must be implemented in each institution or company involved in FSM. Lessons learned from experience should be capitalised on and incorporated to improve system performance. Means for monitoring and optimisation are discussed in Chapter 11. Financial viability and efficiency is discussed in Chapter 13.

**Operation and maintenance management ability:** The operation and maintenance (O&M) is a priority for the entire service chain. The choice of technology should ensure that the compexity and cost related to O&M are appropriate for the local context. Spare parts need to be readily available for all the equipment. External contracts for O&M services should only be arranged if the services are available immediately when needed (e.g. a pump repair should not be delayed due to lack of an available mechanical service). Chapter 11 is dedicated to the system requirement for the O&M of FSTP. Most of the recommendations can also be applied to other equipment and infrastructures such as collection and transport trucks, transfer stations, and resource recovery plants.

**Management system efficiency and flexibility:** The operator(s) should try to maintain flexibility in their management of the service chain to allow for growth and innovations (e.g. in pricing procedure or technology developments). The internal decision-making process must be short and efficient. Incremental solutions can be considered by all stakeholders at all levels of the service chain. For example, if a FSTP is first built in a peri-urban area for small amounts of FS from septic tanks but change of land use results in an increased production of public toilet FS, then the operation of the treatment technologies should be changed. FS can be mixed, the residence time changed, and maybe new investment made to provide new endproducts for resource recovery (e.g. compost). In a case like this, the collection and transport operators should also adapt to answer the new demand for services. Public private partnerships often provide greater flexibility in the FSM system.

Figure 12.2 Harvesting of sludge from drying bed for use in agriculture, Dakar, Senegal (photo: Linda Strande).

**Financial management ability:** Sound financial management must be ensured by each organisation by means of well-defined business plans (Chapter 13). Meetings with stakeholders and authorities must include discussions on pricing, fees, tariffs and funding opportunities.

**Transparency of the system:** The management system must ensure transparency to strengthen the trust between the stakeholders and with the service users. Coordination between the stakeholders through meetings and committees is a good approach to facilitating transparency, as well as communicating to the customers.

**Endproduct marketing and customer relations:** Customer relations should include the marketing of products and services for the collection and transport of FS as well as the way in which endproducts can be used. Customers must be able to contact the organisation easily and positive information dissemination on the benefits of resource recovery, product quality and good practices must be carried out. The importance of the link between the endproduct processing and the market demand for these products is addressed in Chapter 10.

**Ability to acquire land:** Long-term planning should secure access to land for existing and future project developments. The authorities in charge of land planning should be involved early on in the process, together with nearby inhabitants of future FSTPs (Chapter 17).

## 12.3 ENABLING REGULATORY ENVIRONMENT

The national authorities need to be involved in the development, validation and dissemination of an array of policies, strategies, laws and standards that define the stakeholders' roles, the quality standards, the procedures, and penalties (Hecht, 2004). Private sector stakeholders must also be taken into account when defining the regulations, as they may offer more cost-effective services and often fill the gaps between demand and governments' ability to supply the services. Aspects that should be considered in developing regulatory texts are discussed in the following sections, which can be included incrementally in the regulation, and according to the local expertise development (Case Study 12.1) to reach the objectives described in Section 12.2.

**Human and environmental health:** The measures needed to protect human and environmental health from risks linked to FSM need to be clearly laid out by regulations. This includes storage, transfer and treatment infrastructures, protective equipment for employees working in contact with FS, and measures to avoid discharge into the environment (Figure 12.3).

Figure 12.3 Illegal faecal sludge discharge directly into the environment, Yaoundé, Cameroon (photo: Linda Strande).

**Overall sanitation strategy:** To ensure an integrated approach, a strategy for the management of sanitation services needs to be defined, and should include FSM and wastewater management. This includes the existing onsite sanitation technologies and the FS quantities. Also future strategies for the provision of sanitation at the household level need to be coordinated with FSM and wastewater management.

**City-wide approach:** Strategic plans for FSM need to be developed on a city-wide scale in order to define the protocols for implementation at a local level, taking into account the future urban development plans (Strauss and Montangero, 2003). The land use, population characteristics, and type of buildings need to be considered.

**Complete service chain:** Regulation is needed to support the management of each step of the service chain, including the storage, collection, transport, treatment, and enduse or disposal of FS.

**Enforcement:** Regulations need to be enforced at both national and sub-national or city level by separate decrees, decisions, standards and guidelines defining the rules and potential penalties for the following aspects:

- the authorised stakeholders for each step of the service chain, their roles and obligations, and the mechanisms responsible for the monitoring and enforcement of each activity;
- the required design and construction standards for the onsite sanitation technologies and treatment infrastructures;
- the authorised roads and traffic rules for collection and transport;
- the authorised sites for treatment and disposal;
- the access and discharge conditions for the treatment, resource recovery and disposal sites (e.g. opening hours, tariffs);
- the required standards for services and products; and
- the required enforcement and monitoring outputs.

Incentives and control means for the enforcement of regulations are needed for each step (AECOM and SANDEC/EAWAG, 2010; Figure 12.4).

Figure 12.4 Official responsible for enforcement of illegal dumping of faecal sludge, Dakar, Senegal (photo: Linda Strande).

**Permits and licenses:** Documents are necessary to define the role of the stakeholders involved in the service chain. Sufficient financial and human resources need to be allocated to the institutions in charge of the activity, enforcement, and periodic renewal of these documents. The administrative procedure to obtain these documents should be clearly communicated.

**Coordination:** There needs to be structure(s) and financial mechanisms in place for the coordination and evaluation of the entire FSM system (AECOM and SANDEC/EAWAG, 2010). The flow and frequency of communication between the stakeholders and the data required for evaluation of the system should be clearly defined in strategies and regulatory documents.

**Case Study 12.1 : Institutional and regulatory framework in Malaysia**
(Adapted from AECOM and SANDEC/EAWAG, 2010)

The example of Malaysia shows the extent to which government commitment can improve sanitation and FSM. This country has developed a very efficient system for the management of FS that was supported by real institutional changes and a global vision to solve sanitation issues.

In 1993 Indah Water Consortium (IWK) was created, a company that is responsible for the provision of wastewater and FS services across the country. The objectives of IWK are to build infrastructures, develop collection and transport services, and increase acceptance for scheduled FS collection and wastewater fees. In 2000, IWK was incorporated into the Ministry of Finances in order to increase the subsidies and the financial control. The Sewerage Service Act fixes the conditions for the construction and O&M of treatment systems and septic tanks, and for the collection and transport services that are undertaken both by IWK and private operators.

In 2008 a new regulatory institution was created by the Ministry of Energy. Suruhanjaya Perkhidmatan Air Negara (SPAN) is responsible for the definition of sanitation strategies, and the regulation of the water and wastewater infrastructures management. IWK thus relies on the strategies defined by SPAN, and the discharge and quality standards defined by the Ministry of Nature and Environment. Specific committees are responsible for the control of financial viability and transparency. These committees have the power to define wastewater tariffs, subsidies and taxes. Since that same year the Water Service Industry Act also allowed the federal government to collaborate with water and wastewater companies, thus supporting the management of water resources from source to disposal for the country. This Act aims to raise the efficiency of the water sector industries, and to assist in the dissemination of achievements and the sharing of best practices across the country.

Such a strong institutional setup supports the success factors discussed in Section 12.2, as FSM in the country is supported by specific regulations and is considered an integral part of the water resource management process. Additionally, collaboration with national universities ensures the development of a strong national expertise through research and training programmes. The publication of several booklets and press releases has also increased public awareness.

These changes to the institutional and regulatory framework over the last 10 years have resulted in an increase in the percentage of households connected to the sewer network from 5% in 1993 to 73% in 2005, with the remaining 27% of the population benefiting from scheduled collection of FS.

## 12.4 INSTITUTIONAL ARRANGEMENTS

### 12.4.1 Overview of the service chain organisation

One of the main reasons for the failure of FSM systems is the overlapping and unclear allocation of responsibilities and a lack of incentives for efficient operation. This situation frequently occurs where an incomplete institutional framework exists, resulting in both a lack of accountability and disagreements between stakeholders. Since the entire service chain is interlinked, each aspect influences another and it is essential that the roles and responsibilities are clearly defined. For example, stakeholders in charge of the collection and transport of FS must also participate in the organisation of the discharge of FS at the treatment plant. In turn, the FSTP managers need to coordinate their activities with the stakeholder(s) who are in charge of resource recovery and disposal of the endproducts. Thus, coordinating the link between each step in the chain is imperative to ensure a successful FSM system. This differs from wastewater management systems where the waste is transported via the sewer and typically only one stakeholder is in charge of the entire system.

As illustrated in Figure 12.5, where each block represents one stakeholder, there are many possible ways to organise the FSM service chain. Systems that have more stakeholders involved will be more complex, regardless of who the stakeholders are. In contrast, if only one stakeholder is in charge of the whole service chain, flexibility may be hard to ensure and intensive management procedures are then necessary. Thus the selection of an institutional arrangement that is appropriate for the local context is crucial. The arrangement can also be changed incrementally, based on the demand for services. All the stakeholder roles can be carried out by either the public or the private sectors.

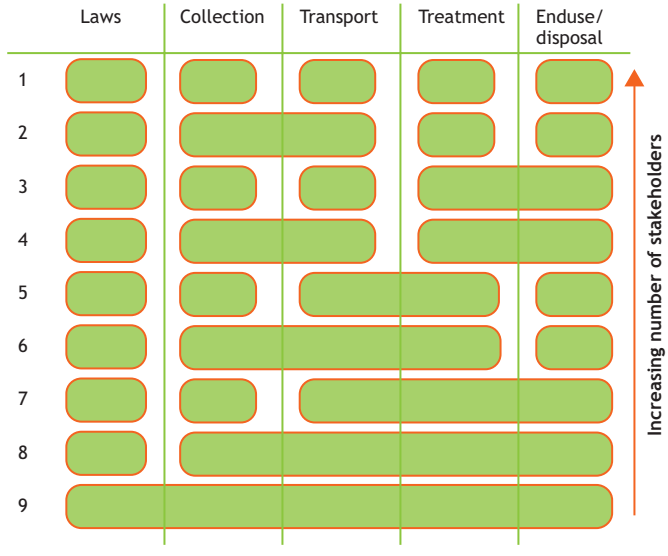


Figure 12.5 Schematic representation of different organisational arrangements for distribution of operational responsibilities among stakeholders (one block represents one stakeholder).

There are advantages and disadvantages to each of the options presented in Figure 12.5:

**Option 1:** Each step of the service chain is provided by a different stakeholder. This allows for organisational flexibility, but enforcement, monitoring and coordination are difficult and may result in tension at the many interfaces. The fact that the collection and transport activities are undertaken by different stakeholders favours job creation. However, a potential drawback is the fact that transfer of FS is needed after collection to transport it to the FSTP, thus involving more infrastructure and organisation (e.g. to operate transfer stations).

**Option 2:** Collection and transport services are operated by one stakeholder, and the treatment is carried out by a separate stakeholder. This option is preferable when mechanical collection and transport services are already available. It simplifies the financial flow and organisation of the transport of FS to the FSTPs. However, the procedure to discharge FS at a treatment plant may be complex, and it is difficult to control the qualitative and quantitative variation of the load. Solutions must also be found for densely populated areas where truck access is difficult.

**Option 3:** The value created through the marketing of endproducts can be used to finance the treatment infrastructure if the same stakeholder is in charge of these activities. This allows optimisation of the O&M and financial management of the treatment and resource recovery plant and endproducts are more easily decontaminated. However, in this option, FS transportation and discharging procedures at the treatment site are not optimised.

**Option 4:** One type of stakeholder manages all the equipment for the collection and transport of FS, while another is in charge of the infrastructures for the treatment of FS and resource recovery. In this case, the two types of stakeholder can develop specific skills for their activity. As with the previous three options, the main disadvantage is that the discharging of FS is not facilitated at the treatment plants. However, similarly to Option 3, the treatment technology can be chosen based on the resource recovery required.

**Option 5:** This option allows local job opportunities to be created in the communities, as well as the development of industrial processes and use of the endproducts. This system is advantageous in densely populated areas, where access by trucks is difficult. The discharging procedure of FS at the treatment plant can be optimised, and the possibility exists to improve control over the quality of sludge that is treated. However the organisation of the transfer of fresh FS between the collection and transport steps may be complex. It is also important to have clear conditions for the delivery of treated FS to the stakeholder in charge of the resource recovery.

**Option 6:** The management of the collection and transport equipment together with the treatment infrastructures involve highly developed managerial skills. This option has the advantage of facilitating the management of FS from the onsite technologies user to the treatment plant, and reducing the risk of unauthorised discharging. However, the financial flow between the enduse step and the rest of the service chain is not optimised.

**Option 7:** Similarly to options 1, 3, and 5, this option is best implemented where transfer stations exist, and an additional responsibility is assigned for the management of the transfer station. This creates local job opportunities and allows for management of FS in densely populated areas. In this option, the service chain is more complex, but resource recovery is easily organised, as there is no transfer between several stakeholders.

**Option 8:** Having one stakeholder in charge of the entire service chain allows easy coordination and optimisation of each component of the service chain based on the needs of the other components, but requires highly developed managerial skills and financial resources.

Option 9: This option should be avoided, as it does not allow for transparency. Regulations and enforcement should be performed by government entities, independent from the interest of companies.

### 12.4.2 Role distribution among the stakeholders

The selection of one of the above-mentioned arrangements depends on the characteristics of the local stakeholders. For example, a small private company might not be structured enough to manage the entire service chain, as described in Option 8. Thus, the features of each stakeholder must first be understood (Chapter 15) and then the institutional system defined.

In most of the currently existing systems, a combination of stakeholders tends to provide services in the FS service chain (e.g. Sanitation Utility, Municipal Services, Military Department, Private Entrepreneurs, Group of Economic Interest (GEI)) (Koné, 2010). Table 12.1 summarises the possible responsibilities of stakeholders. They may take charge of one or more activities within the service chain (Koanda, 2006).

Table 12.1 Different stakeholders in the faecal sludge sector and their possible involvement at different levels of the faecal sludge organisation

| Stakeholder | Laws | Coordination | Collection & Transport | Treatment | Resource recovery | Enforcement | Training & Information | Monitoring |
|---|---|---|---|---|---|---|---|---|
| Ministries | ▪ | ▪ | | | | ▪ | ▪ | ▪ |
| National/ municipal utilities | | ▪ | ▪ | ▪ | ▪ | ▪ | ▪ | ▪ |
| Police | | | | | | ▪ | | |
| Private companies | | | ▪ | ▪ | ▪ | | | |
| Associations[1] /CBO[2] | | ▪ | | | ▪ | ▪ | ▪ | |
| NGOs | | | | | | | ▪ | ▪ |

1 Associations = groups of stakeholders organised around defined objectives

2 CBO = Community Based Organisations that can provide services for the community

The distribution of the responsibilities among the stakeholders should be decided taking into account the intrinsic strengths and weaknesses of each stakeholder involved in the service chain (Table 12.2). Incremental improvements can be facilitated either through capacity building or reorganisation of different stakeholders.

The police, environmental agencies and NGOs are excluded from Table 12.2 as they are only responsible for the enforcement and training aspects. The stakeholders in charge of enforcement and quality monitoring should be clearly recognised and impartial. Ideally, the national or municipal authorities should be involved in the supervision of laws, standards and guidelines (AECOM and SANDEC/ EAWAG, 2010). Consumer organisations can also be involved in discussions about prices, service requirements and quality monitoring (Klingel, 2001).

Table 12.2 Possible stakeholders, their advantages, drawbacks and needs

| Stakeholder | Advantage | Drawback | Needs |
|---|---|---|---|
| **Ministeries, National/municipal utilities** | ▪ Subsidies available<br>▪ Easy enforcement<br>▪ Possibility to manage complex technologies | ▪ Dependency on political situation (e.g. changes of direction with political rearrangements)<br>▪ Potential low priority level among government activities<br>▪ Time consuming internal procedures<br>▪ Low flexibility | ▪ Capacity strengthening<br>▪ Autonomous organisation from the national authorities<br>▪ O&M-driven organisation |
| **Private companies** | ▪ Service flexibility<br>▪ Demand-led market<br>▪ Answer to O&M needs<br>▪ Easy contact with customers<br>▪ Local job production | ▪ Lack of legal enforcement<br>▪ Lack of recognition<br>▪ Poor management capacity<br>▪ Complex coordination<br>▪ Difficulty to accessing subsidies<br>▪ Potential low technical skills | ▪ Capacity strengthening<br>▪ Tax reduction for the delivery of public services<br>▪ Licenses and contracts needed |
| **CBO, associations** | ▪ Service flexibility<br>▪ Local job production<br>▪ Involvement of local population<br>▪ Possibility to inform and raise awareness of the community | ▪ Complex coordination<br>▪ Varying service fees between areas managed by different CBOs<br>▪ Low accountability level<br>▪ Poor management capacity<br>▪ Weak human resource continuity<br>▪ Difficulty in organising service delivery to customer living outside an area that is managed by the CBO | ▪ Coordination committee<br>▪ Capacity strengthening<br>▪ Need simple technologies<br>▪ Increasing the feeling of accountability |

The advantages and drawbacks linked to the involvement of each type of stakeholder, together with documentation and contractual requirements, are discussed further in the following sections. Signing of documentation and definition of the institutional setup should take place early on in the process (Chapter 16).

### 12.4.3 Institutional arrangements for colection and transport

Collection and transport form the first step in the FSM service chain. Any FSM work must include consultation with the collection and transport stakeholders in order to ensure their commitment to the system thus strengthening capacity and coordination. The omission of these stakeholders may result in failure of the process (Case Study 12.2).

**Case Study 12.2: Faecal sludge treatment plant built without involvement of the collection and transport operators**

A FSTP built in Bamako, Mali, was implemented without the involvement of the collection and transport operators, who were not given adequate consideration in the location of the plant. It was thus built too far out of the town, and the collection and transport operators could not afford to drive to the facility between the collection at each onsite technology. As a result, the facility was never utilised, and has since been abandoned.

Different types of stakeholders can be in charge of the collection and transport, with or without transfer stations. National or municipal utilities, or private companies can undertake either collection at the onsite technology, or transport to the treatment plant (Options 1 and 3 in Figure 12.1), and combine transport and treatment activities (Options 5 to 8, Figure 12.1). CBOs commonly have a weaker management structure, and are best involved in collection at a local level. The advantages and constraints related to the involvement of these three different stakeholders include:

**National or municipal government utilities:** National or local departments of governments and municipal utilities (e.g. public works, environment, cleaning) can be responsible for collection and transport of FS. This can also be effective with small, local government-owned companies. In the case of Addis Ababa, Ethiopia, the Sewerage Authority provides low-cost collection and transport services, and benefits from state subsidies that would not be available to private companies (Kebbede, 2004). This option also avoids difficulties with the police who often respect the right of the Authority's trucks more than those belonging to private operators. However national and municipal utilities often lack human resources and equipment resulting in poor quality of the collection and transport service (Strauss and Montangero, 2003; Koanda 2006; AECOM and SANDEC/EAWAG, 2010).

**Private companies :** Private companies offer more flexibility as they often provide other services to improve their competitiveness (e.g. collection of solid wastes, construction etc.), they create employment on a local level and can rapidly adapt to the service demand (PS-Eau&Hydroconseil-Mauritanie *et al.*, 2002; Blunier, 2004; Hecht, 2004; Jeuland *et al.*, 2004; Koanda, 2006). However, if the competition is weak, profit seeking can lead to bad practices and high prices (Jeuland *et al.*, 2004). Private operators frequently lack financial viability, and have a bad reputation with the authorities and the public (Klingel, 2001; Bassan *et al.*, 2013). In Africa, some collection and transport companies are organised in associations that are legally recognised and provide an interface with the authorities, which can then adopt several measures such as tax exemption. Important collection and transport contracts that could not be undertaken by a single company can be secured through this type of association that exists in Senegal, Burkina Faso, Mali and Uganda (Bolomey, 2003; Blunier, 2004; Mbéguéré *et al.*, 2010; Bassan *et al.*, 2013). These associations improve the recognition of small operators, thereby facilitating sector formalisation, regulation and transparency. They should thus be encouraged. Licenses to provide the collection and transport services, and for the truck circulation can be provided by the local authorities.

**Associations/CBOs:** CBOs can take charge of the collection of FS before transfer stations, as well as the management of these stations. This structure favours job creation and also facilitates the information and awareness raising of the customers' awareness concerning the maintenance of the onsite system, as the local community is involved through the CBO. CBOs require a contractual arrangement with local authorities to define their roles, the quality of the service, and the standards for the monitoring.

As will be discussed in Case Study 12.3, the responsibility for emptying septic tanks and latrines can be assigned to the user of the onsite technology or to the service provider (Klingel, 2001; AECOM and SANDEC/EAWAG, 2010). Collecting on demand requires minimal customer management procedures and the responsibility to empty at an adequate frequency is given to the user. However, the frequency of collection cannot be controlled, and customers might only call once the system is full, or more realistically, overflowing, as people tend not to maintain systems until there is a problem. Thus, information campaigns are needed to inform users about the maintenance requirements of their onsite technology and the importance of frequently extracting FS. Another possible disadvantage is the difficulty of controlling illegal discharging of FS. This type of management system is commonly used where the operator does not have sufficient resources to manage a customer database. It is also more flexible and allows for collection and transport services to be provided by different companies.


Figure 12.6 Privately owned collection and transport trucks discharging faecal sludge at a receiving facility owned by the municipality, Kampala, Uganda (photo: Linda Strande).

Where a contractual agreement is signed between the operator and the user, the responsibility to empty the onsite technology at regularly scheduled intervals lies with the operator (i.e. on-demand service must be possible for full onsite technology). In this case, the collection and transport operator needs to have a very organised and efficient management structure in order to manage the service for all types of customers. Typically, the collection frequency is scheduled for regular intervals (AECOM and SANDEC/EAWAG, 2010). The use of a billing system that integrates the collection and transport operators' O&M costs allows for continuous income, rather than just having income on demand when services are requested. Illegal discharging is also more easily controlled. However, possible disadvantages of scheduled collection and transport services could be the limited flexibility, and the dependency on an enforcement system to compel customers to pay (e.g. no water delivery if the bills are unpaid).

### Case Study 12.3: Service chain organisation in Malaysia

Under the Sewerage Service Act, the collection and transport of FS in Malaysia was fully managed by Indah Water Konsortium (IWK) who developed a database to organise scheduled collection per area. Customers were contacted by IWK prior to the FS collection and paid semi-annual wastewater bills. This system was promoted through media spots.

With the adoption of the Water Service Industry Act in 2008, the responsibility for the collection of FS was transferred to the onsite technologies users who have to organise collection and can be fined for non-compliance. Private companies also provide collection and transport services. This system is more flexible, but these changes involve a complex enforcement system for the different companies. Campaigns to strengthen the users' commitment and to raise their awareness of the importance of frequent collection are also needed.

A progressive strategy was adopted for the management of FSTP infrastructures in Malaysia. Old wastewater treatment plants were first rehabilitated and converted to enable FS treatment; then simple technologies were encouraged; and finally modern technologies were implemented in the biggest cities. Today, FS is treated depending on the type of land use in each area.

This example shows that a progressive approach can be adopted which allows the development of a well-coordinated FSM scheme. Each arrangement has advantages and drawbacks. In all cases provision of information to the population and communication among the stakeholders is crucial in order to ensure proper coordination and sustainability of the program. All the steps in the service chain need to be taken into account. Even though Malaysia has achieved great advances in FSM, the system is largely subsidised, and an important challenge is the acceptance of representative, non-subsidised collection and transport fees by the population.



### 12.4.4 Institutional arrangements for treatment of faecal sludge

FSTPs are important technical infrastructures that require adequate training of the personnel responsible for their management, O&M and monitoring (Chapter 11). All treatment technologies need to be managed by a well-organised and effective institution (Strauss and Montangero, 2003). Therefore, CBOs are not recommended, as the high level of technical and managerial skills required are often not available in these organisations.

Referring again to Figure 12.5, both national or municipal utilities and private companies can be in charge of only the treatment plant (Options 1 and 2), or they can combine this activity with transport and/or enduse management (Options 3 to 8). In each case, the contractual links, the financial management, and the communication and monitoring procedures need precise definition. The monitoring of the quality of the endproducts can be done by an independent laboratory, especially in the case of private management. Agreements are useful to define the frequency of sampling and the access rights to the sampling points. The institution in charge of treatment can either own the property and infrastructure or have some type of public-private partnership. Different arrangements can exist as follows:

**Direct management by national or municipal utilities:** The national or municipal utility owns the FSTP. This arrangement has the advantage of facilitating the enforcement of pollutant discharge standards, and also offers the possibility of financing O&M activities through subsidies, without which the finances allocated to the FSTP O&M are often insufficient. The national or municipal utilities should be sufficiently autonomous and not suffer from long or complex internal procedures that can hinder operation activities (Bassan *et al.*, 2013). Contracts or agreements with the authorities can be signed in order to define the responsibilities.

**Direct management by private companies:** The FSTP is owned by a private company. Experiences in Benin, Mali and Gabon with direct private management show that operational requirements of FSTPs can be met, and that competitiveness is raised by a benefit-driven approach. Low technical and managerial skills, and limited access to subsidies are potential drawbacks to private management (Jeuland *et al.*, 2004). However, licenses or contracts can be provided by the local authorities in order to set the quality standards and the monitoring program. The potential for private sector involvement is higher when there is a financial gain from the resource recovery or from FS treatment endproducts.

**Delegated management by national or municipal utilities, or private company:** One potential advantage of delegated management is that the operator can be chosen by the FSTP owner based on their technical and managerial capacity. In this case, contracts need to be signed with the owner, specifying the requirements in terms of O&M. Licenses for the FSTP's O&M can also be provided by the authorities in cases where the FSTP is publicly owned.

Figure 12.7 Meeting with municipal government responsible for sludge management, research institutes, and donor agency in Bac Ninh, Vietnam (photo: Linda Strande).

### 12.4.5 Institutional arrangements for enduse and disposal

The institutional framework needs to promote sustainable business models for the entire service chain. Therefore, good quality endproducts must be ensured, which must also be safe to use (Chapter 10). Similarly for the treatment of FS, resource recovery from the endproducts can require a high level of skills for O&M and monitoring, depending on the choice of technology (Chapter 5). The products not only need to be sanitised and processed, but they also need to be of value to the local market. This requires a preliminary assessment of the market demand, proper marketing and the provision of a high quality of service (Klingel, 2001). A multi-barrier approach should also be adopted to protect the workers, customers and final users from health risks linked to pathogens.

Two types of management structures can be followed – direct or delegated. In the case of delegated management of publicly owned infrastructures and equipment, licenses are useful to define the O&M requirements, the quality standards, and the monitoring program. The comparative advantages and drawbacks are the same as discussed in Section 12.4.4. Three types of stakeholders may be in charge of these activities:

National or municipal utilities: A complex process can be managed by a national or municipal utility, which could also deliver the endproducts to customers. Where national or municipal utilities are in charge of the resource recovery plant they are also likely to be involved in the FSTP management, either through direct or delegated management.

Private companies: Small private companies providing services for resource recovery from waste and treatment endproducts are found worldwide (Jeuland *et al.*, 2004). Their main strengths are related to the inherent dynamism of private entrepreneurs. Capacity strengthening and close coordination of private companies are often needed to ensure efficient management and O&M of the facility (Bolomey, 2003). Contracts or agreements can be signed with the stakeholder in charge of the FSTP O&M in order to define the agreement, as well as the price and quality of the endproducts to be processed and marketed.

Associations/CBOs: CBOs or associations can be involved if the technology used to process, treat and package the endproduct is low, and if customers come to the plant to buy the products. This solution may be applicable where people are living near to the FSTP, especially if endproducts are used directly in the community (e.g. as building material or soil amendment; Klingel, 2001). The management rules of a CBO stipulate the need for sustainable O&M and transparent financial transactions, and therefore licenses can be provided by local authorities.

As for the collection and transport processes, the activities linked to resource recovery can be carried out on demand, or based on a contractual agreement outlining a scheduled sale or delivery. Where valuable endproducts can be produced over the entire year, the main advantage of the scheduled sale is the provision of a regular income that can be used for the O&M of the infrastructures.

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## End of Chapter Study Questions

1. Name five important institutional aspects that play a role in FSM, and explain why they are important.

2. Explain the role of enforcement of regulations in FSM.

3. An example of responsibilities in a service chain is collection and transport services operated by one stakeholder, and the treatment by another stakeholder. When is this way of organisation preferable? Which aspects can be challenging for this arrangement?