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TRANSFORMATION TOWARDS SUSTAINABLE
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Improving revenue management for sustainable rural water services: innovative prepaid water system

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According to the Tanzania Water and Sanitation Network's 2009 national water point mapping survey, 46% of all public, improved water points were non-functioning. In the Karatu District in northern Tanzania, community-owned water supply organizations (COWSOs), Karatu Village Water Supply (KAVIWASU) and Endamarariek/Endabash Water Supply (ENDAWASU), experienced 39 and 34% non-revenue water, respectively. To improve revenue collection and water supply services, the Revolutionizing Remittance Recovery in Water (R3W) project built the capacity of KAVIWASU and ENDAWASU to install and manage a prepaid water technology. Results to date show that revenues increased by 201%, downtime reduced from 1 week to less than a day, COWSOs' technical and management skills improved and there was greater customer satisfaction with the new technology.

Introduction

Background on Tanzania's rural water supply

Non-functionality of water points and mismanagement of revenue are two critical challenges in Tanzania's rural water supply. Community owned water supply organizations (COWSOs) manage, monitor and set user-fees and are the primary mechanism (by government mandate) for financing operations and maintenance of water supply schemes. Each water point is managed by the COWSO. A caretaker is hired to collect fees from water users and receives a 30 percent commission on all sales, sometimes hiking the price of water and pocketing the extra cash. Users pay per bucket (20 litres) collected, so any water wasted during collection is considered lost revenue. However, because there were weak internal controls that track each transaction, it is difficult to know the true earnings and how water funds are used, affecting finances available for operation and maintenance. All O&M costs are covered by fees collected from water users.

In addition, by law, COWSOs are required to register and establish bank accounts, which in principle, would support greater oversight and better tracking of revenue. However, the significant effort and resources required to move through the registration process is discouraging to COWSOs. Finally, there is a broad lack of understanding on the roles and responsibilities of community members themselves, in water governance as well as the mandate of their COWSOs.

Innovative prepaid water system

Funded by UKAID/Human Development Innovation Fund (HDIF- Tanzania) and CRS private funds, the Revolutionizing Remittance Recovery in Water (R3W) Project addressed the issues of non-revenue water and delays in reducing downtime (duration May 2015-November 2017). The project introduced a water technology designed by Grundfos LIFELINK A/S that combines pre-paid water metering with remote reporting in rural and peri-urban communities in the Karatu District for KAVIWASU and ENDAWASU.

The ***AQtap water dispenser*** is housed in a kiosk, and operates on solar energy (Photograph 1). Consumers own a ***prepaid smartcard*** which they place on a slot of the water dispenser and credit is deducted from the smartcard balance to the exact amount of water collected, signifcantly reducing the problem of water wasted due to spillage and non-revenue water (Photograph 1). With the prepaid smartcard, the user is assured that

they are charged the price of water set by the COWSO and not by the kiosk caretaker. Consumers can see all the transactions relating to their water card, including credit balance and volume of water purchased on the display unit. All transactions are recorded through a remote monitoring system that uploads real-time data, including performance data from the AQTap dispenser, using the internet/3G to a central server. This information is viewed remotely by the COWSO's system administrator via the ***Water Management System (WMS)*** dashboard. The WMS also alerts the COWSO if there are any technical problems at any of the 20 water kiosks installed with this system and provides finance and water consumption data that is availabe for reporting and further analysis. Figure 1 provides an overview of the system.

Photograph 1. Community members at R3W's Petro Erney prepaid water kiosk

Photograph 2. Women from the community collecting water with their prepaid smartcard at Mtemi kiosk

In addition to the AQtap, R3W also provided technical and management capacity to both KAVIWASU and ENDAWASU. To assure availability of technical services for system maintenance, COWSO technicians were linked with other local technicians and the district government to provide ongoing O&M services to their water systems. Life Cycle Costing Analysis (LCCA) Training was conducted to build their capacity to make decisions on design, development and operation costs. Specifically, it enabled the COWSOs to determine affordable and realistic water tariffs, assess future resources requirements and investment costs, through more detailed understanding of the input requirement over the expected life cycle.

The AQtap infrastructure alone could not achieve sustained services. Prior to R3W, the main source of water was from river surface water. This created water shortages, especially during the dry season (June to December). In order to have a more reliable supply source, the R3W project provided COWSOs with the training and resources to build a borehole that could supply a sufficient quantity and quality of water to meet the communities' needs.

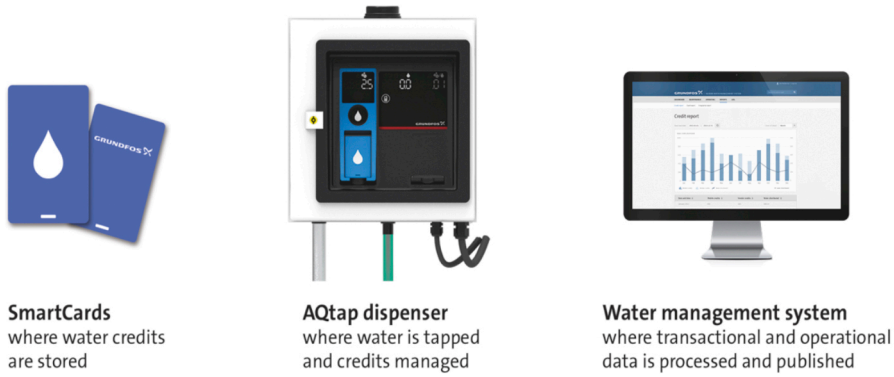

Figure 1. Components of the prepaid AQtap water dispensing technology

Source: Grundfos LIFELINK A/S

Results to date

Improved revenue collection and decreased down-time

In the postpaid system, prior to the adoption of the AQtap, non-revenue water was 39% for KAVIWASU and 34% for ENDAWASU. The project objective was to reduce total non-revenue water to 19 and 14% KAVIWASU and ENDAWASU respectively (i.e. by 20% of the total NRW) 20% at the end of the design period (10yrs). With the adoption of the prepaid system in R3W, revenue collection showed a significant improvement with an average of 201.21% increase. This figure represents the average of all the increased revenues for prepaid in all 20 kiosks replaced with AQtaps from May 2017 to January 2018 in ENDAWASU and July 2017 to January 2018 in KAVIWASU, the increase corresponds to 20% increase of revenues (i.e. 20% reduction of total NRW). The 201.21% indicates the revenues in prepaid has more than doubled the targeted revenues collection improvements, Table below shows revenues for one water point replaced with the prepaid metered system in KAVIWASU.

With the postpaid system it took the COWSO up to 1 week to solve technical challenges. This information is based on testimonies from COWSO representatives and community members. It should be noted that no hard data was collected on downtime in the post-paid system. In contrast, with the record-keeping capability of the AQtap prepaid innovation, the data showed an average of 30 minutes for a technician to attend a minor problem. For more complex issues, less than 1 day was required as it needed more skilled technicians or outsourcing of equipment that is not readily available localy.

Table 1. Revenues for one water point replaced with the prepaid metered system in KAVIWASU

Kiosk name	Month since prepaid began operation	Postpaid revenue collection correspond to 61% (2016/17) i.e. Previous revenues with postpaid system corresponded to 39% nrw (tzs)	Prepaid revenues (2017/18) (tzs)	Postpaid revenues collection equated to 81% i.e. Revenue increased with prepaid system by 20% (tzs)	Percentage increase of revevunes corresponding to 20% increase contributed by prepaid system (%)
MTEMI	JULY	45,000.00	69,850.00	59,754.10	116.90
	AUGUST	72,000.00	164,000.00	95,606.56	171.54
	SEPTEMBER	130,000.00	167,900.00	172,622.95	97.26
	OCTOBER	85,000.00	234,040.00	112,868.85	207.36
	NOVEMBER	55,000.00	279,800.00	73,032.79	383.12
	DECEMBER	42,000.00	303,507.00	55,770.49	544.21
	JANUARY	33,100.00	251,600.00	43,952.46	572.44
AVERAGE					**298.97**

Improved transparency and accountability

The prepaid system reduced the risk for fraud and mismanagement of water funds, and increased transparency and accountability. Payment delays were eliminated and every purchase of water credit and corresponding spending on water-user fees was recorded by the system with printable reports. Figure 2 is an example screenshot of the WMS for KAVIWASU over one month, which shows the water consumed, revenues, number of water cards (one per household) that have accessed the system and water consumption per water card for the month of January 2018. The prepaid water system offered a standardized and closed payment structure, reducing disputes between the user and COWSO and ensuring that all water credit sales were accountable. Users paid for recharging their water cards with credit via prepaid vendor cards, WMS or Vodacom MPESA system in a transparent way. R3W conducted a customer satisfaction survey in 2017 where community members who participated in the project were asked to rank their water service of preference between the prepaid system, post-paid, river water, rainwater catchment, in-home connection and secondary water vendor. For both ENDAWASU and KAVIWASU, water users ranked the prepaid system as their preferred water service (91 and 98%, respectively).

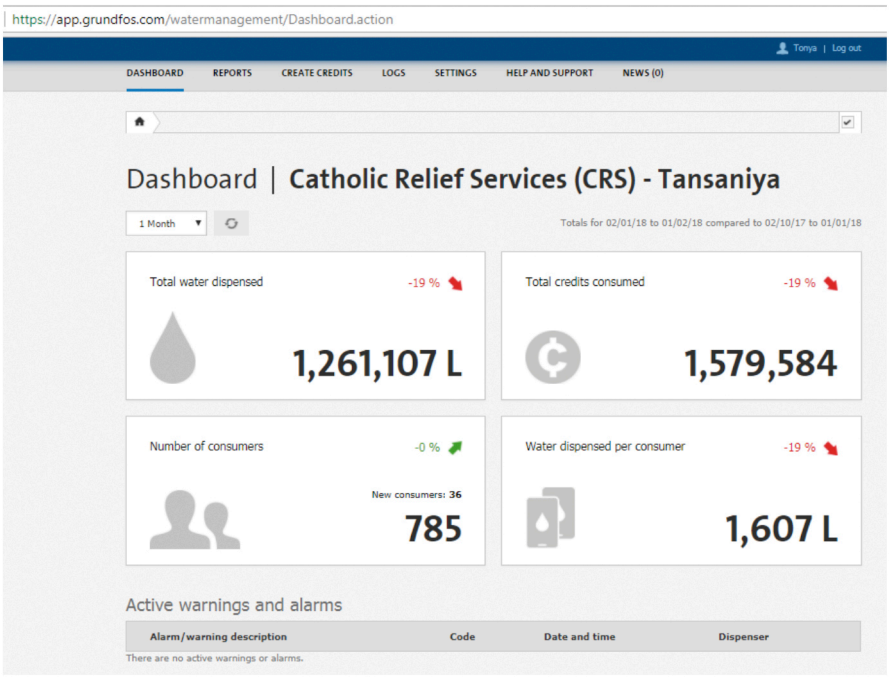

Figure 1. Example screenshot of WMS.

Developmental impact

The project has reduced walking distance to a water point to within 400m to collect the safe/clean water supplied by the R3W prepaid infrastructures, users spends less time (1 to 10 minutes) at water point contrary to post-pay system that led them spending up to 4hours in queue; thereby creating more time for economic activities and childcare, especially for women who are primarily responsible for water collection. There is evidence of gender relationship improvement and at household level a father and mother can now budget accurately and easily for water.

Key lessons learnt

- If innovation considers “local context” then there is a great chance for project success. In the R3W project the AQtap prepaid technology was chosen as appropriate for meeting the needs of the local people.
- Project sustainability depended on the buy-in and training of key stakeholders such as community members, government and private sector before and after the project period. The design, planning, implementation and data collection was done by all stakeholders (communities inclusive), enhancing ownership.
- Introduction of one innovation sparked employment opportunities for others. The introduction of the AQtap water system led to employment for primary water vendors who also used the kiosk as a space to set up convenience shops, a source to irrigate vegetable gardens and sell produce, watering livestock and there are now several secondary water vendors who provide a home delivery service by collecting water from the AQtap and delivering to customers at more than ten times the price.
- From survey results of customer satisfaction, there does not appear to be any push-back against R3W’s prepaid system from community members. This even held true in KAVIWASU after the results of the LCCA caused the COWSO to increase the tariff at its R3W water points.

Challenges

- Little understanding by the communities of the prepaid technology since it was an innovative/new project (first in Tanzania), led to more time invested in awareness, delaying implementation for other project activities.
- Water usage is not uniform throughout the year, resulting in some months where revenues are high (dry period) and others where revenues are low (rainy season) as customers engage in rainwater harvesting for their livestock. This means that there is less money available during that time for O&M costs. However, through proper management, higher earnings from previous months could make up for that gap.

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