Lusaka Sanitation System (LSS)

A fit-for-purpose sanitation data tool

The Lusaka Sanitation System (LSS) is an integrated, web-based sanitation Monitoring & Evaluation Management Information System (M&E MIS) that enables Lusaka Water Supply and Sanitation Company (LWSC) and its key partners to manage service delivery and monitor access to safely managed sanitation services in Lusaka province. It achieves this through automated monitoring and reporting processes on safely managed sanitation targets and key performance indicators (KPIs). The LSS also contains the Geographic Information System (GIS) sanitation database for all sanitation facilities found in Lusaka province.

LSS is owned and managed by LWSC and is in the process of integrating with the external M&E MIS systems for the Ministry of Health (MoH) at district level and the Lusaka City Council (LCC) who are key players in sanitation service delivery and hygiene promotion. The integration and interoperability with other stakeholder systems provide a platform for key players in the sanitation sector to collaborate and share various pieces of data and information collected within their mandate to collectively track progress and improvements towards access to safely managed sanitation services and hygiene.

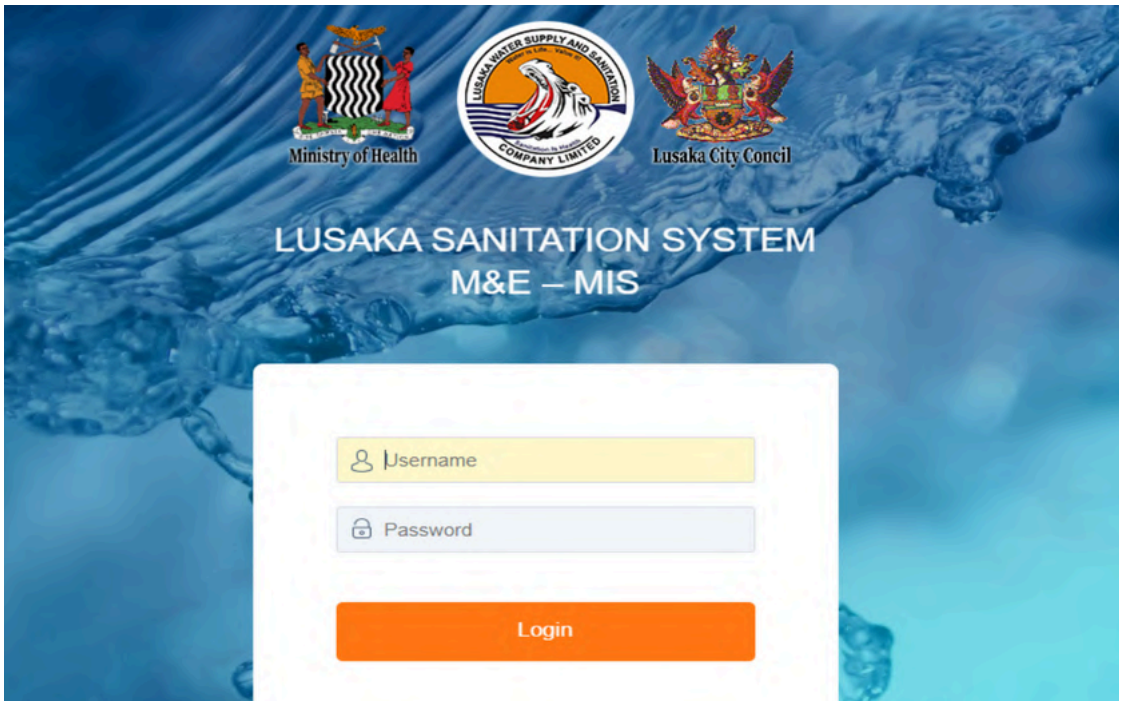


Figure 1: LSS Login Page

Dev-Afrique Development Advisors, a DevGlobal partner, is currently implementing a BMGF-funded project called Public Service Data Systems: Landscaping, Learning, and Technical Assistance. The project aims to strengthen WSH public data systems - focusing on non-sewered sanitation – for effective performance management at the municipal and utility levels in selected countries across Africa.

LSS was developed under the Lusaka Sanitation Program (LSP)—a multi-donor funded initiative aimed at increasing access to sanitation services in Lusaka and strengthening LWSC's capacity to manage those services. The program was implemented by LWSC with financial and technical assistance from World Bank, African Development Bank (AfDB), German Development Bank (KfW), Bill and Melinda Gates Foundation (BMGF), and European Investment Bank (EIB).

Key Objectives of LSS

The LSS is designed to facilitate integrated monitoring of sanitation improvements within Lusaka through:

- **Sanitation Service Delivery and Operations Monitoring:** This falls within the purview of LWSC who has the mandate to deliver sanitation services in Lusaka province. The LSS offers tools for the operational monitoring of sewered and onsite sanitation (OSS) services. For sewered sanitation services, it covers monitoring of clearance of sewer blockages and wastewater treatment plant efficiency. On OSS, LSS manages all processes across the sanitation service chain, from the construction of onsite containment facilities, to the emptying, transportation and treatment of sludge at designated sites. Various data points and information are collected at all these stages and inputted into the system by LWSC, as well as the private service providers engaged for delivery of emptying and transportation of septage and faecal sludge.

- **Public and Environmental Health Monitoring:** This falls within the mandate of LCC as per provisions of the Public Health Act that requires LCC to carry out sanitary inspections in the city. It includes regular inspections on the conditions of sanitation facilities in use in both public and domestic places, enforcement for construction of standard sanitation facilities, surface and groundwater sources quality surveillance, and monitoring to curtail illegal dumping of feacal sludge and septage into the environment. All these monitoring and enforcement activities are done through the LCC M&E MIS system called the SMART PHD which is integrated with the LSS.

- **Behavioral Monitoring:** LWSC's peri-urban department oversees the implementation of hygiene promotion activities. Their effectiveness in changing the population's behaviour is measured through community surveys. These results are used to update the indicators in the system.

- **Health Impact of Sanitation:** This falls within the mandate of MoH. It involves monitoring and evaluating the impact of poor sanitation or sanitation improvement interventions on the health status of the population in the communities. The MoH has an existing surveillance District Health Information System (DHIS) that is used to collect data on KPIs such as prevalence or occurrence of waterborne diseases at hospitals and clinics, which are linked to poor sanitation and hygiene practices, as well as water quality surveillance. Furthermore, MoH conducts health surveys every three to five years which collect data on access to water and sanitation services at household level in the communities. The KPIs for the DHIS are included in the LSS. The DHIS is in the process of integration to the LSS.

Thus, the LSS facilitates sanitation service delivery and operations monitoring, public and environmental health monitoring, hygiene/behavior change promotion, and health impact monitoring. Some of the data is cross-cutting and provided by all three institutions—LWSC, LCC, and MoH—while other data is specific to each institution. The LSS harmonizes this data within a centralized data management system and enables them to implement the City-wide Inclusive Sanitation approach. The system has a unified structure based on the scope of the M&E functionalities of LWSC, LCC, and MoH as per their respective sanitation mandates. Each institution has its own interface to collect and analyse data related to their specific indicators, accessed through unique login credentials.

Lusaka Water Supply and Sanitation Company (LWSC) is a commercial water utility that provides quality water and sanitation services at commercially and environmentally sustainable levels to Lusaka Province. Visit the website to learn more: https://lwsc.com.zm/

The LSS sanitation data pathway, from generation to analysis and operationalization, follows this process:

1. Data Generation

The LSS has three main modules for OSS data entry: (i) the OSS Receipting Module, (ii) the Faecal Sludge Management (FSM) Module, and (iii) the M&E Module. These modules work together to efficiently manage and track various stages in the service delivery process—from household registration and toilet construction verification to payment processing, faecal sludge emptying services, treatment, and customer satisfaction. The OSS Receipting and FSM Modules sit in the OSS Portfolio, while the M&E Module sits in the LSS Portfolio.

A. OSS Receipting Module

This module displays the main operations for implementing OSS facilities. It contains customer information and OSS toilet data, which are entered either through baseline mapping or data entry at construction phase. To construct a toilet, customers submit requests to LWSC's customer service, specifying their desired toilet type. LWSC then conducts an assessment, after which a receipt is generated in the LSS for the customer to pay for this service. This module also produces auto-generated toilet numbers for each constructed toilet.

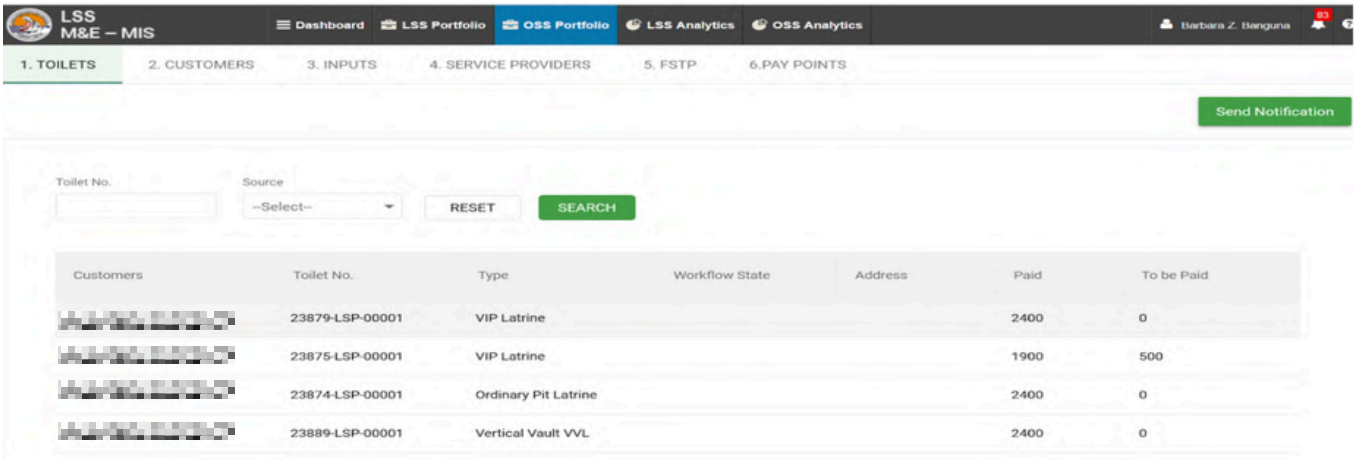


Figure 2: Customer toilet information with amounts

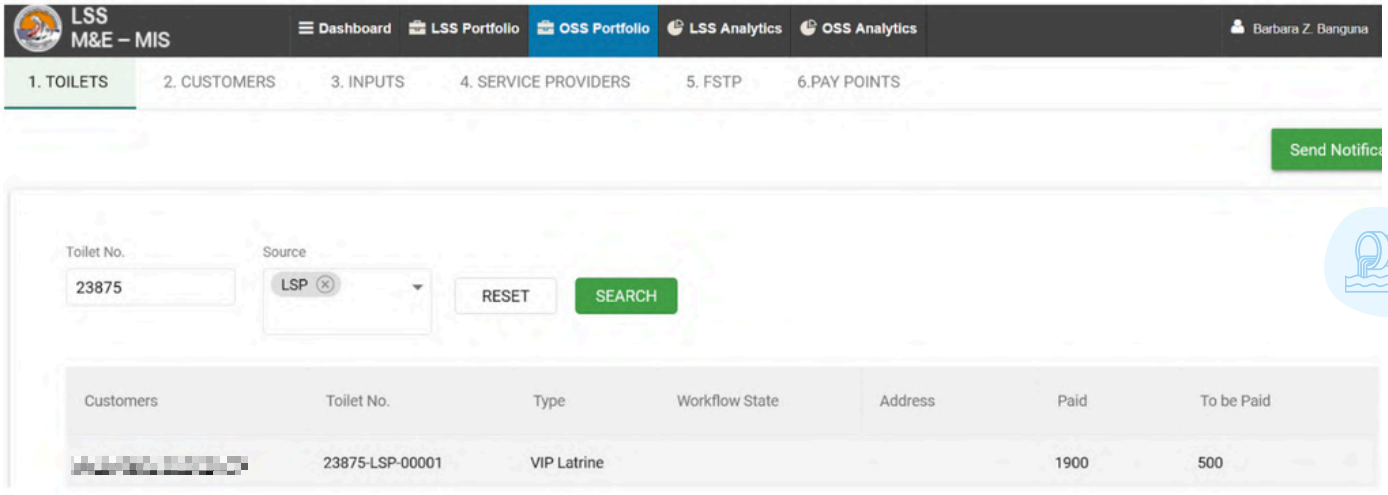


Figure 3: Customer search using toilet number

B.The FSM Module

This module is dedicated to the emptying service providers engaged by LWSC to provide safely managed sanitation services and captures their data. They are required to input all relevant data into the LSS via a mobile app on their phones or tablets before they can dispose of their waste at the utility's treatment plant. After providing the service and inputting all necessary data in the job card, the toilet number is then generated by the service provider and written on the Faecal Sludge Treatment Plant (FSTP) Form given to the Plant Operator at the FSTP.

The Plant Operator uses the toilet number to verify the volumes entered in the job card and FSTP Form (in the LSS) against the volumes physically delivered to the treatment plant, before allowing the service provider to desludge. Upon verification, an FSTP number is created, completing the data loop. Based on the volume of sludge to be dumped, an invoice is generated, and a receipt is issued upon payment. This is the utility's mechanism for ensuring that they obtain accurate OSS data from the service providers.

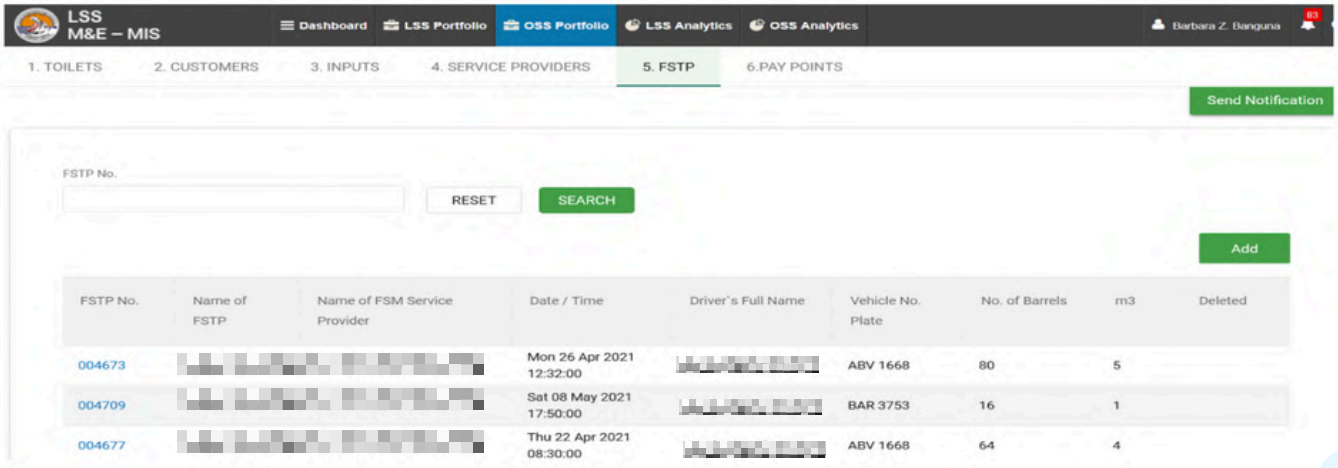


Figure 4: FSTP Form for Plant Operator

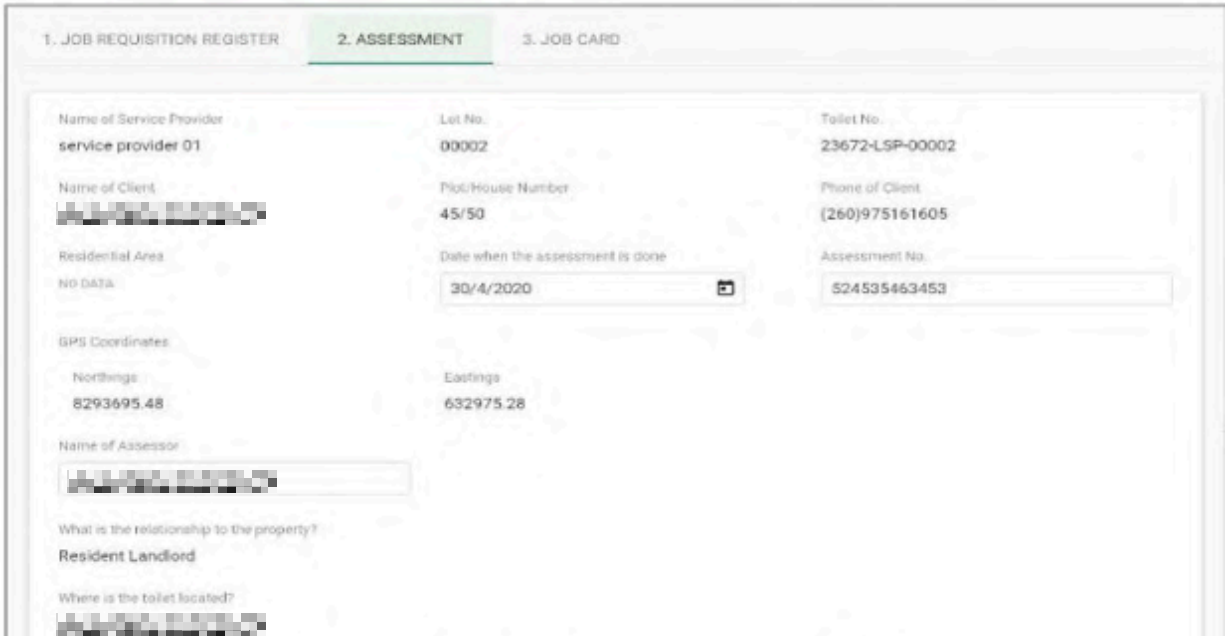


Figure 5: Assessment Form Section

C. M&E Module

This is the module that enables accomplishment of the main function of the LSS as a tool for monitoring and evaluating sanitation and hygiene related interventions in Lusaka. It contains all relevant KPIs for the three institutions, including those used by LWSC to report to the regulator, National Water Supply and Sanitation Council (NWASCO). As a result, if NWASCO requires any information, they can easily obtain it from the system. The MoH and LCC also have their KPIs in this module, within their respective interfaces, and contribute data related to the indicators.

Data collectors from all three institutions collect data during their operational activities using project tablets, and this data is uploaded directly into the LSS. This module has a two-step mechanism to verify and approve data that is entered into the LSS before reports can be generated for decision-making.

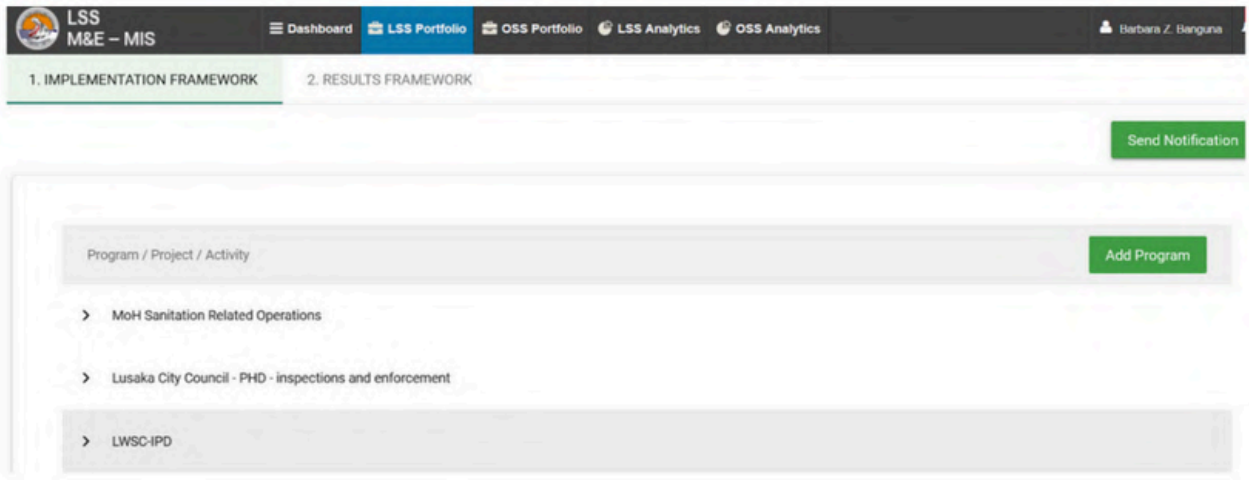


Figure 6: M&E Module showing the Implementation Framework with three programs—MoH, LCC, and LWSC

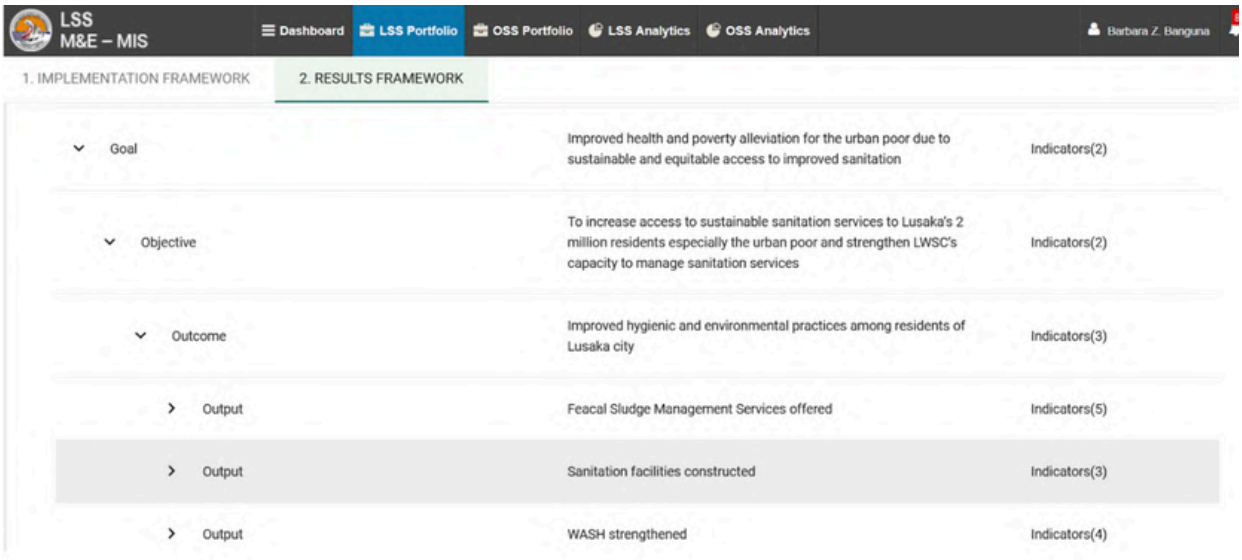


Figure 7: M&E Module showing the Results Framework

2.Data Analysis and Visualization

The LSS includes two additional modules for data analysis and report generation: the LSS Analytics Module for data contained within the LSS Portfolio and the OSS Analytics Module for data contained within the OSS Portfolio. These modules provide the analytical tools for creating lists, charts, maps, and table reports:

1. **The reporting tool** is for creating tabular and free-form reports. The Report builder is an easy-to-use tool which is used to generate different kinds of reports. Reports can be in simple tabular format, but also can have nested hierarchies in columns and rows.
2. **The map tool** allows for GIS-based analysis of the data.
3. **The chart tool** is another way for graphical analysis. The LSS supports a wide range of chart types including bar, pie, spider, and liner charts.
4. **The list tool** is very similar to the reporting analytical tool. It can also create tabular reports, but collapses all data under the first level of the reports' row hierarchy, providing a simplified view.

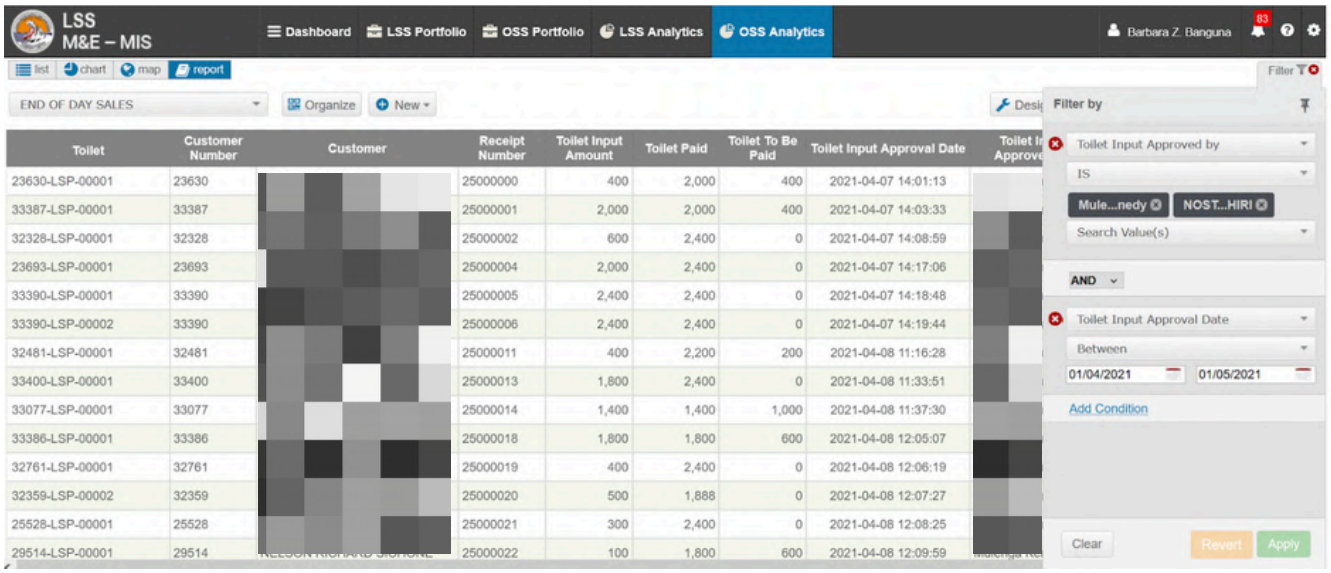


Figure 8: Cashier End-of-Day Sales Report with filter used to change the desired period

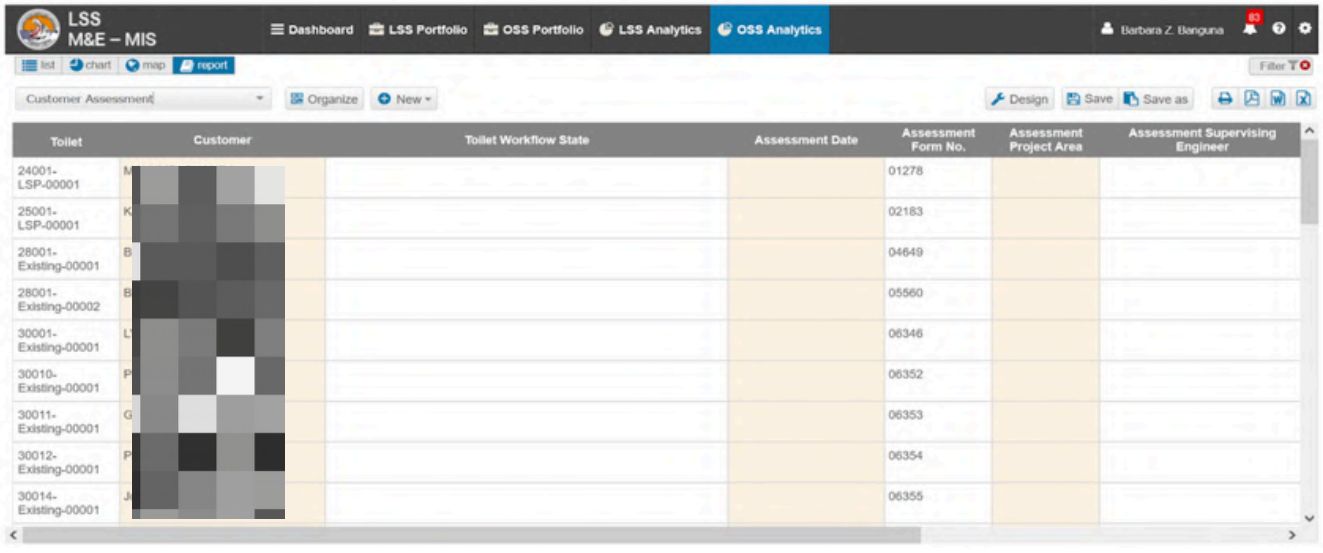
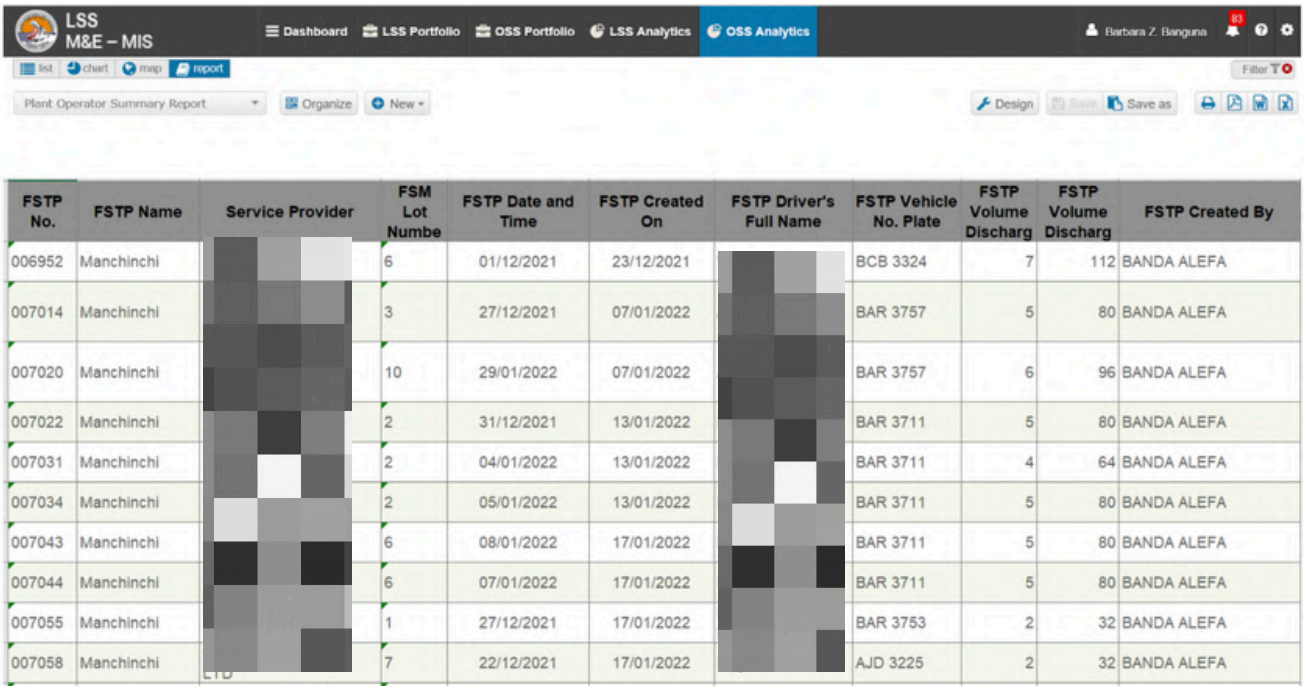


Figure 9: Customer Assessment Report



FSTP No.	FSTP Name	Service Provider	FSM Lot Numbe	FSTP Date and Time	FSTP Created On	FSTP Driver's Full Name	FSTP Vehicle No. Plate	FSTP Volume Discharg	FSTP Volume Discharg	FSTP Created By
006952	Manchinchi		6	01/12/2021	23/12/2021		BCB 3324	7	112	BANDA ALEFA
007014	Manchinchi		3	27/12/2021	07/01/2022		BAR 3757	5	80	BANDA ALEFA
007020	Manchinchi		10	29/01/2022	07/01/2022		BAR 3757	6	96	BANDA ALEFA
007022	Manchinchi		2	31/12/2021	13/01/2022		BAR 3711	5	80	BANDA ALEFA
007031	Manchinchi		2	04/01/2022	13/01/2022		BAR 3711	4	64	BANDA ALEFA
007034	Manchinchi		2	05/01/2022	13/01/2022		BAR 3711	5	80	BANDA ALEFA
007043	Manchinchi		6	08/01/2022	17/01/2022		BAR 3711	5	80	BANDA ALEFA
007044	Manchinchi		6	07/01/2022	17/01/2022		BAR 3711	5	80	BANDA ALEFA
007055	Manchinchi		1	27/12/2021	17/01/2022		BAR 3753	2	32	BANDA ALEFA
007058	Manchinchi		7	22/12/2021	17/01/2022		AJD 3225	2	32	BANDA ALEFA

Figure 10: FSM Plant Operator Summary Report

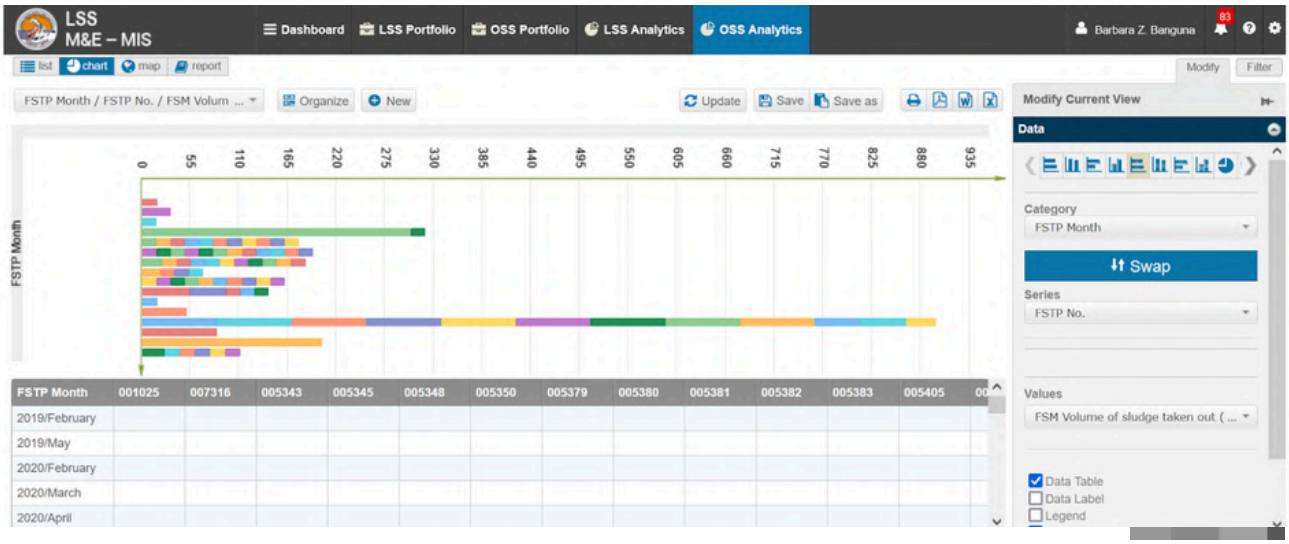


Figure 11: Sample Horizontal Bar Chart generated in the LSS

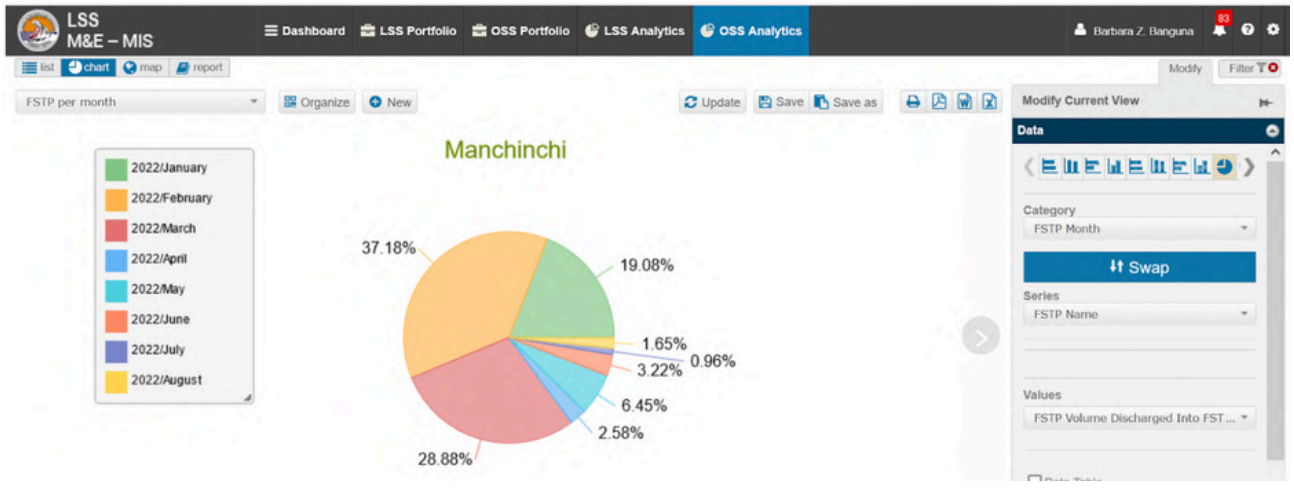


Figure 12: Sample Pie Chart generated in the LSS

If the other two system users request for information from LWSC, the utility conducts its analysis using the analytical tools and shares the reports in the system's public environment, to be viewed by the institution that requested for that information. Shared reports can also be posted in the public environment for anyone to access. The personal environment is used for internal reports such as those exclusively for LWSC or LCC. **See figure below.**

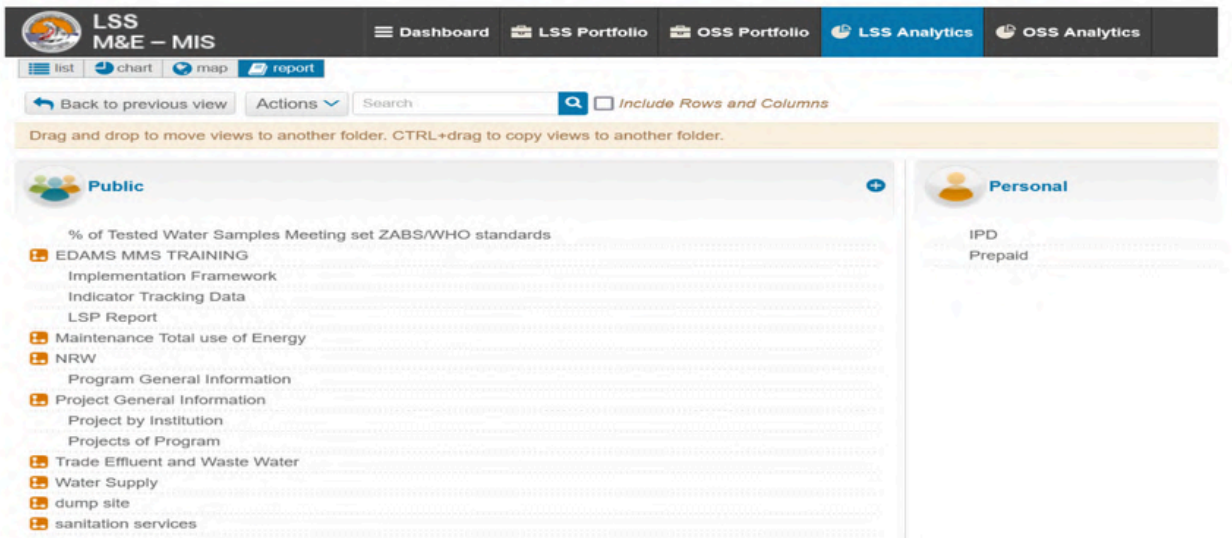


Figure 13: Public and Personal Environments for Data Sharing

The LSS also has a Dashboard Module for data visualization. Data analysts usually create thematic dashboards by combining related reports, charts, maps, and lists, all of which can be viewed on a single page. Dashboards are primarily used by data analysts and high-level management for decision-making. They are highly customizable, allowing analysts to determine the number of rows and columns, specify the analyses to include, and choose the size and layout of each element.

3. Data Operationalization

LWSC, MoH, and LCC use the output data from LSS to make informed decisions. Specifically, this data enables;

1. LWSC to:

- Monitor internal performance, manage operations, and report on KPIs to the regulator.
- Inform long-term planning and programming of sanitation interventions/initiatives to ensure continuous improvement in coverage and quality of sanitation services that benefits all the residents in Lusaka province.

2. LCC to:

- Develop smart enforcement approaches and mechanisms that promote the construction of standard sanitation facilities, as well as monitor their usage, operations, and maintenance.

3. MoH to:

- Inform emergency response and preparedness programs/activities in the wake of outbreaks of waterborne diseases such as Cholera.

This document was developed by Dev-Afrique Development Advisors in collaboration with Lusaka Water Supply and Sanitation Company (LWSC), the Eastern and Southern Africa Water and Sanitation Regulators Association (ESAWAS), and Global Water Operators' Partnerships Alliance (GWOPA).