

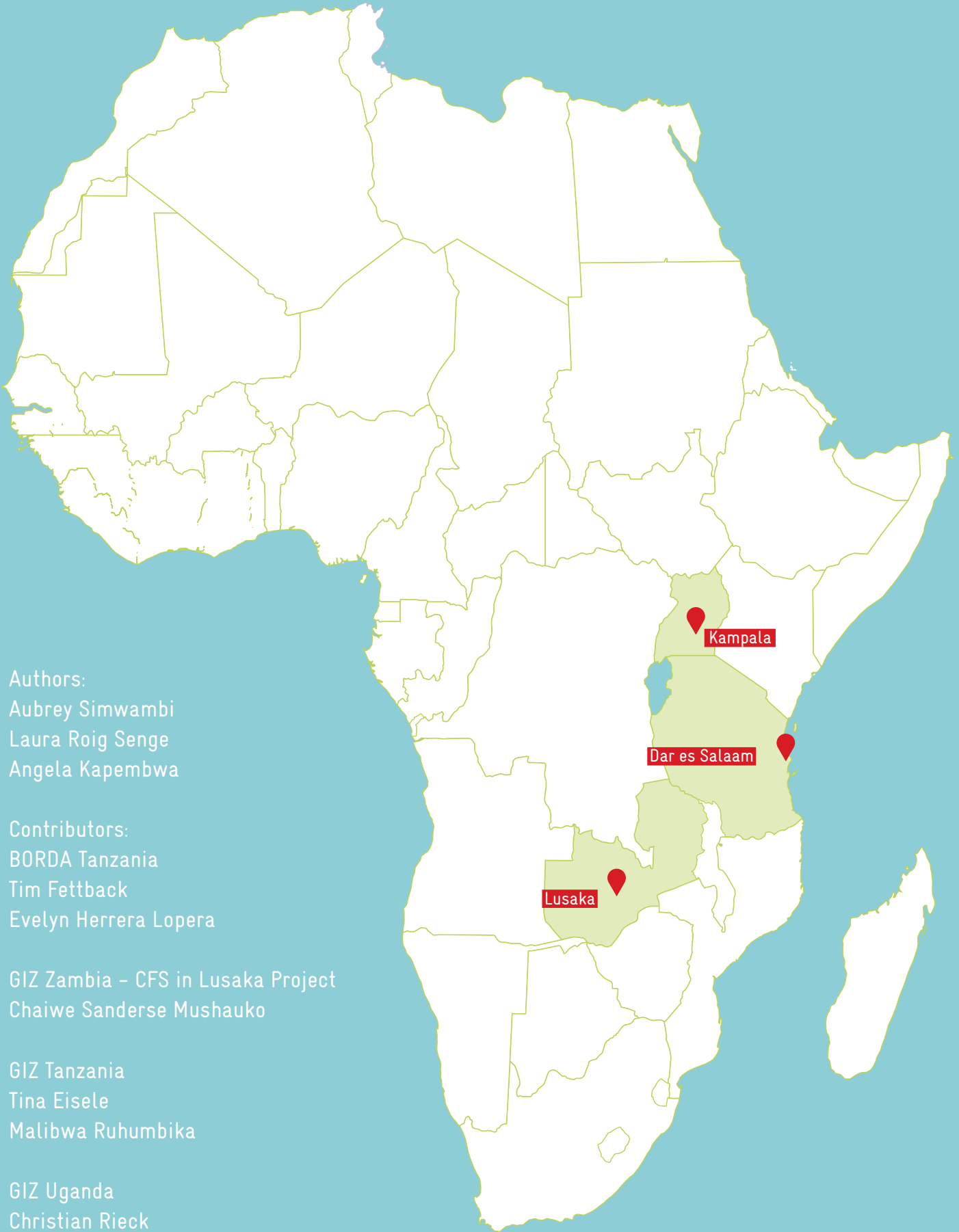
An aerial photograph showing two workers in a concrete pit. One worker is wearing a blue jacket and a grey cap, while the other is wearing a green jacket and a green cap. They are surrounded by several black plastic lids and a blue bucket. Above the pit, there is a large pile of blue plastic barrels, some with metal rods or pipes protruding from them. The ground around the pit is dry and grassy. A red banner is overlaid on the top part of the image, containing the title text.

THREE-CITIES OSS & FSM KNOWLEDGE EXCHANGE

Three Cities On-Site Sanitation (OSS) & Faecal Sludge Management (FSM) Knowledge Exchange (KEx) programme for municipalities/local authorities, commercial (water and sanitation) utilities and regulators.

Case Study

– Lusaka, Kampala and Dar Es Salaam



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Executive Summary

The Three Cities On-Site Sanitation (OSS) and Faecal Sludge Management (FSM) Knowledge Exchange (KEx) Case Study provides detailed highlights of the capacity development initiative that was undertaken in three sub-Saharan African cities; Kampala (Uganda), Dar Es Salaam (Tanzania) and Lusaka (Zambia). The KEx initiative was aimed at enabling keystakeholders from the three cities municipalities/ local authorities, commercial water and sanitation utilities and regulators to be able to make informed decisions in the field of OSS and FSM by learning and exchanging from the approaches, opportunities and challenges of existing OSS and FSM frameworks from the other participating cities.

The first chapter of this document describes the concept and methodology of the KEx in general as well as the thinking behind the Three Cities OSS and FSM KEx initiative.

The following chapter provides detailed information on OSS and FSM within the three participating cities of the KEx. Information includes demographics, stakeholder mappings, institutional and regulatory frameworks as well as city specific information regarding OSS and FSM along the sanitation service chain.

Based on the knowledge gained during the KEx, participants developed lessons learnt which include a comparison of. They include a comparison of the sanitation status quo of the three participating cities, the enabling and limiting factors for OSS and FSM as well as a way forward to improve sanitation in each of the participating cities. Enabling factors identified include but are not limited to: private sector engagement, technology, digital approaches, institutional arrangement, capacity building, enforcement, community participation and engagement and research. Enabling factors that support service delivery along the OSS and FSM service chain are cardinal for service and management success. Identified limitations affecting OSS and FSM for stakeholders from the three cities include but are not limited to: insufficient amount of FSM treatment facilities, inadequate service provision, inadequate financial ability for some customers to pay faecal sludge services, lack of prioritisation of sanitation needs at the political and household level, community awareness on sanitation and its importance, lack of capacity and knowledge amongst many actors, limited private sector engagement and lack of experience in a sustainable FSM business model.



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1. Knowledge Exchange

1.1. Knowledge Exchange Concept

In the past 15 years, Knowledge Exchanges as tools to foster evidence-based decision making have gained increasing popularity in various sectors including conservation, resource management, health and education (Cvitanovic, et al., 2015). However, as there is no common definition in literature defining the term Knowledge Exchange, numerous definitions, approaches and procedures to Knowledge Exchanges have been presented (Fazey, et al., 2012). However, there seems to be general consensus regarding the objective of Knowledge Exchanges; which is that they are designed to share academic, technical or experience-based knowledge among identified stakeholders with the aim to either directly influence practice or policy (instrumental influence), raise awareness (conceptual influence) or confirm existing policy or praxis (symbolic influence) (Rudd, 2011) (UNICEF, 2015).

There are two concepts of Knowledge Exchanges: autonomy and interdependency concepts. The autonomy concept identifies knowledge holders and decision makers as two separate entities (e.g. researchers share their knowledge with policy makers for them to make informed policy decisions). Whereas the interdependency concept assumes that all participants of a Knowledge Exchange “*are embedded in systematic relationships in which the generation and use of knowledge is mediated by a range of factors such as the contexts in which they operate or the institutional norms and values by which they are constrained*” (Gilbert & Stocklmayer, 2013); (Kerkhoff & Lebel, 2006); (Contandriopoulos, et al., 2010); (Cvitanovic, et al., 2015).

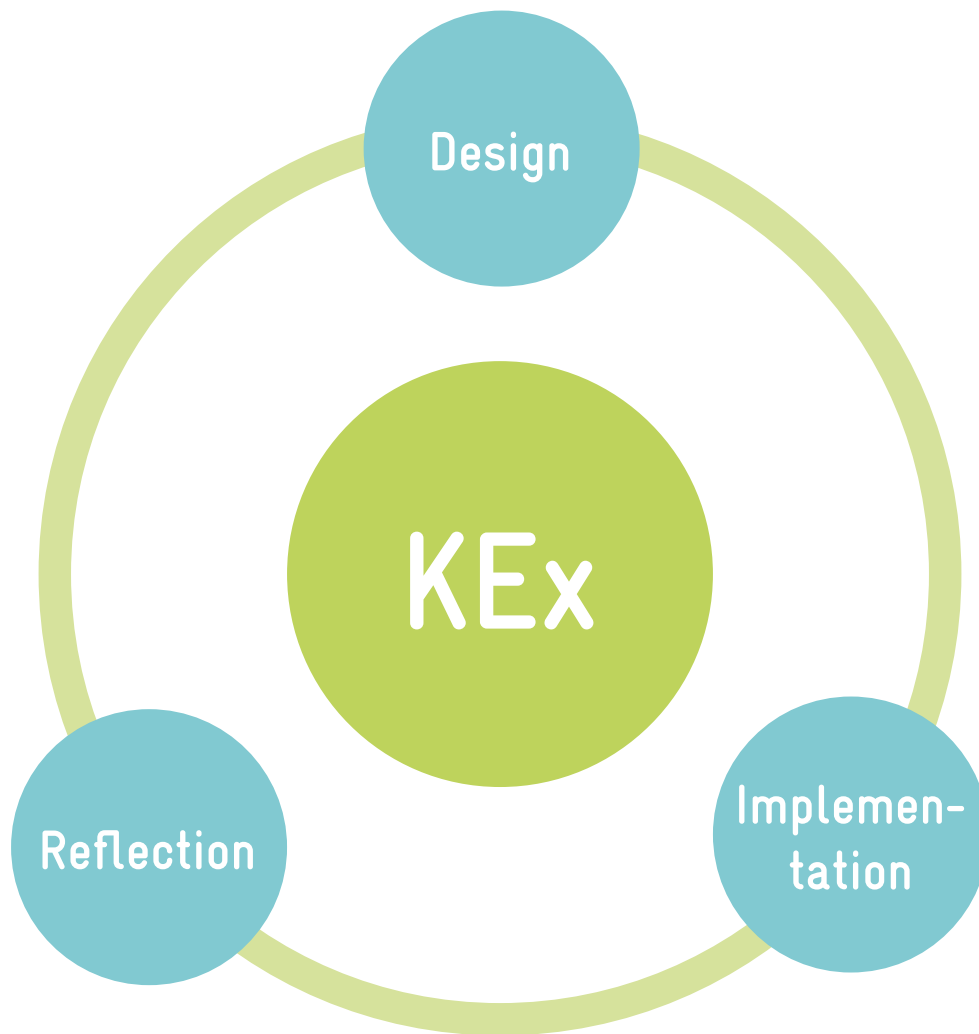
Commonly, a Knowledge Exchange is clustered in different phases, the number of phases and their terminology vary depending on the publication. However, there seem to be three main phases of a Knowledge Exchanges which are design, implementation and reflection (Cvitanovic, et al., 2016).

The design phase is often referred to as the most crucial of the three phases as the success of a Knowledge Exchange depends on thorough design and planning (Cvitanovic, et al., 2016). It is an essential first step that shows that the Knowledge Exchange organisers are clear about intended objectives and outcomes of a Knowledge Exchange (UNICEF, 2015); (Reed, et al., 2014). During the design phase Knowledge Exchange organisers must undertake a stakeholder mapping in order to identify relevant stakeholders and inter-dependencies in their relationships in order to be able to tailor a Knowledge Exchange specifically to the participant’s needs (Crona & Bodin, 2006); (Reed, et al., 2014). Based on the desired outcome of a Knowledge Exchange and the identified stakeholders, appropriate tools for sharing and exchanging of knowledge are to be identified (UNICEF, 2015). Lastly, it is vital to develop a detailed budget, which will guide the Knowledge Exchange execution (Cvitanovic, et al., 2016).

During the implementation phase, mainly logistical aspects like transport or venue arrangements need to be taken into consideration. The implementation phase requires the focussed attention of the Knowledge Exchange organising team as logistical problems are likely to affect participant’s learning experience negatively¹.

The reflection phase of a Knowledge Exchange provides room for participants and/or institutions to reflect on the knowledge, experience and networking opportunities gained as a result of participating in a Knowledge Exchange on a personal and/or institutional level (UNICEF, 2015). To support learning during the reflection phase, Knowledge Exchange organisers may consider the implementation of a knowledge management system, through which participants can access gained knowledge. To ensure sustainability, a process should be in place to update the information of the knowledge management system when required (Cvitanovic, et al., 2016).

1 A Knowledge Exchange implementation check list for logistical aspects based on the experiences of the Three Cities OSS and FSM KEx can be found in annex one of this case study.



1.2. Three Cities OSS and FSM KEx

1.2.1. Background

In many sub-Saharan African cities, the majority of the population live in informal, unplanned peri-urban areas. These areas are characterised by lack of land tenure, high population densities, poor housing standards and a lack of basic public infrastructure and services. Sanitation facilities mainly consist of pit latrines, most of which are classified as “*unimproved*” by the Joint Monitoring Programme (JMP). In many cases the water supply is derived from groundwater sources, which are prone to contamination due to high ground water tables. To further aggravate the situation many sub-Saharan African cities experience heavy rain falls (flush floods) during rainy seasons, which flush out pit latrines, and therefore contaminate surface water

sources, which are used by local communities for consumption or urban agriculture. These conditions result in a high risk for outbreaks of epidemics transmitted through faecal contamination of water resources (e.g. cholera and typhoid) (UN-Habitat, 2014).

In response to this, a growing number of interventions within or targeting low-income countries are aimed at developing improved OSS and FSM solutions. With the realisation that centralised wastewater treatment plants are unable to provide inclusive sanitation services for all city inhabitants, responsible ministries, regulators, local authorities, co-operating partners and other sector players have identified decentralised (“*off-grid*”) systems as an alternative for urban and peri-urban areas to achieve city-wide sanitation coverage. Decentralised sanitation systems can be both complementary towards and integrated into existing centralised systems, to “*fill in the gaps*”. Thereby

offering sanitation service providers a flexible, modular and sustainable response to rapidly growing urban and peri-urban communities to achieving citywide sanitation services coverage (Worldbank, 2018).

FSM is one identified sanitation approach, which has been crucial in tackling sanitation service challenges in rapidly growing urban centres. In FSM, sludge in OSS systems is safely emptied, transported and treated either in a city's central plant or in decentralised Faecal Sludge Treatment Plants (FSTPs). FSTPs are used in the treatment of OSS sludge and these plants are capable of treating sludge from various OSS facilities depending on the identified and installed treatment facilities and required process outputs. For the successful operation of OSS solutions, strong local involvement and ownership have been identified as key success factors. These can be supported through intensive capacity building measures of the relevant institutions. Through Knowledge Exchanges, an opportunity is given to responsible stakeholders to include lessons learnt regarding OSS and FSM set-ups in similar environments to help tackle their own pending challenges (BORDA, 2019).

1.2.2. Objectives and Methodology

The Three Cities On-Site Sanitation (OSS) & Faecal Sludge Management (FSM) Knowledge Exchange (KEx) programme was aimed at enabling mandated institutions in Lusaka (Zambia), Dar Es Salaam (Tanzania) and Kampala (Uganda) to make informed decisions in the field of OSS and FSM by learning from approaches, opportunities and challenges of existing OSS and FSM frameworks in similar environments. Key institutions for this purpose were identified as municipalities/local authorities, commercial utilities and national regulators. Representatives from these institutions alongside representatives ("*resource persons*") from cooperating partners, Civil Society Organisations (CSOs) and training providers undertook exchange visits to Kampala and Dar Es Salaam to view projects, share and exchange critical lessons learnt with their counterparts from Zambia, Tanzania and Uganda.

To foster institutional learning from the OSS and FSM KEx visits to Kampala and Dar Es Salaam, post-KEx dissemination workshops were conducted for the involved Zambian institutions. In order to tailor the workshops to the different institutional mandates, three independent workshops were facilitated for the service providers.

These service providers are: Lusaka Water and Sewerage Company (LWSC), the local municipality - Lusaka City Council (LCC), and the regulators, National Water Supply and Sanitation Council (NWASCO) and the Zambia Environmental Management Agency (ZEMA). In the dissemination workshops, knowledge gained by the participants during the Kampala and the Dar Es Salaam KEx was shared with respective colleagues based on joint lessons learnt for the successful future implementation of FSM in Lusaka.

As a result of the three cities OSS and FSM knowledge exchange and the initially planned two cities visitation, an additional Knowledge Exchange trip to Lusaka was organised in May 2018 by the German Corporation for International Cooperation (GIZ) and the Climate-Friendly Sanitation Services in peri-urban areas of Lusaka project (CFS – Lusaka). During the additional KEx visit, Lusaka, Dar Es Salaam and Kampala participants were given the opportunity to further exchange with representatives from Jordan and Germany on OSS and FSM solutions along the service chain. Further, aspects of digital tools and gender were incorporated into the Lusaka KEx.



2. Sanitation

Status Quo

2.1. Lusaka

Capital of Zambia / Population: **2.238 Mio**
Size: **360km²** /

In Zambia, 60 % of the population uses improved drinking water sources and only 26 % use improved sanitary facilities.



Source: Human Development Reports hdr.undp.org/en/countries/profiles/ZMB

2.1.1. Demographics

Lusaka is the capital city of Zambia with a land size of approximately 360 km² (Lusaka City Council (LCC), 2018). It has a population of approximately 2.5 million people and a projected growth rate of 3.8 (Central Statistics Office, 2018). The district of Lusaka consists of seven constituencies and 33 wards (Lusaka City Council (LCC), 2018). Within the city boundaries there are 35 peri-urban settlements. In the recent past these areas have grown

rapidly in response to urbanisation, outpacing infrastructure development in the City. The peri-urban settlements of Lusaka house about 70 % of the city's residents, largely comprised of lower income group households (UN-habitat, 2015) and are characterized by unplanned infrastructure and lack of adequate basic services.

2.1.2. Sanitation Coverage

Approximately 14 % of Lusaka's residents are serviced through centralised sanitation systems which were constructed in the late 1950s and further developed in the 1980s. The city has an approximate sewer network of 450km carrying the wastewater to six wastewater treatment plants: Manchinchi/Garden Maturation Ponds (36,000m³/day), Chunga (9,000m³/day), Matero Stabilisation Ponds (7,100m³), Ngwerere Stabilisation Ponds (8,350m³/day), Kaunda Square Stabilisation Ponds (3,600m³/day) and the Chelstone Maturation Ponds (2,700m³/day) (Kappauf, et al., 2018); (Kawanga, 2003).

Of the remaining 86 %, 82% are reliant on OSS and approximately 4 % practice open defaecation (Kappauf, et al., 2018); (African development Bank Group, 2015).

The geological structure of Lusaka (figure 1) is characterized by karstic-type geology with a shallow soil cover and a high water table; making sewer connections in most areas very expensive. Furthermore, the rock structure and high water table make groundwater vulnerable to contamination by unsafe OSS facilities. About half of Lusaka's population depend on a water supply system that sources most of its water from deep production wells; and a considerable

LEGEND

- Boreholes
- Basin Boundary
- Stream
- Lusaka Boundary

GEOLOGY

- Alluvium quarternary
 - Dolomite Lusaka Dolomite
 - Dolomite
 - Schist
 - Schist
 - Hermitite-branded
 - Quartzite
 - Granite
- } Cheta formation
- } Chunga Formation

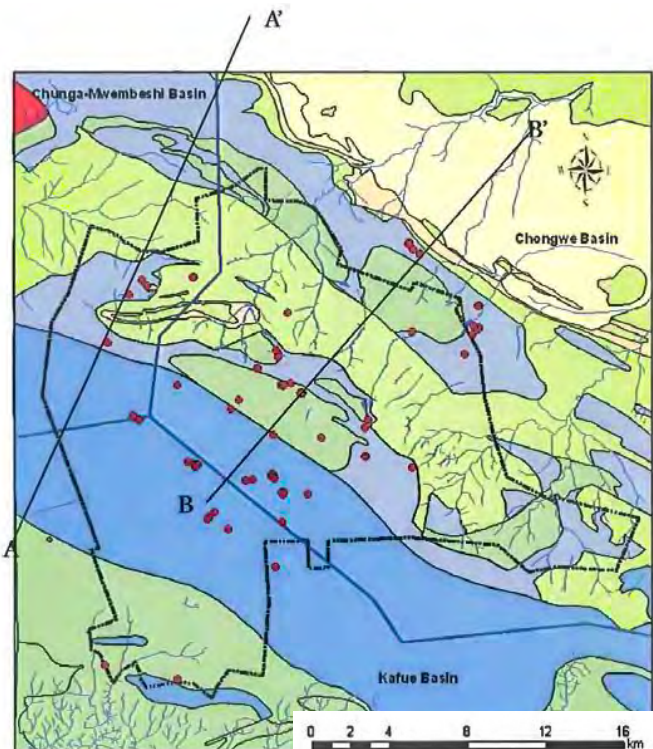
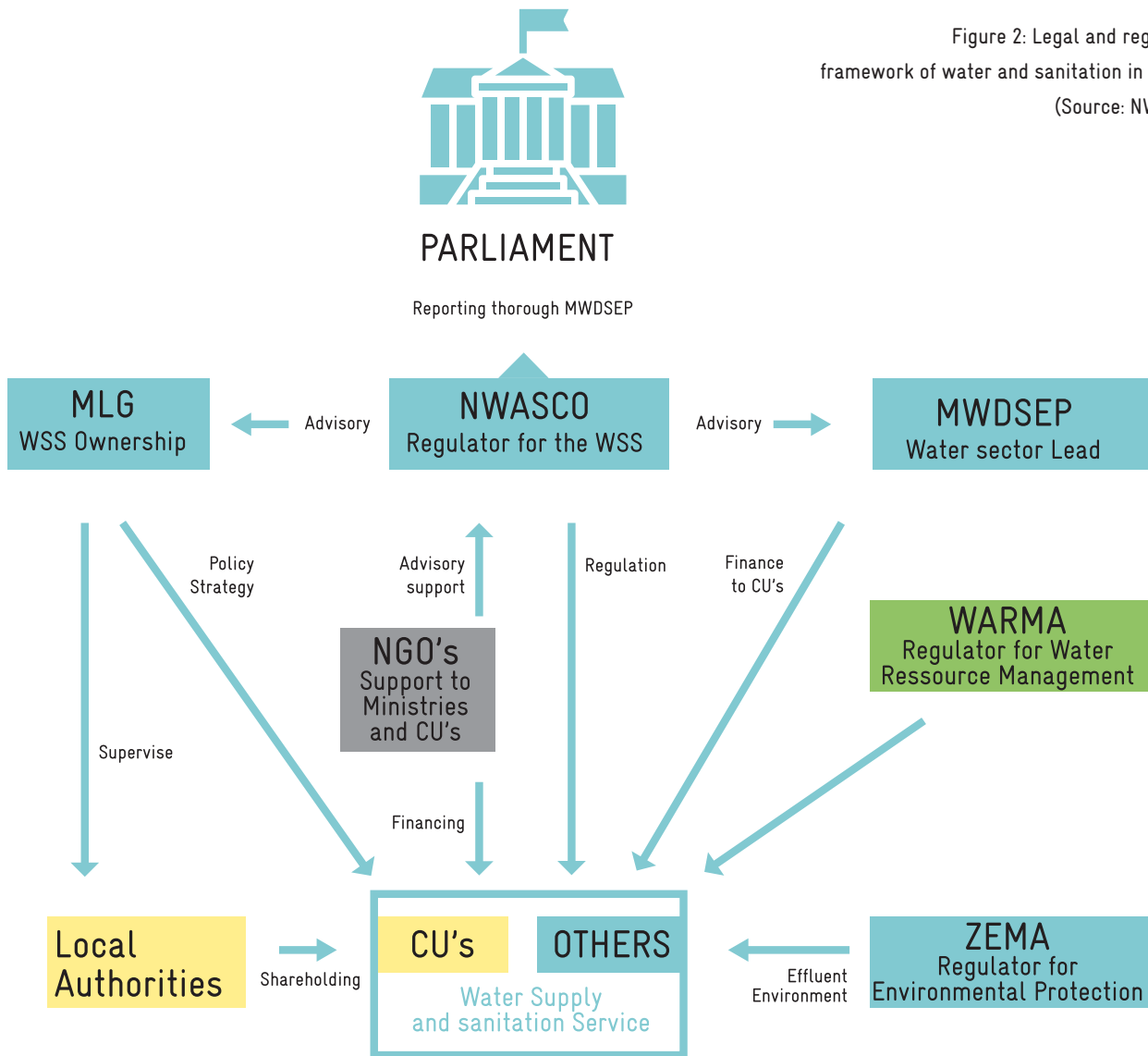


Figure 1: Geological structure of Lusaka (adapted from the LSMP figure sourced from LWSC) 9

Figure 2: Legal and regulatory framework of water and sanitation in Zambia
(Source: NWASCO)



population living within peri-urban areas depend on water supplied by private boreholes and shallow wells (MLGH, LCC, JICA, 2009). These sanitation systems and water supply sources threaten the health of residents as the city frequently experiences cholera outbreaks especially during the rainy season when the water table rises considerably and flooding of settlements and sanitation facilities occurs as a result (Mayerhofer, et al., 2010); (UNICEF, 2015).

2.1.3. Key Stakeholders

The water and sanitation legal and regulatory framework of Zambia specifies the possible stakeholder arrangement of any district and city in the country. Figure 2 shows the legal and regulatory arrangement of sanitation in Zambia. The following are the institutions involved in water and sanitation in Zambia and their functions:

The Ministry of Water Development, Sanitation and Environmental Protection (MWDSEP)

Water and sanitation in Lusaka is guided by the Ministry of Water Development, Sanitation and Environmental Protection (MWDSEP) which was gazetted during the 2nd Session of the 12th National Assembly in 2015. The President of the Republic of Zambia, Mr Edgar Chagwa Lungu re-aligned ministries and institutions to improve efficiency in government operations. This realignment led to the formation of MWDSEP. Under MWDSEP, four institutions were aligned and mandated to regulate water and environment-related activities in the city and the country at large. The Ministry bears responsibility for: environmental policy, environmental protection & pollution control, environmental research & training, water policy, water supply & sanitation, water resources management & development and environmental protection fund (mwdsep, 2019).

Local Authorities (LAs)

In Zambia, the various local authorities report to the Ministry of Local Government (MLG). These local authorities act as the Ministry's implementation agencies and are responsible for the formation of legal frameworks and policies that govern the water and sanitation sector, inspections through the provisions of the Public Health Act and enforcement of standards for OSS (Government of the Republic of Zambia, 2016) (Zambia, 1991). The responsible local authority for the city of Lusaka is Lusaka City Council (LCC). LCC formed and registered with the Registrar of Societies the utility company Lusaka Water Supply and Sanitation Company LWSSC formerly Lusaka water and sewerage company (LWSC) and outsources service provision to this utility company (Water Utility Partnership, 2001).

The Zambia Environmental Management Agency (ZEMA)

The government of the Republic of Zambia enacted the Environmental Management Act in 2011. The Act established the Zambia Environmental Management Agency (ZEMA) Formerly Environmental Council of Zambia (ECZ); provided for integrated environmental management and the sustainable use and management of natural resources; addressed emerging environmental issues and challenges such as climate change and pollution from persistent organic pollutants and electronic waste. The Act addressed the implementation of environmental safeguards and natural resource management in the sector by setting out the requirements for carrying out Environmental Impact Assessments (EIA) and Strategic Environmental Assessments (SEA). Under the act, ZEMA is responsible for environmental protection (i.e. licensing of FSM transportation vehicles and treatment plants) (The Environmental Management Act, 2011).

The National Water Supply and Sanitation Council (NWASCO)

NWASCO was established by the Water, Supply, and Sanitation Act of 1997. The Act was “*to establish the National Water Supply and Sanitation Council and define its functions; to provide for the establishment by local authorities, of water supply and sanitation utilities; to provide for the efficient and sustainable supply of water and sanitation services under the general regulation of the National Water Supply and Sanitation Council; and to provide for matters connected with or incidental to the foregoing*”. The council regulates water supply and sanitation service provision and provides operating licenses to commercial utilities for service provision (Water Supply and Sanitation Act, 1997).

The Water Resources Management Agency (WARMA)

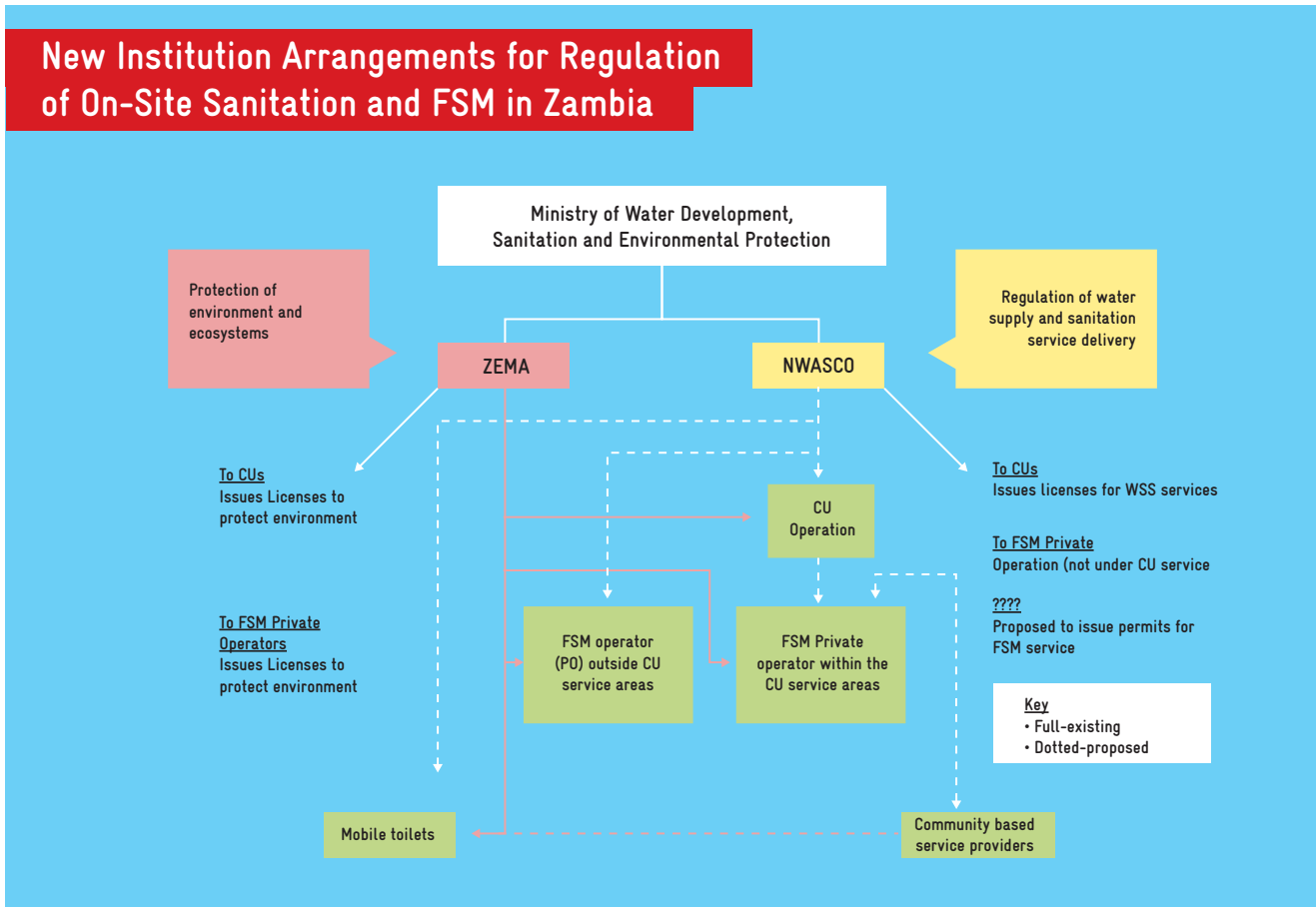
WARMA was established in 2011 under the Water Resources Management Act No.21. The main purpose of WARMA is to serve as a regulatory body for the management and development of water resources in the whole country and ensure equal access to water for the various stakeholders. The organisation functions of WARMA include: ensuring the sustainable and rational utilization, management and development of water resources, establish and maintain an integrated water resources management information system that is easily accessible by all users, provide access to water resources of acceptable quality and quantity for various uses, set standards and guidelines for undertaking water resources management and development, and to provide comprehensive advice to the Minister responsible for water on policies for utilization, management and development of water resources (Water Resources Management Act, 2011).

Further, the Ministry MWDSEP aligns stakeholders which are part of the Ministry of Local Government and Housing. These stakeholders include 11 commercial utilities spread over 10 different provinces in the country under the management of local authorities. The utility companies are responsible for water and sanitation provision in municipal areas. The utility companies also have oversight and monitoring of the operations of the private service providers. In Lusaka, the utility company Lusaka Water Supply and Sanitation Company Limited (LWSSC) has extended its license to community-based organisations to provide water services in peri-urban areas of which two private service providers (Kanyama Water Trust and Chazanga Water Trust) also offer sanitation services through offering sludge emptying services and faecal sludge emptying and transporters. Figure 3 shows the recommended institutional arrangements for OSS service provision and regulation in Zambia.

Co-operating and Development Partners

There are various development partners in sanitation in Lusaka with stakeholders offering assistance and services along the entire service chain. The noted stakeholders along the sanitation service chain include the African Development Bank (AfDB), the World Bank, the Bill and Melinda Gates Foundation (BMGF), European Investment Bank, Development Bank of Germany 'Kreditanstalt für Wiederaufbau' (KfW), GIZ as well as the German and American governments.

Figure 3: Recommended Institutional Arrangement for OSS and FSM in Zambia



2.1.4. Legal Framework

The Zambian sanitation sector is guided by water policies that also address OSS. The policies with direct linkage to water and sanitation are:

- **The National Water Policy, 1994:** Sets an objective on water supply and sanitation, which is “to promote sustainable water resources management and development with a view to facilitate an equitable provision of adequate quantity and quality of water for water supply and sanitation in a timely manner” (National Water Policy, 2010).
- **The Water Supply and Sanitation Act [No. 28 of 1997]:** “An Act to establish the National Water Supply and Sanitation Council and define its functions; to provide for the establishment, by local authorities, of water supply and sanitation utilities; to provide for the efficient and sustainable supply of water and sanitation services under the general regulation of the National Water Supply and Sanitation Council; and to provide for matters connected with or incidental to the foregoing.” (Water Supply and Sanitation Act, 1997)

- **The National Housing Policy:** Specifies all the required services for households. The policy refers to basic infrastructure whose availability enhances the quality and value of shelter such as road networks, waste disposal, sanitation, water supply, drainage, energy, communications and social facilities (Mbatii-Mwengwe, 2001).

In an effort to achieve the Sustainable Development Goals (SDGs) the government have not only accelerated development in the water and sanitation sector but they have also developed various programmes and strategies in addition to the developed national policies. The water and sanitation strategies developed include:

- **The National Urban Water Supply and Sanitation Programme (NUWSSP) (2011–2030):** A national programme that aims to achieve universal access to sanitation and water supply services for all urban residents, institutions and industry for improved health, well-being and livelihood by 2030 (National Urban and Peri-Urban Sanitation Strategy, 2010).

- **The National Urban and Peri-Urban Sanitation Strategy (NUSS) (2015–2030):** A programme that provides a framework for financing and implementing the sanitation component of the NUWSSP and has set a target to “*provide adequate, safe and cost-effective sanitation services to 90 % of the urban population by 2030*”. The strategy addresses challenges in the sector and with the implementation of the NUWSSP while also elaborating on the sanitation service delivery component of the NUWSSP. The process is also closely related to the ongoing revision of the Water Supply and Sanitation Policy which shall include solid waste management (National Urban and Peri-Urban Sanitation Strategy (NUSS), 2015).
- **The Seventh National Development Plan (2017–2021):** A plan aimed at attaining the long-term objectives outlined in the vision for 2030 of becoming a “*prosperous middle-income country*”. The plan moves away from sectoral-based planning to an integrated (multi-sectoral) development approach under the theme “*Accelerating development efforts towards the Vision 2030 without leaving anyone behind*”. (Towards Successful Implementation of the Seventh National development Plan, 2018)
- **Open Defaecation Free Zambia 2018–2030 Strategy:** “*Strategy is designed to inform and support the government’s core planning processes towards an Open Defaecation Free environment, and to guide the implementation of the national programmes*” (Open Defaecation Free Zambia Strategy (2018–2030), 2018).
- **The National Water Supply and Sanitation Capacity Development Strategy 2015–2020:** A strategy to guide the implementation of water supply, sanitation and solid waste capacity development activities. It also provides strategic guidance on how the capacities will be conceptualised, financed, delivered and monitored by the government and other stakeholders (The National Water Supply and Sanitation Capacity Development Strategy 2015–2020:, 2015).

At the local authority level, the following laws and regulations govern and guide sanitation in the city of Lusaka:

- **The Local Government Act Cap [No. 281 of 2010]:** The Act provides for an integrated three-tier local administration system: defines the functions of local authorities, repeals the Local Administration Act and related laws and provides for matters connected with or incidental to the foregoing (The Local Government Act, 2010).
- **The Public Health Act Cap 295:** The Act provides for the prevention and suppression of diseases and regulates all matters connected with public health in Zambia (The Public Health Act, 2010).
- **The Urban Planning and Regional Act [No. 3 of 2015]:** This Act provides for the development, planning and administration principles, standards and requirements for urban and regional planning processes and systems. It provides a framework for administering and managing urban and regional planning for the nation (Urban and Regional Planning Act, 2015).
- **Solid Waste Regulation and Management Act [No. 20 of 2018]:** The Act provides for the sustainable regulation and management of solid waste; general and self-service solid waste services; the incorporation of solid waste management companies and defines their statutory functions; the licensing and functions of solid waste service providers, operators and self-service solid waste providers and provides for their functions; the regulation, operation, maintenance and construction of landfills and other disposal facilities; the setting and approval of tariffs for management of solid waste and provision of solid waste services; and provides for matters connected with or incidental to the foregoing (Solid waste Regulation and Management Act, 2018).

To bridge the existing gap between sanitation and faecal sludge service delivery, which is due to lack of guidelines and enforcement of OSS and FSM in the sector, the Ministry of Water Development, Sanitation and Environmental Protection through its regulatory bodies and other regulatory bodies in associated ministries have embarked on

the process of developing legal, regulatory, standards and guidelines to shape the sector. Some of the documents under development include, but are not limited to the following:

- OSS/FSM Code of Practice being developed by NWASCO
- OSS by-laws being developed by the local authority, Lusaka City Council
- Enactment of the Solid Waste Regulation and Management Act No. 20 of 2018 by the government of the Republic of Zambia

2.1.5. OSS and FSM Service Delivery along the Service Chain

2.1.5.1. Capture and storage

In places where no centralised sewer network exists, the responsibility and financial burden for providing OSS facilities lies at an individual household level. Therefore, the quality of OSS facilities is determined by the financial capability of respective households and construction capacities within communities. In the case of Lusaka, more than 95 % of the city's households living in peri-urban settlements rely on pit latrines (WSUP, 2018).

With support from multi-donor development corporations working within Lusaka (The World Bank, the AFDB, the European Investment Bank and the Development Bank of Germany (KfW)), the utility LWSC is working on an improvement of full FSM service in some of the most vulnerable peri-urban areas of Lusaka as well as implementing the Lusaka Sanitation programme (LSP) to improve sanitation services throughout the city with an integrated approach. On the household level, the programme involves improving sanitation conditions in peri-urban areas and informal settlements through the construction of 10,000 OSS facilities, benefiting about 180,000 people from an estimated 37,000 households by 2021. Under the programme, FSM infrastructure and service providers will be developed with the capacity to serve approximately 25,000 OSS facilities used by around 450,000 people in selected peri-urban areas (Lusaka water and sewerage company Limited, 2017). This is supported by a major campaign of sanitation promotion, hygiene education and support for on-site household sanitation

(African development Bank Group, 2015).

GIZ is also assisting the LSP to meet its objectives by running a programme on climate-friendly sanitation, whose major objective is the implementation of climate-friendly sanitation services and FSM that reduce greenhouse gas emissions in the peri-urban areas of Lusaka. The programme has four major outputs:

- Adapted procedures for the introduction of climate-friendly OSS with FSM that reduce greenhouse gas emissions have been developed.
- Prerequisites for the coordination of measures for OSS with climate-friendly FSM have been established for peri-urban areas of Lusaka.
- Prerequisites for the monitoring of compliance with climate relevant regulations in sanitation (incl. faecal sludge and solid waste management) have been improved.
- Prerequisites for the improvement of qualifications of public and private service providers of climate-friendly wastewater management have been established.
- Under the fourth output, with support from training and sanitation stakeholders, a national curriculum has been developed and validated by the Technical Education and Vocational Entrepreneurship Training Authority (TEVETA). The curriculum has been developed with modules dealing with pit emptying, inspection of OSS and FSM facilities and services, safe sludge transportation, occupational health and safety, FSTP operations and maintenance and FSTP management.

On a local authority level, again with support from multi-donor development corporations working within Lusaka, LCC is running programmes to enhance service provision and enforcement in the city such as:

- Sanitation mapping
- Slum upgrading programme (upgrading of settlement) through land ownership
- Know your neighbour project



- FRACTAL – Future Resilient for African Cities
- Lusaka Water and Sanitation Sewer and Drainage Project
- Lusaka Water Security Initiative
- Lusaka Green Schools programme
- In order not to lose information in the already implemented steps and keep track of progress, the LWSC under the LSP is creating an integrated management information system for key sanitation stakeholders in the city.

2.1.5.2. Emptying and transport

Vacuum truck operators predominantly offer formalised emptying and transportation services of faecal sludge in Lusaka. There are about 36 vacuum truck service providers, who offer services in the affluent areas of the city that are serviced by OSS at a fee ranging between US\$ 70–\$ 180

per truckload (3–10m³) depending on the distance to conventional treatment plants. Vacuum truck operators mostly service septic tanks but in some cases also offer services in pit latrine emptying. Due to the high price by vacuum truck operators compared to the average income of households in peri-urban areas of Lusaka, most households in these areas rely on service provision from either community-based organisations (CBOs) or informal individual emptiers (Simwambi, et al., 2017). Figure 4 shows sludge transportation in barrels by a community based organisation.

Gulpers as well as machine-powered emptying technologies often fail due to the high percentage of solid waste in pit latrines, which leads to clogging of suction pipes. Therefore, pit emptiers mainly offer manual services using modified garden tools, which allow the scooping of both, solid waste and sludge at the same time.

The costs for service provision by the CBOs are usually clustered according to the amount of sludge to be removed from a pit latrine. The Kanyama water trust, a CBO licenced by LWSC for the service provision, charges

approximately US\$ 35 for 0.72 m³, US\$ 50 for 1.44 m³ and US\$ 60 for 1.92 m³ for emptying and disposal at a nearby treatment facility.

According to residents of the same area in Kanyama, informal pit emptiers, who are not recognized by the local authority, offer to empty pit latrines for approximately US\$ 80 per pit. Often these informal emptiers do not dispose of the sludge at a treatment facility but either bury the existing pits and dig new ones or dispose of the sludge illegally.

To improve the level of sludge collection, the LWSC is running a tariff bundling exercise in one of the peri-urban areas of the city. The exercise includes the payment of solid waste collection services through water tariffs.

In some areas where the tariff is not exercised, solid waste is being recycled by an organisation called “Manja Pamodzi” translated as “Working together” – a social enterprise created by Zambia Breweries Limited. Households are encouraged to separate their waste and take them to a solid waste collection facility for a fee and encouraged not to dump their waste on-site.

Under the developed OSS and FSM training curriculum, service providers in this area have been earmarked for professional emptying and occupational health and safety training.

The LSP programme supports an organisation of service providers in the form of an association of emptiers who will also be co-ordinated by the local authority. Households with OSS will have an opportunity be serviced by calling the local authority who will then allocate a service provider according to the location and type of facility. Only licensed service providers equipped with GPS systems are planned to be part of the association and local authority contact list.

2.1.5.3. Treatment and reuse/disposal

Faecal sludge treatment in Lusaka is done in three sludge treatment plants in the city: the Manchinchi wastewater treatment plant, the Kanyama water trust plant and the Chazanga water trust treatment plant. The existing two treatment plants managed by the water trusts were implemented with support from the Water and Sanitation for the Urban Poor (WSUP) between 2011 and 2014.



Figure 5: Treated solid waste ready for sale

Whilst the Manchinchi treatment plant's tipping point was incorporated during the construction of the wastewater treatment plant in the early 1970s. The treatment plant to which sludge is taken for treatment depends on the OSS facility area the sludge is from (pit-latrines/septic tank) as well as the area it is taken from, e.g. South and North of the city are taken to Kanyama and Chazanga respectively. Treatment of pit latrine sludge is mostly done through anaerobic stabilisation in biogas digesters at either Kanyama or Chazanga depending on the team that has emptied the sludge. Further treatment of anaerobically stabilised sludge is done in sludge drying beds. Sludge from septic tanks and emptied by vacuum trucks is tipped at the Manchinchi treatment plant where it is co-treated with wastewater in stabilisation ponds after the mixture is screened for solid waste. Vacuum trucks tip their emptied waste at the Manchinchi conventional wastewater treatment plant at a fee of US\$ 3/m³. Sludge from the Manchinchi treatment plant is sold to willing buyers after drying. Most residents of Lusaka reportedly use the sludge on grass lawns. The treated sludge from the Chazanga and Kanyama treatment plant

is processed by crushing the solidified sludge, which is then packed in 5kg bags (figure 5), and sold at US\$ 1.5 per bag to Lusaka residents. The digester generated biogas is used on-site at the treatment plants for cooking and heating needs. The effluent water is disposed into open water bodies at the Manchinchi treatment plant whilst it is disposed through underground infiltration at the FSTPs in Chazanga and Kanyama.

Realising the need for more sludge treatment plants due to the increase in unplanned and un-sewered settlements in the city, the LSP, with support from the World Bank and the AFDB, will construct two semi-centralised FSTPs. These will be at the Matero and Manchinchi wastewater treatment plant site and will complement the existing faecal sludge treatment plants (Lusaka water and sewerage company Limited, 2017). The new plant operators and managers will have a capacity built in faecal sludge treatment, reuse and disposal using the developed FSM curriculum under the training authority TEVETA. Figure 6 shows the proposed FSM service chain approach in Lusaka.

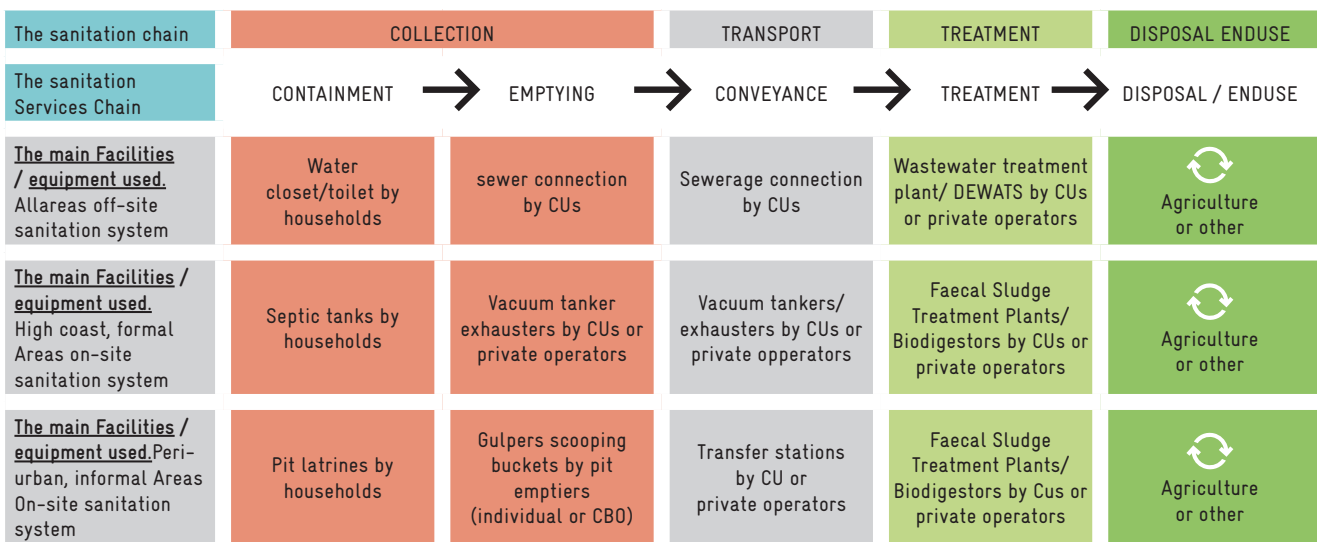


Figure 6: Proposed Faecal Sludge Management Approaches in Zambia (Source: NWASCO)

2.2. Kampala

Capital of Uganda / Population: **1.507 Mio**
Size: **195km²** /

In Uganda, 49 % of the population uses improved drinking water sources and only 18 % use improved sanitary facilities.



Source: Human Development Reports hdr.undp.org/en/countries/profiles/UGA

2.2.1. Demographics

Kampala is the capital city of Uganda, located on the shores of Lake Victoria and is a city surrounded by hills and valleys. The city is zoned into five administrative districts: Nakawa, Kawempe, Rubaga, Central and Makidye with the central district being the economic and industrial business hub (Figure 7) (Uganda Bureau of Statistics, 2017). All districts of Kampala are characterised by a mix of residential and market areas including high-end housing as well as informal settlements (Kampala Capital City Authority, 2011–2019). The census of population and housing in 2014 recorded a residential population of 1.5 million. However, this is estimated to double during the day due to commuting flows (Uganda Bureau of Statistics, 2017).

This makes Kampala the largest urban centre in Uganda. The city accounts for about 80 % of the country's industrial and commercial activities and generates around 65 % of the national gross domestic product (GDP) (Uganda Bureau of Statistics, 2017). However, approximately 60 % of the residents in Kampala live in informal low-income settlements, these cover a mere 10 % of the city area with the majority (95 %) lying in the valleys of the city (Nkurunziza, et al., 2017).

2.2.2. Sanitation Coverage

Approximately 10 % of the residents of Kampala are serviced by two conventional treatment plants: Bugolobi sewage treatment works and Lubigi sewage and Faecal Sludge Treatment plant (Nkurunziza, et al., 2017). The sewerage network in the city passes through most of the central division as well as the Nakivubo catchment area, which drains into Lake Victoria's inner Murchison Bay, Kampala's main fresh water source. The sewage in the city flows by natural gravity over a length of approximately 185 kilometres. The low percentage of sewage connections results in indiscriminate disposal of untreated sewerage into the environment (KCCA, 2016). The remaining 90 % of the population relies on OSS, most of which is classified as 'unimproved' and 'unacceptable' with the predominant sanitation technology being pit latrines and septic tanks. Generally, around 34 % of the city's households have access to improved toilet facilities (flush toilets, VIP latrines, compost toilets or pit latrines covered with a slab) (KCCA, 2015). Approximately 1.8 % of the population of Kampala in low-income settlements of the city are estimated to have no access to a toilet (KCCA, 2016).

Many sanitation facilities are used by multiple households and are difficult to access for emptying due to congested

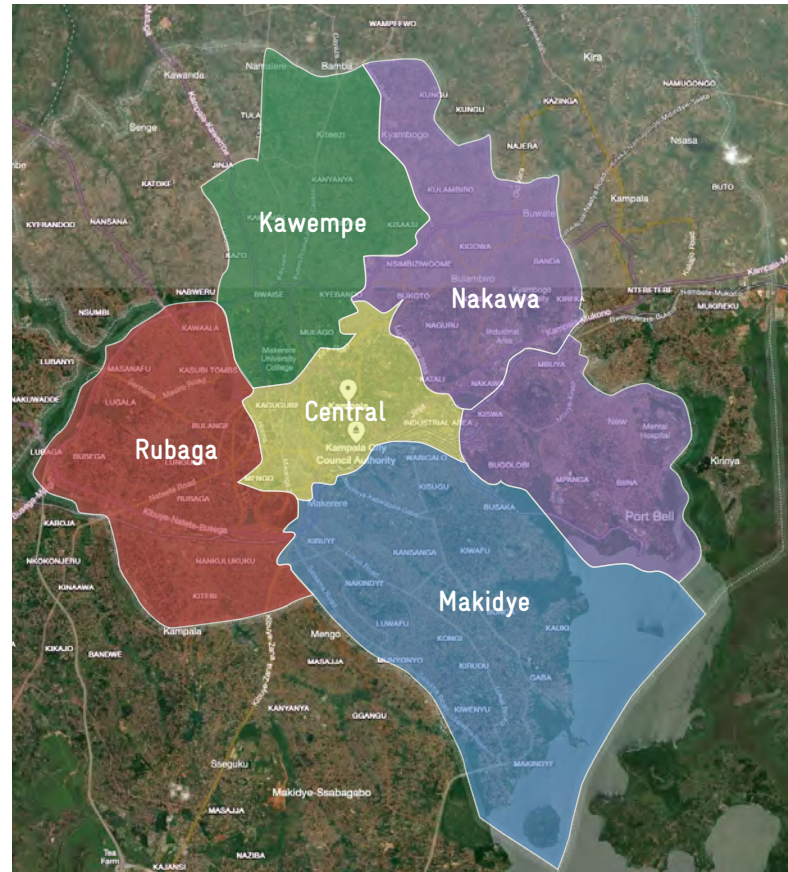


Figure 7: Map of Kampala Capital City 2014 (Kampala Capital City Authority, 2014)

housing units. This situation, coupled with large amounts of solid waste thrown into the pit latrines, results in filled pits either being abandoned or emptied directly into the environment, contaminating the surrounding wetlands, Murchison's Bay and groundwater tables. Thereby posing health and environmental risks for the city and its people. (KCCA, 2015).

2.2.3. Key Stakeholders

In Kampala there are different stakeholders involved in the sanitation service chain and these stakeholders are each responsible for specific areas of the sanitation service chain. The identified stakeholders in FSM services include households, the National Water and Sewerage Company Limited (NWSC), the National Environmental Management Agency (NEMA), Kampala Capital City Authority (KCCA), Cooperating Partners, Non-Governmental Organisations (NGOs) and the private sector (sludge emptiers and transporters) (Rokob, 2017). The stakeholder analysis for Kampala is shown in figure 8.

Stakeholder roles in the sanitation service chain in Kampala are in accordance with the outlines of the legal and regulatory framework. The following are the key stakeholders and their roles within the FSM sector in Kampala:

- **The Local Authority (KCCA):** KCCA is the biggest stakeholder in FSM in Kampala due to its standing as the authority of the city. The authority has the mandate to plan and regulate the waste and sanitation sector under the Directorate for Public Health and Environment. KCCA's responsibility includes, but is not limited to physical planning, education, social and public health. The authority is also focused on improving the regulation of solid waste management and FSM (Kampala Capital City Authority, 2011–2019).
- **The Private Sector:** The private sector plays a key role in the provision of sanitation services along the service chain. Under the authority of KCCA, the private sector in Kampala has been given the mandate to collect and transport faecal sludge from households to treatment plants. KCCA has developed a Public Private Partnership (PPP) framework, where the authority remains the regulator but has handed over the task of implementation, collection and transportation of services of FS along the service chain to the private sector (KCCA, 2015).
- **The National Water and Sewerage Company (NWSC):** NWSC is a government parastatal which sits under the Ministry of Water and Environment. Its mandate is to develop, operate and maintain water supply and sewerage services in urban areas. While collection and transportation of faecal sludge is carried out by the private sector, the responsibility of treating FS lies with the National Water and Sewerage Company (NWSC) (Kampala Capital City Authority, 2011–2019).
- **The National Environment Management Authority (NEMA):** NEMA regulates the disposal of waste into the environment; therefore, NEMA regulates both solid waste management and FS transportation and disposal in the city. NEMA works together with KCCA in enforcing environmental protection policies. Operational licenses for private service providers in environmental related services such as solid waste and FSM services are issued by NEMA only under recommendation by KCCA thereby giving both institutions power to regulate and prosecute environmental offenders in the city (Nkurunziza, et al., 2017).
- **Non-governmental organisations (NGOs):** NGOs and CBOs are also active in the sanitation service provision of the city. NGOs help with information dissemination in addition to giving segmented services such as desludging technologies and value addition on faecal sludge products. Additionally, co-operating partners come in through funding of some infrastructure and capacity building in various interventions (Nkurunziza, et al., 2017).
- **Co-operating partners:** There are various development partners working in sanitation in Kampala with stakeholders offering assistance and services along the entire service chain. The noted stakeholders along the sanitation service chain include the BMGF, the UK Department for International Development (DFID), the AFDB, the World Bank and the German government.

To improve coordination of stakeholders, KCCA has formed the Kampala Water, Sanitation and Hygiene (WASH) Forum which is used as a platform for sharing sanitation practices as well as streamlining and optimising

available safe sanitation practices in the city. Hosted by KCCA, the Forum focuses on the following thematic working groups:

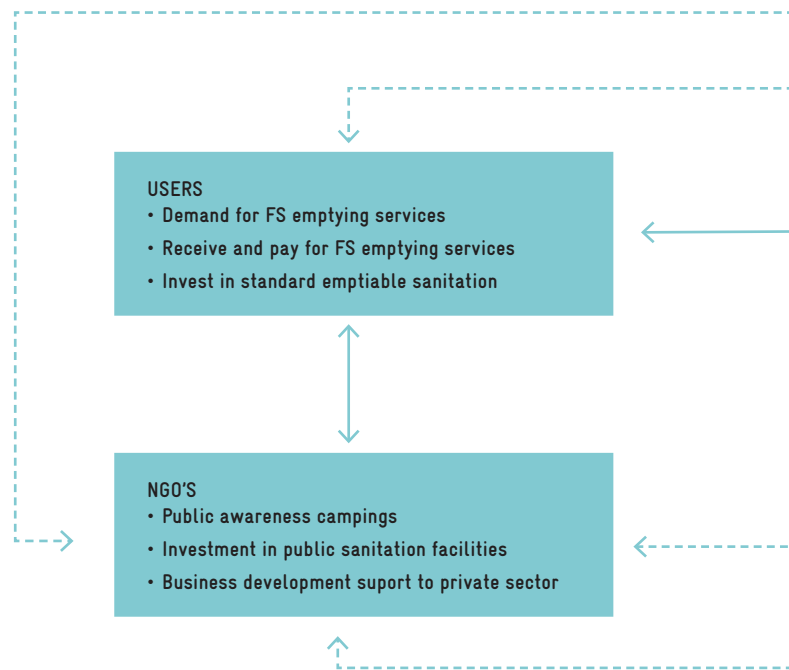
- Hygiene and public health education
- Appropriate technologies
- Knowledge management
- Governance and policy

KCCA also believes that strengthening coordination of sector stakeholders from NGOs, service providers to financiers will improve service delivery in FSM, minimise duplication of efforts and wastage of resources. Sector coordination has been identified as a mechanism of closing the sanitation loop as well as a holistic approach where FSM interventions are identified and planned along the sanitation service chain.

2.2.4. Legal Framework

Interventions surrounding the legal and institutional frameworks are seen as essential as they address cooperation of stakeholders and their interests. Laws and regulations need to exist to bring different stakeholders together, enable synergies of different players, and facilitate better planning of FSM services. Various laws instituted by the government of Uganda through parliament govern sanitation in Kampala. The following are the laws directly linked to sanitation in the city of Kampala:

Public Health Act 2000: The Public Health Act of 1935 (Cap.281) was revised in 2000. This Act provides for the protection of public health in Uganda. It was established to mandate the local authority to safeguard and promote public health. The law requires all dwellings in the city to have functional sanitation facilities that meet specified minimum standards. Therefore, all buildings are directed to be erected with proper and sufficient facilities before occupation is approved (KCCA, 2017). It also provides for rules and regulation that relate to the prevention and suppression of (animal) diseases, sewerage and drainage, prevention and destruction of mosquitoes, storage of food-stuffs, the handling of food by diseased persons and control of potable water. The Act defines adequate regulation-making powers of the Water Minister. By Statutory Instruments in this Act, the Minister may establish Sanitary Boards. These Boards shall exercise the powers conferred on local authorities by this Act in respect of any specified area. The Minister shall also establish the Advisory Board of Health (International Labor Organisation, 1996–2014).



The Local Government Act 1997 (Cap.243): The Act allows KCCA to implement and maintain public sanitation facilities and sanitary responsibility for the removal and disposal of night soil. The Act enables the local authority to make by-laws for reinforcing existing laws and creates opportunities to regulate (e.g. setting operational standards) the FSM business through licensing (KCCA, 2017).

Kampala Capital City Act 2010: This Act provides for the establishment of Kampala as the capital city of Uganda in the Article of the Constitution. The KCCA Act aims to provide the governance and administrative framework for the city of Kampala by the central government as well as creation of the Kampala Capital City Authority (KCCA) as the governing institution of the city. The Act also defines the election and removal procedures for Lord Mayor and the Deputy Lord Mayor. It also establishes lower urban councils under the KCCA, which include:

- Division urban councils
- Ward urban councils
- Village urban councils

The Act also establishes a Metropolitan Physical Planning Authority for Kampala and adjacent districts which is

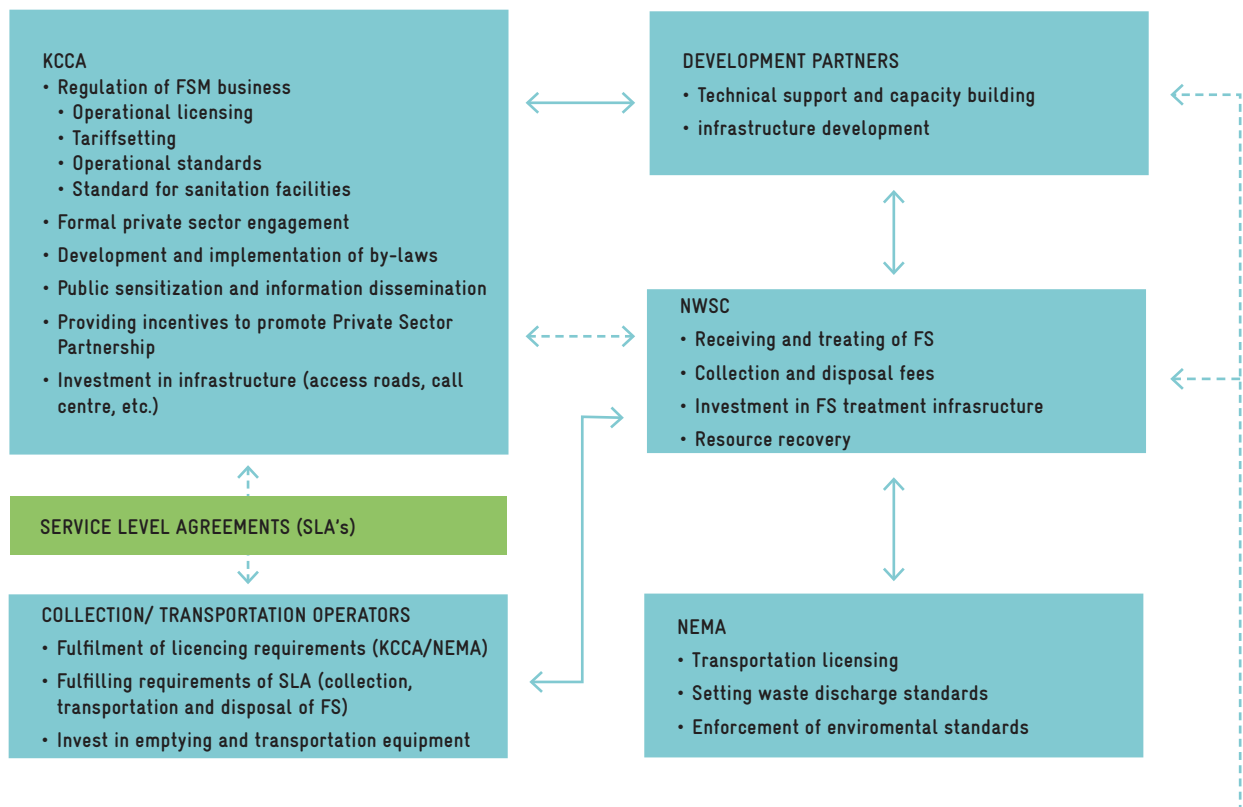


Figure 8: Institutional and Operational Framework for Kampala

mandated to develop physical development plans for the Capital City and the metropolitan area (The Kampala Capital Act, 2010) (UNHABITAT, 2010).

The National Environment (Waste Management) Regulations S.I. of 1999: The Environmental SI establishes the National Environmental Management Agency (NEMA) as a mandated institution for licensing persons intending to transport waste and/or to operate a waste treatment plant or waste disposal site after an EIA study. The SI recognizes enforcement as a strategy to minimize public health risks and prevent environmental pollution (KCCA, 2017).

The Public Private Partnerships Act, 2015: The PPP Act enables private sector involvement in the design, construction, maintenance and operation of infrastructure or services in transport, information technology, social and health, water management, the energy and fuel industry, sports and recreational facilities, tourism, extraction and processing of raw materials, culture processing industry and any other projects that the minister can approve by statutory instrument. Private sector engagement in FSM in Kampala city is provided for in the act through different private-public partnership arrangements (Public Private Partnership Act, 2015).

The Physical Planning Act, 2010: Provides for the making and approval of physical development plans by the KCCA and for the applications for development permission in Kampala (The Physical Planning Act, 2010).

National Physical Planning Standards and Guidelines, 2011: Provides guidelines on toilet and septic tank standards as well as planning guidelines for dwellings and public places (National Physical Planning Standards and Guidelines, 2011).

The laws and instruments above show that Kampala has enough laws for a conducive FSM service, if properly enforced. Given this, the GIZ programme Reform of the Urban Water and Sanitation Sector (RUWASS) in Uganda has a focus on supporting and strengthening the regulatory framework and governing institutions in sanitation and supporting private sector engagement in the sanitation sector (KCCA, 2015).

To ensure efficiency in FSM services, an operational framework to guide service provision and sector regulation has been developed. The framework provides for but not limited to the following:

- Standards for OSS
- Minimum health standards for sanitation related processes

- Obligations for the safe collection and transportation of faecal sludge
- Monitoring tools, incentives and penalties

Development of the framework was through a consultative and integrative approach of various key stakeholders. Implementation and revision of the new regulation started in June 2017. However, there is already evidence that property owners are improving their sanitation facilities to meet the new standards.

2.2.5. OSS and FSM Service Delivery along the Service Chain

2.2.5.1. Capture and Storage

As is the case in Lusaka, in Kampala it is the mandate of the household to provide its own sanitation facilities and ensure its safety in terms of faecal containment and disposal when the pit is full. However, in order to improve the easiness of emptying sanitation facilities, KCCA has embarked on the mission of persuading property owners to upgrade sanitation facilities through raising awareness. In order to assist households, developers and KCCA to define the minimum standards for OSS technology options that can be adopted in Kampala city, KCCA with assistance from sanitation stakeholders has developed “*Minimum Standards for on-site technology options in Kampala*”. The standards also provide enforcement guidance to KCCA and assistance towards the improvement of FSM in the city. The standards are derived from various existing legislation and guidelines related to sanitation (KCCA, 2017).

To enhance acceptance, citywide communication has been identified as a major step in sanitation marketing and promotion of emptying services. Therefore, sanitation awareness raising programmes have been and are continuing to be conducted in various communities of the city. The sanitation awareness raising, and behavioural change messages have been streamlined into a set of messages addressing safe pit emptying, improved



Figure 9: Weyonje Logo

emptiable toilets and toilet hygiene. A phased rollout of the campaign has been adopted for maximum impact. As of 2017, 22 out of 99 parishes² in the city were at the centre of the campaign; with the aim to extend this by 20 more parishes every two months. Data from the sanitation call centre shows that the community mobilisation campaign has already made an impact in parishes yet to be engaged. The following interventions have also been identified to keep things moving in the right direction:

- The need for constant engagement with communities where door-to-door engagement was identified as the most effective.
- Enforcement or the threat of prosecution plays a key role in behavioural change.
- City-wide community communication by property owners to deliver the message.

Within community sanitation campaigns, it has been recognised that communities significantly contribute to achieving these three interventions and that community leaders understand the importance of good sanitation. The influence of community leaders is fundamental in influencing and conveying these messages throughout their jurisdictions. To ensure adherence to sanitation interventions, community leaders carry out periodic door-to-door checks to ensure that households are engaging the correct people to provide their sanitation services. The results of these visits have a ripple effect in that the entire community's awareness in relation to whom to contact for sanitation services. In addition to this, community radio and television campaigns have been conducted using different strategies, one such example is the “Weyonje Campaign” translated as “Keep yourself clean Campaign”. Social media is another tool that is effective at informing both parties (KCCA and the communities) on what is happening. The KCCA posts regular updates on the different services available and how to access them, while the communities post issues they are facing and suggestions on how they would prefer the services to be delivered. Figure 9 shows one of the logos used in the Weyonje campaign.

² A territorial entity having its own church and a designated priest and administratively managed under the pastoral care and clerical jurisdiction of a parish priest

Figure 10: Mobile Transfer Station



A toll-free call centre was also created at the KCCA in mid-November 2016; the centre serves to provide a platform for customers to inquire and file complaints on service deliveries, as well as a means to connect the households to service providers (Rokob, 2017). However, the call centre is not a bidding building. However, information on the service pricing is recorded from follow up calls made to households, together with customer satisfaction and gathering information on the sanitation issues faced. Based on these records, an indication of market rates is obtained by KCCA. A comparison of service rates then often results in the reduction of the cost of service when a service provider is being engaged. The call centre received information from 1,231 calls and much positive feedback in the first eight months of operation. The information provided by the call centre has proven valuable to inform KCCA of sanitation activities in the cities.

In order to have an informed OSS facility knowledge and plan service delivery, KCCA have been conducting a city-wide sanitation mapping exercise since 2016.

The local authority has developed a geodatabase of all the OSS facilities in the city. The city-wide field data collection exercise was initially planned for a period of six months with 200 enumerators who were engaged by the authority to carry out door-to-door assessments. The mapping was done using open source mapping tools installed on mobile devices such as smart phones and tablets and a total of 170,000 sanitation facilities were initially mapped in the first six months. An IT consultant was contracted to setup the IT systems required for this exercise while KCCA procured equipment such as mobile devices. The organisation was responsible for the supervision of the enumerators as well as providing all logistical support that was required for the exercise. The city sanitation mapping serves as a guide to sanitation investment in the city and zoning of the whole city into financially viable areas for use in the Service Level Agreement (SLA) model. This exercise was done with close involvement of local political leaders and community leaders who played a key role in mobilising the community members.

2.2.5.2. Emptying and Transport

Between 2014 and 2016, KCCA estimated that Kampala city generated about 900m³ of faecal sludge every year not including an additional 150m³ emanating from neighbouring districts (KCCA, 2019). At household level, the emptying service is predominantly managed by the private sector whilst KCCA owns six cesspool trucks, each with a 5m³ capacity for emptying public and institutional toilets such as public schools and health centres (KCCA, 2015). There are four main categories of FS collection and transportation service providers in Kampala and these are:

- Cesspool truck operators
- Gulper operators
- Manual emptiers
- Re-users of FS (KCCA, 2015)

The cesspool operators are required to work formally with a certificate of incorporation, trading license, NEMA license or a formal office. However, this is usually not the case as it is known that only a few operators or companies have a NEMA license for transportation of FS, certificates of incorporation and/or formal offices (KCCA, 2015). In an effort to know the number of FS operators in the city, KCCA has developed a comprehensive list of cesspool trucks, their owners and contacts in Kampala to facilitate future selection and formal engagement of the operators; over 100 cesspool emptying truck operators and their vacuum tank sizes have been recorded so far. Measures have been introduced to formalise the operation of private operators operating without the required documentation. This will strengthen operator's market power, set minimum industrial standards and provide pricing standards and guidelines for safe services.

In areas not accessible by cesspool trucks, gulper operators and manual emptiers in operation have been identified and recorded. This effort has reduced the illegal service provision of manual pit emptiers, who often empty pits unsafely, and reduced the ensuing indiscriminate disposal of their contents in the open environment around the neighbourhoods. These measures have encouraged illegal service providers to join existing community SMEs and local NGOs to formalise their operations. Local leaders have also been engaged to create awareness on the interventions taking place in their communities and introduce community disciplinary measures for households who have been found to engage illegal emptiers (Lukooya, 2018).

As the FSM market is currently not regulated, existing guidelines on pricing for service provision are not binding. This has led to increased competition among service providers stemming from the customers being free to choose a supplier. Service providers and customers negotiate costs for service provision on a case-by-case basis. The charges for service provision vary due to the aforementioned lack of regulation in the FSM market; gulper emptying charges for households between US\$ 7–\$ 11 per 200L barrel. With an average daily income of US\$ 2 for low-income urban households, this service is considered expensive (Uganda Bureau of Statistics, 2017). Cesspool trucks are considerably cheaper, charging from US\$20 for 2.5 m³ to US\$ 50 for 10m³ of FS. (Lukooya, 2018). To improve service provision for low-income areas, areas with difficult road access and/or areas, which are located geographically far from treatment plants, mobile transfer stations designed to receive sludge from several households before emptying into treatment facilities as shown in figure 10 have been introduced. Neighbourhoods in which mobile transfer stations are placed, are informed in advance to allow gulpers to benefit by offering households an emptying service while having a safe location to dispose of the collected sludge. (Lukooya, 2018).

To increase collection efficiency and accord all emptiers a market opportunity, KCCA is currently developing a PPP model that includes dividing the city into five different zones for faecal sludge collection. Sanitation coordinators have been allocated in the five zones with more to be assigned in parishes of the cities to promote communication between stakeholders and the city authority. This PPP model also relies on SLAs to regulate and monitor service delivery in these areas. The aim of the partnerships with private sector is to:

- Increase coverage, affordability and efficiency of emptying services, trust and enforcement
- Develop MoU with service providers which serves as a model for future SLAs
- Create an inventory of service providers to facilitate mobilisation and engagement activities

Service providers are encouraged to be in constant and productive exchange with KCCA to fine-tune the model.

2.2.5.3. Treatment and Reuse/Disposal

As the majority of the population in the city of Kampala relies on OSS systems, sustainable FSM is critical to the city's sanitation services to maintain public and environmental health. NWSC is responsible for developing, operating and maintaining water supply and sewerage services in urban areas. Thus, NWSC takes responsibility for the treatment of the generated waste. (National Water and Sewerage Cooperation, 2017).

The city has two centralised wastewater treatment plants, Bugolobi sewerage treatment plant and Lubigi sewerage and faecal sludge treatment plant. The former is a centralised conventional treatment plant that was designed to treat domestic and industrial waste only, and has a capacity of 14,000 m³ per day and expansion works are currently underway to increase the capacity of wastewater treatment. The Lubigi sewerage treatment plant uses the pond treatment method and has a sewerage treatment capacity of 5000 m³ per day. Plans are also underway to expand its capacity to 12,000 m³ per day and faecal sludge treatment capacity of 400 m³ per day. This sludge represents only 44 % safe management of full pits (KCCA, 2014). However, it is estimated that only half of daily faecal sludge produced in Kampala city is currently emptied and safely disposed. Furthermore, Bugolobi is also receiving FS on a daily basis, even though it is not designed to treat it. (Rokob, 2017). Records from NEMA at the Lubigi treatment plant in 2017 showed that the Lubigi treatment plant received an average of 600 m³ per day of FS showing that it is already overloaded.

Sludge dumping fees at Bugolobi treatment plant are fixed and only depend on truck sizes and not sludge volumes delivered; this pricing mechanism incentivises cesspool owners to deliver full trucks. At Bugolobi treatment plant, the pricing mechanism is categorised according to truck size in the following clusters:

- 3 m³: US\$ 2.50
- 3–6 m³: US\$ 3
- 6 m³: US\$ 5

At the Lubigi Treatment Plant, sludge stabilised in settling thickening tanks is pumped into drying beds to dry where it is removed after caking and then stored in tanks to undergo hygienisation for 6 months. The hygienised sludge is then carbonized and moulded into briquettes and palettes for use as an energy source. To ensure safety of the consumer, plant scientists test treated sludge for safety conformity before selling it to the farmers (Orwiny, 2018).

In an effort to increase the treatment of sludge produced by cities, NWSC seeks to improve and expand sewerage services and pro-poor OSS projects. In this regard, three micro faecal sludge treatment plants and disposal points are planned by NWSC in addition to the two existing treatment plants. (National Water and Sewerage Cooperation, 2017).

KCCA is also currently working towards capacity development and business development skills in the FSM sector. The Authority has in the recent past received support and high level training from co-operating partners to strengthen its supportive and regulatory role as well as assisting in developing the framework for the private sector and development of small-scale service providers on manual and semi-automatic tools. Under this capacity building and business development programme, KCCA recruited sanitation SMEs and helped them formalise and develop their businesses by providing training, registration licensing and procurement of equipment. The authority also has plans to on board both manual and vacuum truck operators into the new business space.

KCCA takes pride in educating the private service providers in different issues that arise from rendering sanitation services. Periodic workshops are held to disseminate information and transfer knowledge to the numerous vacuum truck owners and gulping teams. These workshops not only build the capacity of service providers, but also help KCCA keep track of service providers in the sector. They encourage the creation of representative groups in their working circles who are in charge of sorting out issues that may arise (Lukooya, 2018).

2.3. Dar Es Salaam

Capital of Tanzania / Population: **5,47 Mio**
Size: **1.590 km²** /

In Tanzania, 57 % of the population uses improved drinking water sources and only 30 % uses improved sanitary facilities.



Source: Human Development Reports hdr.undp.org/en/countries/profiles/TZA

2.3.1. Demographics

Dar Es Salaam is Tanzania's largest and most industrialised and commercial centre with an estimated population of approximately 4.3 million (in 2012), residing in around 1,100,00 households representing approximately 10 % of the country's total population. The city had a recorded population growth of 5.6 % between 2002 to 2012 making it the third fastest growing city in Africa and among the ten fastest growing cities of the world (National Bureau of Statistics, 2014). The city has an area of approximately 1,350 km² and occupies about 0.19 % of the country's area (Kysessi & Sakijenge, 2013). About 80 % of the city's residents live in unplanned settlements covering about 30 % of the total city (Kysessi & Sakijenge, 2013). The population is expected to double by 2030, which will increase the demand of sustainable urban infrastructure (National Bureau of Statistics, 2014) (Ministry of Water, 2018).

2.3.2. Sanitation Coverage

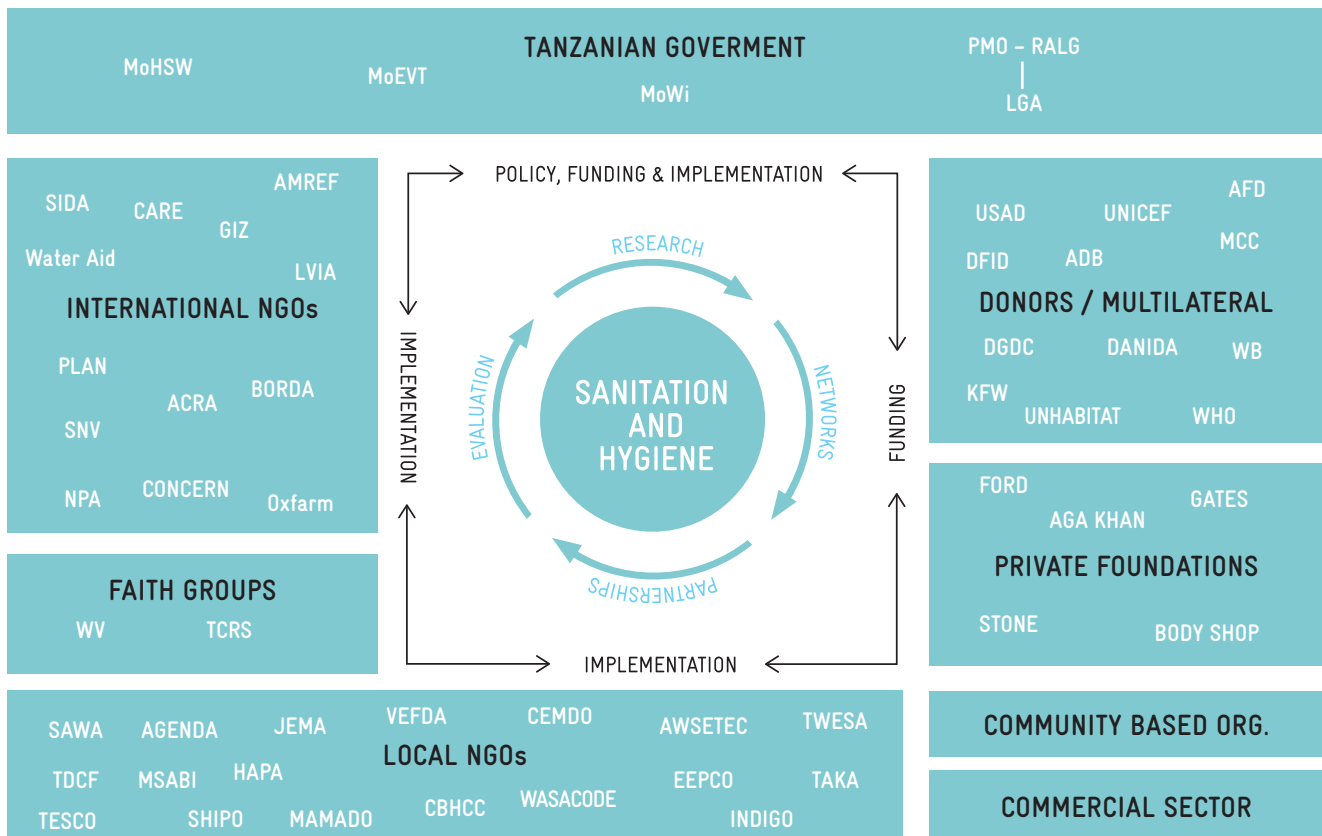
The concentration of informal settlements in Dar Es Salaam presents challenges for municipal service providers – especially in relation to wastewater and faecal sludge. The challenges are mostly attributed to the high concentration of households with inadequate access roads. These challenges are enormous especially in the rainy season when a high rate of flooding results in impassable roads (Ministry of Water, 2018).

It is estimated that only about five to seven percent of Dar Es Salaam city's wastewater and faecal sludge is safely managed. The Dar Es Salaam Water and Sanitation Authority (DAWASA) only covers about ten percent of the city with sewerage networks leaving the remaining 90 percent of the population depending on OSS (Brandes, et al., 2015). Households are solely responsible for providing their own OSS of choice (Sakijenge, et al., 2014). Approximately one percent of Dar Es Salaam's population have no access to sewerage or OSS facilities hence practice open defaecation (Brandes, et al., 2015). Figure 11 shows the population and sanitation distribution of Dar Es Salaam.



Figure 11: Sanitation map and network of Dar Es Salaam

Figure 12 shows stakeholders in sanitation and hygiene in Dar Es Salaam. OSS and FSM implementation in Dar Es Salaam in particular include the following stakeholders:



2.3.3. Key Stakeholders

There are several stakeholders responsible and involved in the implementation and support of water and sanitation laws and policies in Dar Es Salaam, ranging from government agencies to non-governmental organisations as well as the private sector. According to the laws of Tanzania, the government guides the sanitation and hygiene sector in Dar Es Salaam. There are numerous other stakeholders active in sanitation and hygiene in the city, such as international and local NGOs, faith-based organisations, co-operating partners such as multi-lateral donors and private foundations, community-based organisations and the commercial sector.

Figure 12 shows stakeholders in sanitation and hygiene in Dar Es Salaam. OSS and FSM implementation in Dar Es Salaam in particular include the following stakeholders:

DAWASA: DAWASA was established in 2001 and was assigned with the responsibility of water supply and sewerage (WSS) services in Dar Es Salaam and some parts of the Pwani Region including Bagamoyo and Kibaha townships (DAWASA Act, 2001). However, the establishment of DAWASA has had little impacts on areas under DAWASA jurisdiction as residents still have low access to

adequate sanitation services. For example, only an average of about 4% of revenues were expended between 2012 and 2017 in the expansion and maintenance of sewerage networks (National Audit Office, 2018). These efforts have been insignificant in fulfilling the 10% population target served by sewerage network set by DAWASA in 2014 (EWURA, 2014). In 2017 only about 3% of Dar es Salaam’s population was connected to the sewerage network (EWURA, 2017).

According to the National Audit Office report of 2018, there are many factors that hinder the provision of adequate on-site and off-site sanitation services by DAWASA and some of them include; Inadequate budgeting for sewerage services, rapid population growth (5.8% per year), overloaded and dilapidated structures (infrastructure commissioned in 1979), an inadequate maintenance and rehabilitation of sewer network as well as a weak coordination with LGAs (Andreasen, 2017),(National Audit Office, 2018).

Energy and Water Utilities Regulatory Authority (EWURA) (2001): The authority regulates all Water Supply and Sanitation Authorities (WSSA) in Tanzania, amongst them also DAWASA. As such, it regulates DAWASA’s function in the provision of water and sanitation services (EWURA Act, 2001).

National Environment Management Council (NEMC): Established in 1983 under the National Environment Management Act No. 19 of 1983, the council oversees DAWASA's compliance to environmental standards (Malisa, 2007).

Local Government Authorities (LGAs): In Tanzania, Local Government Authorities (The Regional commissioner's office, Municipal councils, ward committees, etc.) have the overall responsibility for the provision of water, sanitation and solid waste management, and they have the power to establish and enforce by-law. In the case of Dar Es Salaam, LGAs the Dar Es Salaam Water and Sewerage Authority (DAWASA) is executing water and sanitation services, whereby the overall responsibility stays with the LGA.

The Private Sector: The private sector consists of countless individuals and companies that support OSS & FSM service along the service chain. Examples for private sector players are Vacuum Tanker Operators, Construction companies, Manual Emptiers, etc.

2.3.4. Legal Framework

Tanzania has different laws, regulatory frameworks, and development strategies that provide clear policy statements on sanitation. These acts and policies provide legal mandates and institutional framework to government agencies to aid and guide in the governance and provision of services for the people of Tanzania.

→ **The Water Supply and Sanitation Act No 5 (2019):** aims to ensure every Tanzanian has access to efficient, effective and sustainable water supply and sanitation services. It provides a legal framework, including financial aspects (tariffs, contributions, donations, public budget, etc.) (section 24), which encourages the public and private sector to participate in the development, operation, management and in general in the execution of functions related to the provision of water supply and sanitation services (section 4). Section 8 of the Act delineates the functions of the Local Government Authorities (District and Urban) among which are the creation of by-laws to “provide efficient and sustainable water supply and sanitation services in their areas of jurisdiction by water authorities and community organisations”. Similarly, the water supply and sanitation authorities are mandated to provide water supply and sanitation services (section 13) through the development, acquisition, construction and operation of waterworks and sanitation works (on-site and off-site) unless a community based organisation provides the service in a specific area or a person provides services for their

own use. Additionally, the Water Supply and Sanitation Authorities, *inter alia*, are mandated with the responsibility of educating final users on public health aspects related to water supply and sanitation issues (sections 20 and 21). The act also reiterates the functions of the Energy Water Utilities Regulatory Authority (EWURA) as the regulator of water authorities' performance (section 29).

The Water Supply and Sanitation Act of 2019 defines the creation of the Rural Water Supply and Sanitation Authority (RUWASA). Among RUWASA's functions and responsibilities (section 43) are the monitoring and regulation of community based organisations and the development and sustainable management of rural water supply and sanitation projects. Similar to the Water and Sanitation Authorities, the act provides RUWASA's source of funds (sections 50 and 51). Additionally, the act establishes the creation of a National Water Fund to facilitate the mobilization of resources and investment support for water service provision only (section 55).

→ **The Local Government Act, 1982:** Mandates Urban Authorities, *inter alia*, to keep, repair and maintain in good conditions all public onsite sanitation systems such as public latrines, urinals, cesspits as well as containers used for solid waste collection. Additionally, urban authorities have the duty to remove faeces and undertake all necessary activities to protect preserve natural resources and prevent any public nuisance that could threaten public safety and health (section 55). The act provides the power of urban authorities to make by-laws within their areas of jurisdiction to put into effect the functions described in the act. The *Sheria Ndogo za (Hifadhi ya Mazingira) za Halmashauri ya Manispaa ya Singida, 2011 [GN 331/2011]* defines that it is illegal to dump or discharge any human excreta in water bodies or any unauthorized place.

→ **The Environmental Management Act, 2004:** Defines the main roles of the National Environment Management Council (NEMC). The Act prohibits all projects with significant negative effect on the environment and is enforced by environmental impact assessments (The Environmental Management Act, 2004).

→ **The Public Health Act, 2009:** Emphasises issues that are of public concern, including sanitation and hygiene. The Act prohibits discharge of wastewater without following national standards and laws. The Act emphasises

that all public buildings are to be equipped with sufficient sanitation facilities (The Public Health Act, 2009).

→ **Energy and Water Utilities Regulatory Authority (EWURA) Act, 2001:** Regulates the provision of water supply and sanitation services by a water authority or other persons. This includes the establishment of standards related to equipment and tariffs chargeable for the provision of water supply and sanitation services (EWURA Act, 2001)

→ **The Water Resources Management Act (WRMA) 11/2009:** Provides the institutional and legal framework for the sustainable management and development of water resources. It specifically outlines the principles for water resources management, and the prevention and control of water pollution. The Act prohibits discharge of waste into any waterbody including ground water without a written permit. In this regard, the legislation provides guidelines and standards for the construction and maintenance of water resource structures, and the issuance and operation of water permits and registration of boreholes (The Water Resources Management Act, 2009).

→ **The Urban Planning Act 8 2007:** Provides for the orderly and sustainable development of land in urban areas, to preserve and improve amenities, to provide for the grant of consent to develop land and powers of control over the use of land, and to provide for other related matters. This includes improving the provision of infrastructure and social services for the development of sustainable human settlements (The Urban Planning Act, 2007).

To enhance governance and provision of water supply and sanitation services, the government has additionally developed various sectoral policies in the past 20 years and some of the policies developed include:

→ **The National Water Policy (NAWAPO) 2002:** Recognises that lack of safe water, poor hygiene and inadequate sanitation are major causes of sicknesses and deaths in Tanzania and therefore, highlights the need to integrate water supply, sanitation and hygiene. Revision of the NAWAPO started in 2019 and the new policy is expected to be finalized by 2020.

→ **The National Health Policy 2007:** Aims at reducing the burden of disease and infant mortality, and increasing life expectancy through, among other things, facilitating environmental health and sanitation. The policy also aims to promote awareness among government employees and the community at large that health problems can only be adequately solved through multi-sectoral cooperation. The Ministry of Health will continue to collaborate with other stakeholders with the aim of achieving better environmental health and sanitation and will enforce the safe management of solid and liquid waste at each facility.

→ **The National Environmental Policy 1997:** Targeted towards protecting water sources and preventing environmental pollution. One proposed way to achieve this is to promote technologies for wastewater treatment and recycling.

→ **The Community Development Policy 1996:** The policy enables Tanzanian communities to build a better life through self-reliance and the use of locally available resources (this is also a fundamental principle of decentralised wastewater management). One of the policy's objectives is to help to respond to and meet the basic needs of communities, such as:

- Food and nutrition
- Health and sanitation
- Water and environmental sanitation
- Appropriate technology for domestic energy use (Ministry of Water and Irrigation, 2008)

These policies and Acts provide legal mandates and institutional framework to agencies such as the Energy and Water Utilities Regulatory Authority (EWURA), the National Environmental Management Council (NEMC), the Tanzanian Bureau of Standards (TBS), the Regional Commissioners Office (RCO), and Local Government Authorities (LGAs), and last but not least to the Water Supply and Sanitation Authorities, as stipulated in the respective laws and guidelines for sustainable management of the environment. To promote safety and health of OSS users, service providers as well as guide enforcers and regulators, Government with support from cooperating partners and NGO's in 2018 developed a "Guideline for the Application of Small-Scale, Decentralized Wastewater Treatment Systems" and is also developing "OSS and FSM Guidelines".

ADMINISTRATIVE LEVEL

CENTRAL GOVERNMENT

NATIONAL

PO-RALG

REGIONAL

Regional Administrative Secretary (RAS)

Regional Commissioner (RC)

DISTRICT/TOWN/MUNICIPAL

District Administrative Secretary (DAS)

District Commissioner (DC)

DIVISION

Division Secretary (DS)

Division officer (DO)

WARD

SUB-WARD/VILLAGE

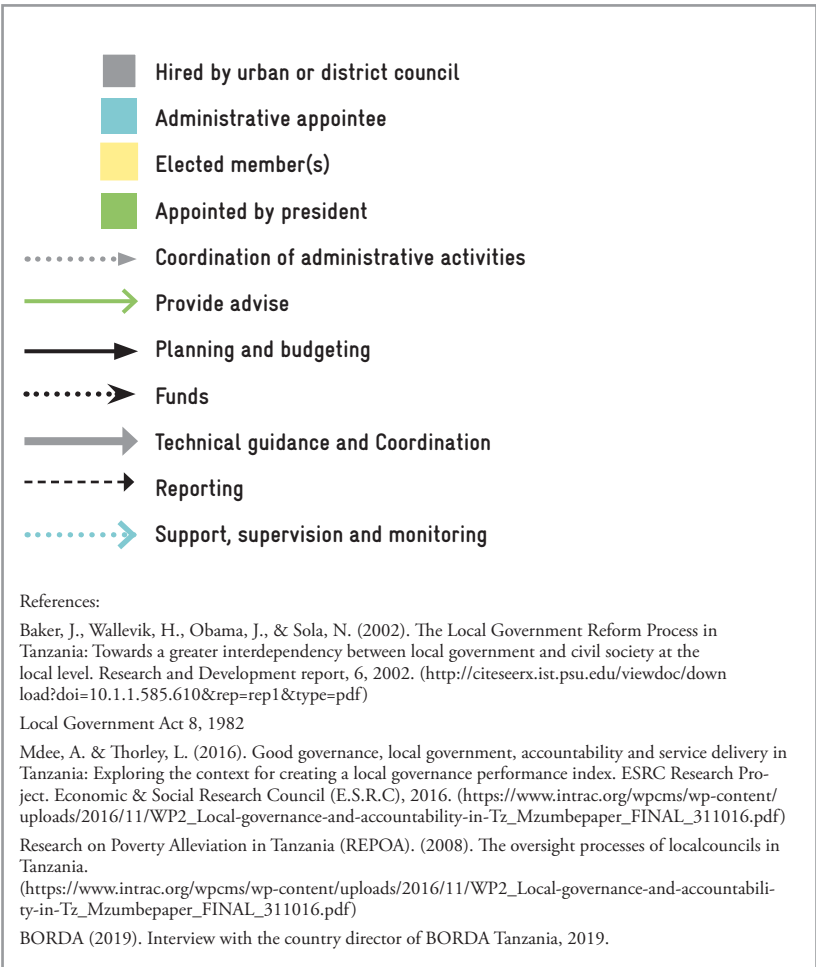
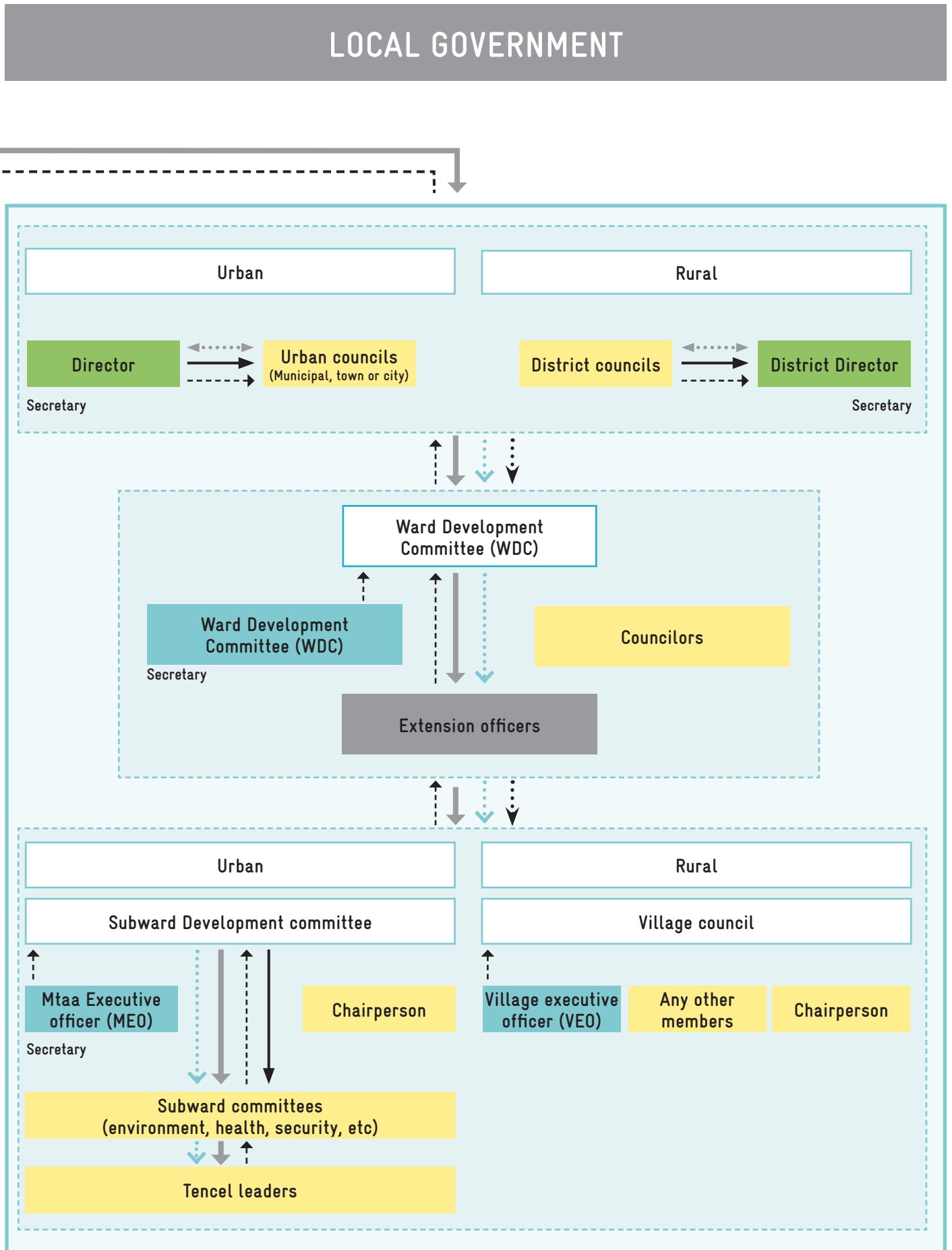


Figure 13: Local Government structure of Tanzania



At a local level, the administration of sanitation and hygiene is the responsibility of the local government structures. The political structure of local governance is as outlined in figure 13 and the responsibilities of the respective office policies are:

The President's Office: The president's office governs regional and local government administration on which administration of LGAs falls under its mandate. Among the functions of the regional administration and local government is the co-ordination of urban services such as transport, water and sanitation.

Once a settlement has been declared as an urban township/town in a region, a Supply and Sanitation Authority (WSSA) is established by the Minister responsible for water in consultation with the Minister responsible for LGAs (The Water Supply and Sanitation Act, 2009). However, the establishment of a utility in any given area does not relieve the LGAs of their duties under the Public Health Act, 2009 and Environmental Management Act, 2004. The power to monitor the performance of LGAs lies with the Minister responsible for local government. Politically, LGAs are accountable to the people through their councillors (CLGF, 2018).

The Vice President's Office: The office of the Vice President is vested with matters on environmental protection and enforcement. With this responsibility, it is under this office that the environmental management council falls. Other sanitation and hygiene offices which fall under this office are:

- **The Ministry of Water:** Responsible for matters on water quality and pollution control, water sources protection, sewage and drainage development. Through the development of different legal instruments, "sewage and drainage" have been extended to general "sanitation services".
- **The Ministry of Health, Community Development, Gender, Elderly and Children:** It leads sanitation service delivery (including hygiene education) (but the lead agency in the actual implementation remains to be PO-RALG).

Despite the existence of laws and institutions in the sanitation and hygiene sector in Dar Es Salaam, AMCOW reported that policy and legal frameworks

were being redressed after acknowledging their weaknesses (AMCOW, 2011). Variations in the interpretation of laws, strategies, guidelines, and regulations also make enforcement challenging to the extent that laws, regulations, and strategies are simply not enforced in many cases.

2.3.5. OSS and FSM Service Delivery along the Service Chain

2.3.5.1. Capture and Storage

Where the household is solely responsible in choosing its OSS system, the most predominant OSS facility used in Dar Es Salaam are pit latrines (58.3–75%) (mainly including Improved Pit Latrines, Ventilated Improved Pit Latrines). Facilities in use in the city and in their approximate proportion include septic tanks (15–41%), connected to DAWASA's sewer network (approximately 10%) and approximately 1–2% practice open defecation (DAWASA, 2017) (Brandes, et al., 2015). The sewer network mostly covers the Central Business District and one small section outside of the city centre, whilst septic tanks are used by the high-come down to the middle class only. This leaves the poor in application of semi-lined pit latrines with average pit depths of 3–4.5m whereby in areas of high ground water tables, some pit latrines are constructed above ground level (DAWASA, 2017). Limited capacities in many areas of sanitation (human resource, finance, private sector involvement) including inadequacy in OSS standards and guidelines for poorer parts of the population especially those with poor water access have led households implement their "capture and storage" facilities according to the household budget and existing community construction knowledge and skills.

2.3.5.2. Emptying and Transport

The most popular emptying technology utilised in Dar Es Salaam is the vacuum truck, which is also the least expensive to operate. The service costs are the responsibility of each household, which are approximately US\$ 30 for 4m³.

In Kigamboni District, a private FSM service provider manages UMAWA, a company which provides faecal sludge services from emptying to treatment. The service providers charge between US\$ 15–\$25 for 200 L and between US\$ 40–\$50 for 1,000 L of emptied sludge depending on the distance of the household from the treatment facility.

Figure 14: Barrel transport system of Kingamboni



The service provider uses various tools for emptying such as modified garden tools and the gulper for manual emptying and the sludge-go for machine powered emptying. The sludge is put in barrels when using the gulper for emptying and the barrels transported in a tractor pulled cart. For sludge-go emptied sludge, the sludge is transported in a 1m³ tank. The type of tools to be used on a facility depends on the type of OSS facility and the sludge characteristics. Figure 14 and 15 shows the gulper and barrel system and the sludge-go with a 1 m³ tank respectively. An eVac (vacuum emptying tool developed by Partners In Development (PID) in South Africa) has also been acquired with support from co-operating partners to allow service providers to de-sludge faecal matter, while rejecting solid waste in tight spaces where the sludge-go cannot fit. The main challenge of the available eVAC version is its dependency on electricity and the uncontentional availability of electricity. The eVac was also tested in a rapid assessment in Zambia supported by GIZ's CFS – Lusaka Project, and based on recommendations from the Zambia experience, some modifications were made to make emptying of pits using the technology easier and cleaner.

With the current tools at hand, the service provider is able to service approximately four to five households per day, with one pit taking approximately one hour to empty depending on the emptying technology, type of OSS system, and pit content.

DAWASA processes all licences for faecal sludge collection and the business is shared between public works, private entrepreneurs and NGOs. Since 2019 DAWASA has an own department for off-grid sanitation under the communication unit dedicated to FSM education and public awareness. Examples of existing FSM business models within Dar Es Salaam include:

- Private full service chain service providers: Emptying, transport, treatment and reuse/disposal
- Private Vacuum Trucks: Emptying, transport, discharge (not always safe discharge)
- Manual pit emptiers: Illegal manual pit-emptying and illegal disposal services (e.g. dumping into nearby river or burying)

- Construction and upgrading of the user interface (toilet), the containment and simplified wastewater treatment systems (Improved pits, septic tanks, and basic onsite treatment systems for wastewater (e.g. Wastewater Solutions (OSWAMS)))

2.3.5.3. Treatment and Reuse/Disposal

DAWASA treats collected sewage from the connected households in its six oxidation ponds, two of which are also used for the treatment of faecal sludge brought by vacuum trucks from various parts of the city. Household collected sludge is also treated in decentralised sludge treatment plants installed by various private sanitation service providers. An average of 250–300 trucks dispose faecal sludge in ponds daily and DAWASA charges approximately US\$ 26 per truck load no matter the capacity. The co-treated sludge from stabilisation ponds and its wastewater is disposed of in drains and ends up in the ocean. The disposing of faecal sludge into the four other ponds within the city has been suspended due to their proximity to residential settlements.

Three Decentralised Wastewater Treatment Systems (DEWATS) plants are also in operation within the city treating sludge from wards and divisions in their vicinities; the plants are located in Kinondoni, Ubungo and Temeke Municipalities. At the DEWATS plant, the sludge is stabilized and produces biogas which is transported to on-site heating appliances through a pipeline where it is used for heating and cooking needs with the use of burners. The stabilized sediment settles at the bottom of the biogas dome where it is periodically removed and dried in drying beds before being used as soil conditioners. The separated liquid moves on for further treatment in Anaerobic Baffled Reactors (ABR) and Anaerobic Filters (AF) for treatment of dissolved solids and the planted gravel filter for oxidation of the treated water before safe disposal into the environment or reuse.

Figure 15: Sludge-Go emptying technology



DAWASA seeks to increase sanitation coverage by strengthening coordination among stakeholders, adopt and expand alternative efficient technologies. DAWASA hopes to increase sewerage network coverage to 30 % by 2025. The organisation hopes to achieve this by: constructing three conventional sewerage treatment facilities, construction of 50 decentralised FSTP units and 25 faecal sludge transfer stations as well as condominium sewerage networks. However, in the short term, DAWASA will start by constructing 10 FSTPs with support from co-operating partners across Dar Es Salaam to achieve its target in sanitation service

provision. In addition, the utility will specifically focus on scaling up the production of FSM by-products and the development of viable business models for emptying as well as sanitation provision by-products and will be investing in conventional vacuum trucks, as they see the potential of generating income, and they aim for providing affordable services.



3. Lessons Learnt

3.1. Comparison of Sanitation Status

Lusaka, Dar Es Salaam and Kampala are three cities with different cultural, socio-economic and historical contexts and different technological and social requirements regarding OSS and FSM services. However, KEx participants identified common challenges along the sanitation service chain in all three cities. Collectively, the reported key challenges in emptying, transport, and treatment and disposal processes by service providers in all the cities include:

- High solid waste content in most pits leading to failure of sludge suction methods. There is always need of electric power for vacuuming methods but some households in low income communities are not electrified or have intermitted power supply, thereby limiting emptying to manual methods.
- Lack of behavioural change by some communities in the management of faecal sludge.
- Limited access to some toilets due to their confinement in dense neighbourhoods.
- Lack of an emptying market in the rainy season due to the draining of sludge into rain waters from households and inadequate treatment facilities in the cities.
- Lack of/ poor planning of settlements, resulting in poor road networks making most households in peri-urban areas inaccessible for services.
- Poor communication strategy among sector stakeholders leading to duplication of initiatives.

To mitigate limitations and enhance sanitation service provision, implementers have stressed the need for action plans to engage in awareness creation, encourage private sector engagement, provide capacity development programmes, ensure cost-reflective tariff creation, and involve political leaders and policy makers to enhance an enabling environment in finance and service provision.

To implement and professionalise FSM services in the three cities, community engagement has been highlighted as an essential component. A successful, sustainable FSM system is one whose citizens have ownership over the

process and are willing to pay for sludge collection and processing. To ensure buy-in and sustainability in FSM projects, some of the successfully identified steps and interventions by KEx participants include:

- **Mapping:** Sanitation and water source mapping together with other complementary facilities was identified as one of the first most important activities in the planning and execution of FSM service provision. The mapping exercise should cover sanitation facilities to collect toilet specific attributes, water points, solid waste garbage dumps, public and commercial places in service areas. Mapping of facilities and service provides reliable baseline data for both planners and service providers. The data could be used by municipalities in many ways including providing various services to residents in an efficient way and better management and collection of various property levies. Private Service delivery companies especially those which apply mobile apps could also benefit from the data in their service and goods delivery hence municipalities could make money out of it. Standardised property addressing systems which is currently non-existent in most peri-urban areas could be enhanced through mapping processes of the cities.
- **Measurement of Knowledge Attitudes and Practices (KAPs):** Local KAPs need to be understood before implementing or upscaling FSM. There must be studies and formative research on the local KAPs concerning FSM and sanitation. Identifying and addressing KAPs is necessary for the Municipality and implementer to successfully run FSM systems and ensure that the community is on-board.

Existing KAPs in Dar Es Salaam include but are not limited to “illegal status of emptiers”, leading to inexpensive services at the cost of risk to human and environmental health, as well as business competition with legal emptiers and the “illegal connection” from toilets to drainages and rivers, which is especially dangerous during the rainy season. Reasons for failing to empty OSS points also need to be understood. Identifying these factors is crucial when designing any community awareness campaign or program.

A study on 10,003 respondents in peri-urban and unplanned settlements in Lusaka aimed at

establishing the common KAPs with regards to sanitation and hygiene revealed that; The understanding of sanitation and hygiene as well as ways of contracting and preventing diarrhoea diseases is not impacted by the household's level of education. This meant that sensitization and iconic educational messages used by the ministry of health and their co-operating partners in water and sanitation are penetrative into communities. However, practices were observed not to be consistent with the knowledge. Majority of residents only attribute sanitation and hygiene to hygiene and cleanliness and except a small proportion include environmental health. Knowledge on service provision by formal pit emptiers is limited to vacuum tankers and little on water trusts due to residents not knowing about sanitation service provision by water trusts. Solid waste is mostly buried, burned or is collected by private companies franchised in zones of the city though some residents still do not pay for the service. Therefore, the municipality need to develop sustainable waste management strategies to deal with consistent waste collection. Marketing of on-site services should therefore be done as a matter of urgency (GIZ-Climate Friendly sanitation in Peri-Urban Areas of Lusaka, 2018).

To improve the knowledge and attitudes of the population on sanitation and hygiene, awareness campaigns need to be extended and done in local or community familiar languages so that the intended message can be transmitted. Handwashing promotions should not only be done during crisis times but continuously especially utilising events and places where people meet such as clinics, churches, schools, community meetings, etc. and the promotion of practices need to go hand in hand with service provision to discourage relentness of the communities. Periodic knowledge, attitude and practices studies need to be done to ascertain adoption of safe sanitation and hygiene practices by residents. Compliance by residents and business owners also need to be emphasized by intensifying public health inspections.

- **Project Introduction, Acceptance and formation of Committee:** In the first stage of FSM project implementation, implementers should introduce the project to the community by holding kick-off

meetings and carry out evidence-based study visits for community buy-in. This has been deemed necessary by the experience that there may be community rejection of the project or misconceptions among community members on project goals and/or expected outcomes. These meetings and study visits should seek to mitigate confusion and build trust and support among community members. After project acceptance, a project steering committee should be established which shall include all stakeholders from community members, implementers, policy makers and regulators. This will ensure an informed project acceptance, land acquisition, construction and operation. In Dar Es Salaam, BORDA is applying a BOT (build operate transfer) model where all responsibility over the constructed FSM sites will be handed over to the Municipality and DAWASA after construction and establishment of services. BORDA has organized and placed all new FSM projects under “steering committees” comprised of the Municipality, DAWASA, and BORDA. This has been deemed necessary by lessons learnt from Kigamboni and Mburahati were it took a year and a year and a half respectively to gain community support. In Lusaka, under the LSP sanitation marketing aspect, similar approaches are being implemented.

- **Land Acquisition, Political Cooperation, and Community Engagement:** Finding a site for FSM is challenging and should be considered from the beginning of project. Open and public space land acquisition for FSM implementation is often a challenge especially that land owners may not be open to the idea of using the site for FSM. In addition, there may be a lack of land compensation on available open spaces. There are often long procedures for changes of land acquisition and use as well as interference with other development tasks. Therefore, political will must be nurtured, and government administration at all levels should be considered in land acquisition. It is advisable that water utilities or municipalities reserve land for (future) projects well ahead of time. The community at all levels should also be engaged through various means for project awareness and support. Appropriate methods for community awareness depend on the environment.

→ **FSM and Business Operations:** Before designing FSM business models, OSS needs to be carefully reviewed. The profitability of emptying, transport and treatment and disposal business models all depend on the first stage - OSS. If the sanitation facility at household level does not comply with certain standards, the rest of the sanitation service chain is at stake, and no service can be offered. The issue of initial storage has to be considered, i.e. are there enough storage facilities to be emptied in the area? In other words, the whole picture (sanitation service chain) needs to be considered. Practitioners must ensure that there is enough household storage that produce enough waste for a business model to thrive in a particular area.

Start-up equipment in project costs must also be calculated and considered as part of the total project cost. Costs for equipment cannot fall on the entrepreneur or the business person newly venturing in the sector as it is nearly impossible to take out a loan for FSM services. The bank interests in all three KEx countries are so monumental that it makes the business less feasible. Therefore, cities should also consider subsidising the cost of FSM facilities through water tariff bundling. In order to design a tariff structure for customers, practitioners also need more information regarding the regulation of FSM facilities. They need proper record keeping for the regulator's use. They should also look at monitoring the by-products, especially water.

To further motivate new players, informing and motivating entrepreneurs with regard to successful business models such as UMAWA in Dar Es Salaam, which is reported to be lucrative, should be encouraged through facilitating tours and one-on-one talks. There may be more private sector involvement and interest if entrepreneurs could see and share successes and challenges. Emptiers and FSM operators will attract banks for finance if the banks see that service providers are motivated to make profit and believe in the sustainability of the service; the bank's involvement would further motivate entrepreneurs in the sector.

→ **Realize Full Potential of FSM:** In order to integrate finished FSM sites into the community, with full support from local authorities and government institutions, implementers should begin capacity

development concerning the roles of responsibilities on FSM, as well as advocating for the review of existing regulations, guidelines, laws, and by-laws. The enforcement of such laws and by-laws can be achieved through lobbying, advocacy, and strategic engagement. In addition, awareness creation through music, sports, games, and clear information about services is crucial and must be delivered by trusted community leaders or representatives. FSM marketing may also include messages, logos, and slogans, i.e. BORDA's slogan "choo rafiki, nyonya kistaarabu" meaning "The toilet is your friend, empty it [your pit] in a smart way". Finally, a workable business model will increase employment opportunities while securing the sustainability of the FSM facility.

3.2. Enabling Factors for OSS and FSM

As enabling factors, which support the service delivery along the OSS and FSM service chain, the following aspects were identified:

- **Private Sector Engagement:** Private sector engagement and involvement is key to sustainability of FSM services as the private sector can venture into areas where government and municipal resources could be limited. The success of FSM in Dar Es Salaam is due to private sector engagement and support. Therefore, business start-ups in FSM should be supported by both the government and cooperating partners.
- **Technology:** Appropriate technology options should be promoted to ease the process of desludging and treatment of sludge. Technological success is contextual to the environment e.g. the success of the gulper in Kampala cannot be translated to Lusaka where most pits are characterised with huge quantities of solid waste.
- **Institutional Arrangements:** Institutional setups strengthening coordination of activities for all the stakeholders is very important in FSM service delivery. Utility and city collaboration at policy, technical and operational levels is cardinal for service success.

- **Capacity Building:** The safety of OSS and FSM services by all stakeholders depends on the capacity in the sector. Therefore, service providers, legislators and enforcers need to be well informed by capacity building measures for service delivery.
- **Laws and Enforcement:** The safety of OSS and FSM services lies on the success of enforcement at all stages of the service chain. Therefore, enforcers should ensure service providers compliance to environmental, occupational health and safety laws.
- **Community Engagement:** Community engagement is key in the implementation of faecal sludge management services that culturally are difficult to accept. The community can advise on the best approaches for service success.
- **Research:** Research partnerships should be enhanced in cities to improve sludge treatment and handling. Both social and scientific researchers can inform on the success of FSM in many contexts. Therefore, collaboration between service providers and research institutions should be promoted in all the cities.
- **Product Acceptance and Market:** The acceptance and market of FSM products incentivises service cost and provision. Knowledge Exchange on FSM products and their uses should be encouraged including research and market development. High service charges in most cases are due to low service demand hence service providers making their profits on once off customers.

The identified enabling factors as shown in figure 16 are overlapping and interdependent and form together an enabling environment for OSS and FSM services.

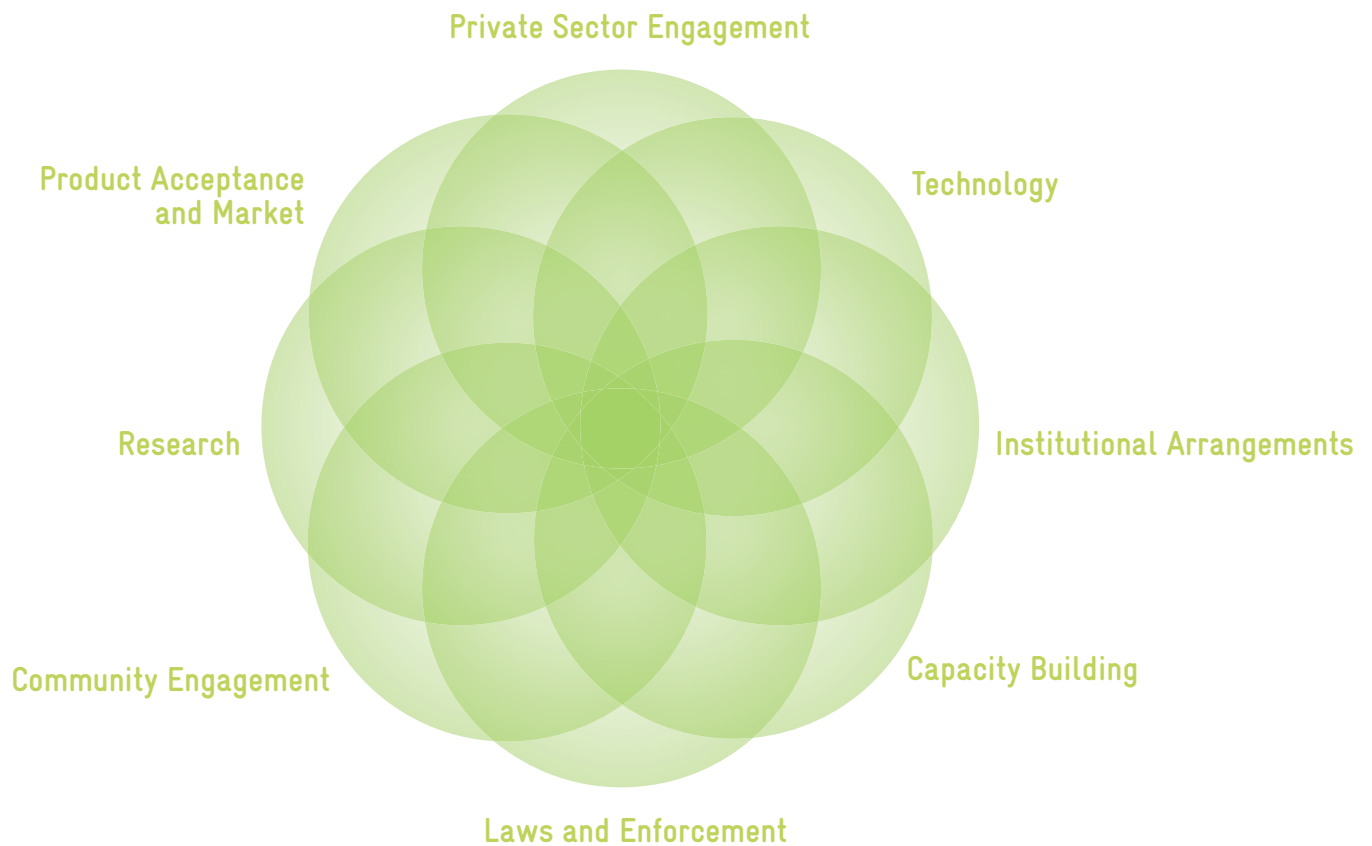


Figure 16: Enabling Environment

3.3. Opposing Factors for OSS and FSM

The participants of the Knowledge Exchange identified opposing factors for OSS and FSM, which categorise according to regulation and legislation as well as implementation.

3.3.1. Regulation and legislation

The opposing factors for OSS and FSM deriving from regulation and legislation are identified to be:

→ **Unclear Institutional Mandates and Jurisdiction:**

Laws, policies and regulatory frameworks have been noted to be sufficient in all the three cities. However, in some cases they seem incomprehensive or difficult to understand for mandated institutions to aid them in regulating services and increase in sanitation coverage. Therefore, there is need for implementers of the laws, strategies, policies, regulations, and Memoranda of Understanding (MoUs) to understand these mandates and jurisdictions and how they overlap with other mandated organisations for effective collaborated efforts. Practices of working without coordination and mutually agreed responsibilities, often compromises the quality of sanitation processes along the sanitation service chain as there can be negligence in observing the available relevant information on different sanitation solutions and corresponding sludge handling and disposal options.

→ **Inadequate Enforcement of Laws and Standards:**

The existence of laws and standards but inadequate enforcement defeats efforts in interventions of improving environmental health and safety as communities have tendencies of reverting to old practices. Therefore, enforcement on laws and standards must always be enhanced for public health and environmental protection. To enhance enforcement, one successful identified approach is working with community leaders and stakeholders in enforcement. This approach brings in advantages of self-regulation at the community level.

- **Insufficient Fund Allocation to the Sanitation Sector and Inadequate Funding of OSS and FSM:** Low access and acquisitions of loans to finance the private service sector as financial institutions are less likely to provide loans for those in the sanitation business; Lack of tariff regulation for FSM businesses.
- **Inadequate Political Will:** Politics play a critical role in the success of FSM services. Politicians influence service delivery, sometimes negatively, for them to achieve a political milestone, e.g. instruction of implementers to provide free services in some instances such as disease breakdown reverses successes made in the sector in forcing people to pay for services.
- **Lack of Advocacy to Build Communities Prioritisation of OSS and FSM Services: Lack of willingness to demand and pay for the service by households.** Communities do not demand the service, and therefore entrepreneurs may think that the sanitation business is not lucrative.
- **Lack of Advocacy and Behaviour Change Messages:** There is inadequate advocacy on behaviour change messages in some communities making it very difficult to improve service delivery in affected communities. Behavioural change and communication are identified as being cardinal for service delivery in all communities.

3.3.2. Implementation

Limitations identified to be affecting OSS and FSM implementers from the three cities include but are not limited to:

- **Insufficient Amount of FSM Treatment Facilities:**
The capacity of treatment plants in all the three cities is inadequate to treat the daily production of sludge. The treatment plants are very far off from some communities making safe sludge management difficult for these communities. Service provision in communities more than 15 kilometres away from the treatment plant is a challenge as service providers often seek to dispose the sludge into nearby open spaces or farms. To provide a conducive environment for sludge treatment, there need to be sludge treatment plant within convenient reachable distances for sludge transporters.
- **Inadequate financial capacity for some customers to pay faecal sludge services and lack of prioritisation of needs at the household level:** Some households genuinely do not have resources to pay for services and this creates a challenge for safe management of the sludge. Some households also do not prioritise sanitation and allocate resources to other needs thereby compromising community safety. Community awareness on sanitation and its importance need to be enhanced. Incentives and methods of providing services in specific cases need to be developed e.g. special sanitation tariff bundling with other common services. To spread the sanitation messages, awareness campaigns need to be followed with service provision.
- **Inadequate capacity and knowledge among many implementers:** capacity building programmes and initiatives need to be built up to bridge stakeholders, identification of knowledge and capacity gaps.
- **Inadequate private sector engagement in the sector:** Poor private sector involvement and engagement has made the sector lag in the advancement of emptying tools and treatment technologies. Inadequate treatment infrastructure makes it difficult for some communities to access services, as the service providers are not willing to travel long distances to offer services as it is uneconomical for them. Ownership of accessible treatment and/or transfer

stations by the private sector was viewed as the best approach to accord most communities service accessibility.

- **Inadequate experience on FSM business models:**
Lack of experience on the ground, challenges in the area of OSS and FSM business models and related service technologies as well as a lack of case studies on business models have been the key hampering factors in operationalising FSM service delivery. There is a need for a solid example to motivate service providers to scale-up.



3.4. Way forward

During the Lusaka KEx dissemination workshops, the Zambian participating institutions were given the opportunity to reflect on gained knowledge and translate the Tanzanian and Ugandan experiences to the Zambian context.

Each of the participating institutions (the local authority LCC, the commercial utility LWSC and the national regulators NWASCO and ZEMA) designed individual action plans to limit the influence of opposing factors and create an enabling environment for OSS and FSM in Lusaka. Depending on the mandate of the respective institution, aspects covered in the action plan include:

- Encouragement of private sector engagement along the service chain,
- Development of an operational framework that covers the CUs and private operators,
- Provision of awareness raising and capacity development programmes for the public and political leaders,
- Zoning of service providers according to administrative boundaries,
- Identification of missing regulation and development of applicable laws, guidelines and standards,
- Ensure quality maintenance of FSTPs in Lusaka will be provided,
- Ensure cost-reflective tariff creation,
- Involvement of political leaders and policy makers to enhance an enabling environment in finance and service provision,
- Incorporation of enforcement urgencies in managing good service provision,
- Enhance stakeholder coordination

For continued knowledge exchange and information sharing, workshop materials incl. presentations, documents, the documentation of lessons learned etc. shall be made available to workshop participants using an online platform within the African Chapter of SuSanA, which is currently under development. The platform is further aimed at fostering future exchange between the KEx participants to enhance the continuous sharing of knowledge gained and lessons learnt. During the facilitation of the FSM & OSS three cities KEx, the participants have expressed their interest in such a platform and their willingness to actively contribute towards it. This platform may further hold the potential for the future integration of webinars and/ or additional online based learning and exchanging opportunities.





4. Annex

4.1. Acknowledgements

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Checklist for the Organisation of Knowledge Exchange Workshops³

Design Phase

Task	PiC	Y	N	N/A	Comments
Stakeholder identification					
Relevant participating organisations/institutions/companies are identified					
Suitable representatives per organisations/institutions/companies are identified					
Total no. of participants per organisation is decided on					
Content development					
Objective(s) of the KEx is/are identified					
Desired outcomes, outputs and indicators are identified					
Identification of appropriate tools					
Appropriate content, ice breaker, feedback, etc. tools for KEx facilitation are identified (note: the UNICEF Knowledge Exchange Toolbox offers a comprehensive overview of methods)					
Detailed budget					
Detailed budget is developed and approved					

Implementation Phase

Task	PiC	Y	N	N/A	Comments
Travel & Transport					
Mode of travel is booked for participants and moderators/facilitators (e.g. airplane, train, bus, etc.)					
Transport to/from departure airport/train station/bus station is arranged for participants and moderators/facilitators					
Transport to/from arrival airport/train station/bus station to/from accommodation is arranged for participants and moderators/facilitators					
Transport to/from accommodation to/from workshop venue is arranged for participants and moderators/facilitators					
Transport for site visits is arranged					
Drivers are familiar with routes and are aware of alternative routes (e.g. in cases of road blocks) to the respective destinations					
Cash and required documentation (e.g. signature lists) for travel refunds is available					
Accommodation					
Suitable accommodation is booked for participants and moderators/facilitators, preferably not too far from venue					
Venue					
Suitable workshop venue is booked					
Venue requirements (e.g. space available, no./arrangement of chairs and tables, lighting, washroom facilities, provisions for heating/cooling according to weather conditions, etc.) are communicated to venue operator					
Suitable destinations for field visits are identified					
Arrangements for field visits are made (e.g. communication with site provider, knowledgeable presenters to explain the site are available and briefed)					

3 The checklist is based on the Three Cities OSS and FSM KEx organising team's experiences and observations. Therefore, the criteria listed might require adjustment on a case-by-case basis.

Catering					
Breakfast for participants and moderators/facilitators is arranged for (e.g. at accommodation)					
Tea Breaks (hot beverages, cold beverages, snacks) are catered for (either at the workshop venue or on-site during field visits)					
Lunch is catered for (either at the workshop venue or on-site during field visits)					
Dinner is catered for (e.g. at accommodation)					
Sufficient water is made available for participants during the workshop sessions					
Additional beverages (water, soft drinks) are available for field visits					
Plates, glasses, cups, serviettes, cutlery, tables for catering set-up, standing tables, tables cloths etc. are available (e.g. by caterer, by venue, etc.)					
Caterer is aware of catering times, exact locations and space (e.g. 5m ² in the hall) and equipment made available/to bring (e.g. tables for catering set-up, standing tables, table cloths, etc.)					
Dietary restrictions of participants and moderators/facilitators (e.g. due to religious beliefs, allergies, personal food preferences (e.g. vegetarian, vegan), etc.) are taken into consideration and catered for at all times					
Workshop facilitation					
Based on identified objective, outcomes, outputs and indicators a (tentative) agenda is developed					
Based on the (tentative) agenda a detailed moderation plan is developed					
Suitable internal or external moderator(s) / facilitator(s) are identified, engaged and briefed					
Suitable internal or external input giver(s) are identified, engaged and briefed					
Suitable internal or external minute taker(s) are identified, engaged and briefed					
Suitable internal or external time keeper(s) are identified, engaged and briefed					
A suitable internal or external documentation team (e.g. photographer) is identified, engaged and briefed					
Workshop equipment					
Participant registration lists are available					
Name tags for participants and moderators/facilitators are available					
Projector(s) is/are available (consider arranging for a back-up projector in case of technical difficulties)					
Laptops(s) and respective charger(s) is/are available (consider arranging for a back-up laptop in case of technical difficulties)					
Power extension cable(s) is/are available					
Adapters for power supply are available (e.g. UK to SA, EU to UK, etc.)					
Adapters for different connection methods are available (VGA to HDMI, HDMI to VGA)					
Camera for documentation is available (full battery/exchange battery, sufficient space on memory card/exchange memory card)					
Phone(s) and respective charger(s) is/are available (consider arranging for a back-up laptop in case of technical difficulties)					
Pin boards and pins are available					
Flipchart holders and paper are available					
Presentation cards are available					

Pens and markers are available					
Sellotape, blue-tack, etc. is available					
Notebooks for participants to take notes are available					
Workshop handouts are available (digital or analogue)					
Workshop feedback sheets are available					
Workshop giveaways are available					
All technical equipment is tested at the venue before the beginning of the workshop					
Transport for equipment is arranged					
Safe storage location for equipment is arranged (e.g. at the venue)					
Field visit					
Suitable destinations for field visits are identified					
Approval from site operator/responsible organisation/institution/company to visit the site is obtained					
Knowledgeable presenters to explain the site are available and briefed					
Hand-outs are prepared					
Communication with participants and moderators/facilitators					
Participants and moderators/facilitators have received invitation letters and confirmed their attendance					
Participants and moderators/facilitators are aware of travel itineraries and requirements (e.g. valid passport, visas, required vaccinations, departure times and times to be at the point of departure (e.g. 2 hrs in advance for international flights))					
Participants and moderators/facilitators are aware of transportation arrangements (e.g. arranged travel to/from venue to/from accommodation) or are aware at what time they are expected to be present at the venue (directions to the venue are to be given)					
Participants and moderators/facilitators have received a (tentative) workshop agenda					
Participants and moderators/facilitators are aware of their expected/required inputs during the					
Participants and moderators/facilitators have submitted input presentations to organising team prior to workshop					
Participants and moderators/facilitators have submitted dietary restrictions to organising team prior to workshop					

Reflection Phase

Task	PiC	Y	N	N/A	Comments
Post-KEx reflection workshops					
Post KEx workshops are organised to reflection on lessons learnt and institutional knowledge preservation/dissemination (note: for the organisation of the post-KEx workshops, the aspects indicated under the implementation phase may be considered)					
Knowledge Management system					
Suitable Knowledge Management system is in place for participants to access knowledge, update information and continue exchanging (e.g. email list, online platform, linking participants with suitable advocacy and exchange groups)					
Documentation					
Develop comprehensive documentation (e.g. report, case study, etc.) to be shared with participants, participating organisations/institutions/companies and if applicable the sector and/or general public					

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