CASE STUDY: **Operation & Maintenance (O&M) for Rural Water Supplies in the state of Uttar Pradesh (India)**

Overview:

The objective of the efficient operation and maintenance (O&M) of a water supply system is to provide safe drinking water as per designed quality and quantity, with adequate pressure at a convenient location and time at a competitive cost on a sustainable basis.

"Operation refers to the timely and daily operation of the components of a Water Supply system such as headwork, treatment plant, machinery and equipment, conveying mains, service reservoirs and distribution system etc., effectively by various technical personnel, as a routine function."

"Maintenance is defined as the act of keeping the structures, plants, machinery and equipment and other facilities in an optimum working order. Maintenance includes preventive /routine maintenance and also breakdown maintenance. However, replacements, correction of defects etc. are considered as actions excluded from preventive maintenance.

The entire project is all about the smooth functioning of the entire rural water supply schemes and the management associated with O&M via vendor or the respective selected agency.

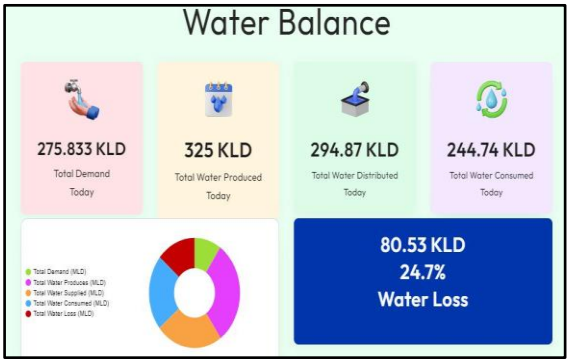
Challenges:

Challenges for the execution of successful O&M Project:

- GIS mapping of complete DPRs for each village scheme
- GIS mapping of pipelines, ponds, OHTs, pump house etc.
- Real-time data view & update on GIS section
- Digitization of the database of each household Beneficiary
- Count of beneficiaries in each house of each village
- Enrolment each beneficiary with complete location details
- Assignment of a unique ID to each tap connection & water meter
- Water testing & sample collection at regular intervals
- Mobile App for each pump house operator
- Optimization of electricity usage based on daily pump house working & other activities
- Repair & Maintenance module based on the predefined items and pricing along with timelines mentioned
- Tracking of each complaint, its resolution, remarks, verification & final closure based on beneficiary feedback
- Huge amounts of data & machinery items have to be managed
- Coverage of inner parts of the state for better awareness of the scheme
- Technical complexity for technicians & data integration to system
- Create and manage numerous login IDs and Passwords
- Integration of SCADA and IOT at various sections for data analytics
- Complete implementation in the entire state level
- Strengthen IT support for ongoing projects at various levels

Major Modules of the project:

- GIS based tracking system
- Complaint Monitoring System (CMS)
- Different categories of complaints using color code & display over the GIS module
- Water Balancing & Retrofitting
- Water Quality & Testing Lab's detail
- Complete Vendor Management
- Asset Tracking & Inventory
- Finance, Revenue & Billings
- KPI's integration at various levels
- Field Engineers Work Tracking System
- Prepare estimation & DMS
- MIS & Data Analytics and some more.



Approach:

- Our team and organizational officers prepared strategies for the successful execution of O&M Project.

Below are the key points:

- Public Awareness about the water management scheme
- Setup various campaigns at Village & Gram Panchayat levels
- Public Awareness program about the tap connection and enrollment to the online system
- For development methodology, the team worked in a phase-wise manner & created sequencing for a road map.
- Conducted several meetings, sessions etc. to analyze the best possible practices and prepared development plans.
- Convert as-built drawings (DPR) for integration with GIS
- Developed DB strategies for managing huge data sets & secured server configuration for data security.
- Develop techniques to prepare work estimates automatically for repair and maintenance work.
- Develop and implement various KPIs for tracking vendor's performance and working.
- Develop techniques for document verification, vendor billings, vendor registrations, item details, fund transfers, implement GIS techniques and many more.
- Rigorous testing of each module at certain intervals.

Technologies:

MS.NET, MS-SQL Server, ASP.NET, JQuery, Angular, Selenium, GeoServ, ArcGIS, QGIS, SCADA, IOT, Embedded System & Integrations, Android, iOS, AWS, Security Audit etc.

Benefits Achieved:

- Total households with tap connections: 20 Million (approx.)
- Project under "Jal Jeevan Mission"
- Usage of GIS provides a real-time monitoring system
- Track real-time complaints and the status
- Track real-time repairs & maintenance work by Engineers
- Track the status of each OHT with their capacity etc. details
- Mandatory KPIs for vendors (on daily/quarterly/monthly and yearly basis) for clearance of their invoices
- SCADA and IOT integration to provide real-time data
- Identify electricity consumption and tariffs
- Track inventory of machineries, equipments, items etc.
- Water quality testing and sampling for clean water
- Identify ground water and surface water sources & schemes
- Better service to beneficiaries
- With reduced human interference, lesser chances of corruption & analyze performance working