Mobile for Development Utilities Perspective

Our quarterly insights – Issue 1

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Mobile for Development Utilities

The Mobile for Development Utilities programme improves access to basic energy, water and sanitation services in underserved communities using mobile technology and infrastructure. Our work encompasses any energy, water and sanitation service provided to a community, which includes a mobile component, whether it is voice, SMS, USSD, Machine-to-Machine, NFC, a mobile operator's agent network or tower infrastructure. We aim to seize the opportunity, leveraging mobile technology and infrastructure to enhance access to affordable and reliable energy, clean and safe water and sanitation services in underserved communities. The GSMA Mobile for Development Utilities programme receives support from the UK Government and Scaling Off-Grid Energy.

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Foreword

Over the last six years, the GSMA Mobile for Development (M4D) Utilities Innovation Fund has supported 50 organisations with a total of £9.4 million in grant funding, benefitting over 2.7 million people directly through grant activities in the energy, water and sanitation sectors. We have been sharing our lessons and experiences from these projects through a variety of research outputs, including insights reports, quantitative research, case studies, blogs and videos.

As we continue to capture more insights through our latest round of grantees, it is our pleasure to share the first issue of *M4D Utilities Perspective*, which will highlight some of these insights together every quarter. Each issue will present industry perspectives across the three sectors covered by our programme, but will also focus on a key topic discussed in an opinion piece and explored in more depth in case studies and infographics. Each issue will also track notable mobile operator activities in the energy, water and sanitation sectors during the quarter and feature one of our most-read blogs.

In our first issue, we explore the digitisation of water utilities in Africa and Asia. Today, 844 million people globally still lack access to clean water. Ensuring clean water and sanitation to all by 2030 (Sustainable Development Goal 6) is important to meeting wider goals to end poverty, advance sustainable development and ensure peace and stability. However, we are not on track to achieve this goal.[1] Water utilities in countries with poor access to clean water are stuck in a cycle of huge operational losses, making it impossible to invest in infrastructure that would serve more people and leaving many to rely on unsafe alternative sources of water. Can digitisation help solve the problem?

We explore this question through interviews with three utilities from Niger (SEEN), Kenya (KIWASCO) and Bangladesh (Dhaka WASA). Complementing the research are case studies of three of our grantees that have worked with one of these utilities. In the case studies, we share different mobile-enabled business models in water delivery, including community-level water service provision in partnership with a water utility (Drinkwell), prepaid water provided by a utility at the household level (CityTaps) and digital solutions for utilities (Wonderkid).

We would specifically like to thank Ms. Eldah Odhiambo (KIWASCO), Mr. Year Khan (Dhaka WASA) and Mr. Ayaz Mohammad Beig (SEEN) for sharing their perspectives and experiences with the ongoing digitisation of their utilities. We hope that you find the first issue of *M4D Utilities Perspectives* interesting and thought provoking. We encourage you to share your feedback with us.

Akanksha Sharma
Senior Insights Manager,
GSMA Mobile for Development Utilities

1. UN Water (2018), "SDG 6 Synthesis Report 2018 on Water and Sanitation".

Contents

M4D UTILITIES PROGRAMME IMPACT 2012 - 2019

£ 9.4 million awarded through

53 grants

- 33 Energy
- 14 Water
- 6 Sanitation

£ 257.7 million

raised by our grantees in investment from the private sector following our Innovation Fund contribution

- £ 248.4 million
- £ 6.4 million
- £ 2.9 million

Funded projects in

28 countries

direct partnerships with

40 mobile operators

Beneficiaries directly impacted through grants:

2,760,000+

Beneficiaries impacted in the years following the grant through scaling:

27,550,000+*

We estimate that approximately 50 per cent of these are female.

* This includes a period of two years following the completion of the grant. A larger portion of these are attributed to the growth of Wonderkid, who serves 22 large utilities across Africa as of January 2019.

Sector focus: Mobile-enabled water services

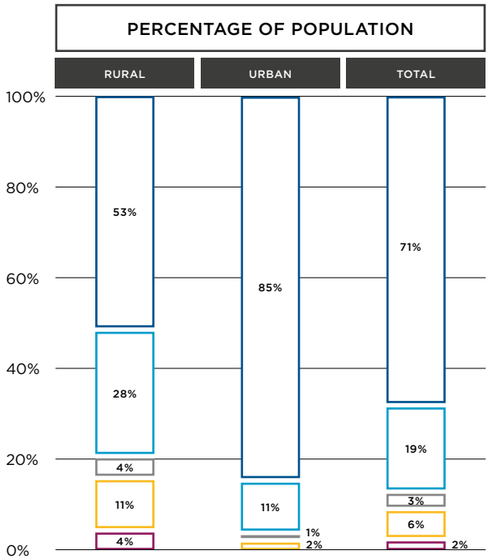
THE GLOBAL WATER CHALLENGE

785 million

people across the globe lack access to a basic drinking water service

2.1 billion

lack access to safely managed water



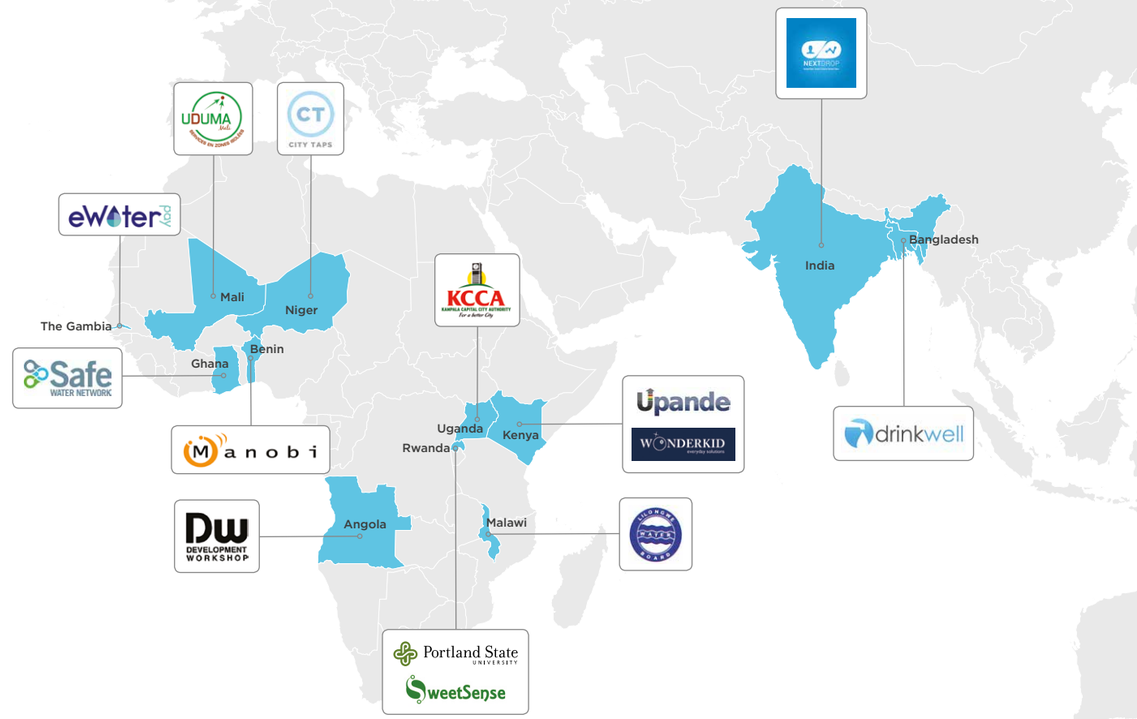
Source: Progress on household drinking water, sanitation and hygiene 2000-2017. Special focus on inequalities. New York: United Nations Children's Fund (UNICEF) and World Health Organization (WHO), 2019.

SERVICE LEVEL	DEFINITION
SAFELY MANAGED	Drinking water from an improved water source that is located on premises, available when needed and free from faecal and priority chemical contamination.
BASIC	Drinking water from an improved source, provided collection time is not more than 30 minutes for a round trip, including queuing.
LIMITED	Drinking water from an improved source for which collection time exceeds 30 minutes for a round trip, including queuing.
UNIMPROVED	Drinking water from an unprotected dug well or unprotected spring.
SURFACE WATER	Drinking water directly from a river, dam, lake, pond, stream, canal or irrigation canal.

Note: Improved sources include: piped water, boreholes or tubewells, protected dug wells, protected springs, rainwater, and packaged or delivered water.

GSMA M4D UTILITIES INNOVATION FUND: WATER GRANTEES

14 water grantees working in 12 countries across Africa and Asia



Digitising water utilities in Asia and Africa

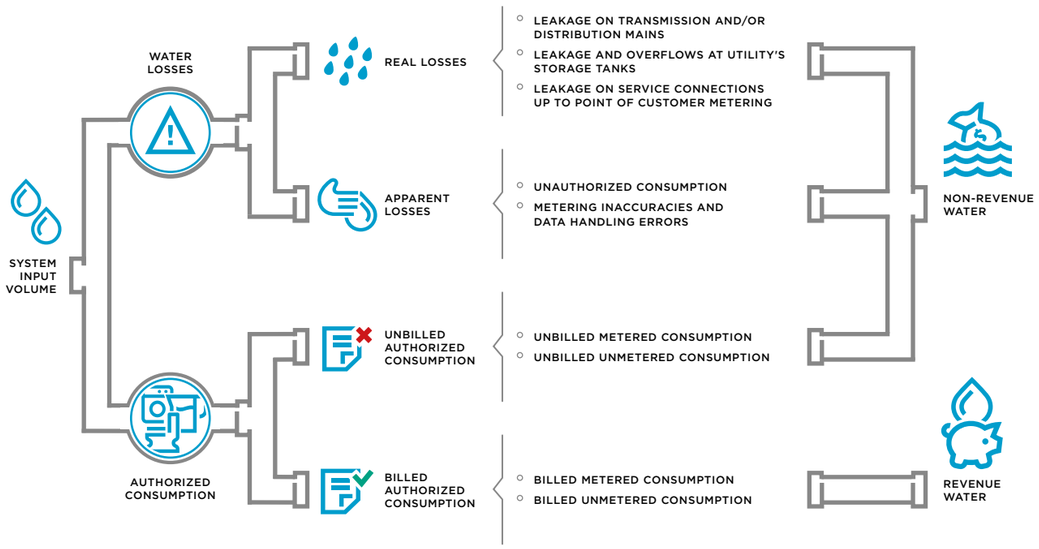
The fundamental question: Why digitise?

Today, 2.1 billion people across the globe lack access to safely managed water, which refers to drinking water from an improved water source that is located on premises, available when needed and free from faecal and priority chemical contamination.[2] The job of water utilities supplying piped water is not getting any easier with high provisioning (infrastructure + supply + maintenance) costs coupled with the pressure of setting low tariffs or making water available at no charge.

Moreover, most water utilities in developing countries suffer from high rates of non-revenue water (NRW). NRW is water that is treated and distributed by the utility but is not paid for by the consumer, due to infrastructure problems like leaky pipes, or commercial issues like incorrect billing, faulty meters or illegal connections to the water network (see Figure 1). Recent estimates[3] presented at the International Water Association Water Loss Summit 2018, place global annual NRW at 126 billion cubic meters. This translates to nearly $40 billion in annual losses in waste and foregone revenues.[4] It is estimated that water utilities in Kenya lose anywhere between 30 and 85 per cent of revenues due to faulty infrastructure.[5] By failing to collect revenue for all the water they treat and distribute, utilities with high NRW rates cannot provide a sustained and reliable service for their customers as they lack the resources to fix problems. Extending and maintaining the network, or making other investments, also becomes more difficult, creating a vicious cycle of service decline.

Figure 1 Source: International Water Association

Non-revenue water explained



2. WHO, JMP and UNICEF (2017), "Progress on Drinking Water, Sanitation and Hygiene".
3. Presented by the IWA Water Loss Group http://www.waterloss2018.com/wp-content/uploads/2018/06/08/A24.pdf
4. Roland Leimberger and Alan Wyatt (2018), Quantifying global non-revenue water
5. WASREB (August 2018), "Non-Revenue Water Audit of WSPs: Final Report".

Digitisation, or the process of converting information or transactions into digital format, can help improve many aspects of water delivery — from water treatment to payments to after service — by enabling communication channels between utilities and their subscribers. Several decentralised service providers supported by the GSMA M4D Utilities programme, such as Drinkwell (Bangladesh), Safe Water Network (Ghana) and eWaterPay (Gambia, Tanzania), are already deploying several of these solutions on a smaller scale.

Digitisation can bring about a big step change in how utilities function, and digitising processes like meter reading, billing, payments and complaint management systems, has shown a clear reduction in NRW for some utilities. We have identified three main areas where digitisation is already delivering operational savings for water companies (both decentralised and centralised) in emerging markets: delivery and monitoring, billing and payments, and reporting and feedback (see Figure 2). We discuss some examples later in this issue.

Figure 2 Source: GSMA M4D Utilities

Use cases for digital water delivery (categories may overlap)

	WATER SERVICE COMPONENTS FOR DIGITISATION			DELIVERY MODELS	
Company Examples	**Network/System Monitoring** (fully automated or human communication via mobile apps)	**Usage Metering** (volume of water dispensed)	**Billing & Payments** (issuing bills and collecting payments)	**Household Connections**	**Community Water Points/kiosk**
WONDERKID	■		■	■	
CITYTAPS	■	■	■	■	
SAFE WATER NETWORK	■	■	■	■	■
UDUMA	■	■	■		■
EWATERPAY	■	■	■		■
UPANDE	■	■		■	
GRUNDFOS	■	■	■		■

The bigger question: How to implement digitisation?

In 2019, the question of why the digitisation of water utilities is critically needed is clear: the value of lowering operational expenses and, in turn, revenue requirements, has been proven for most industries. The more important question is how to implement and execute digitisation. This process is especially difficult in the water sector, which in many countries is subject to government oversight and provided as a public good with little emphasis on efficiency and revenue recovery. For utilities operating in developing countries in Africa and Asia, this becomes even more complex as losses from operational inefficiencies are greater and resources to invest in digitisation sparser.

The digitisation process raises several questions. The first is, "Where to start?" a utility must decide which departments or processes to digitise first and how to integrate the digitised parts with those that are not digitised yet. To understand the level of digital maturity in the water sector, the International Water Association recently conducted research on 40 utilities worldwide.[6] It developed a five-phase 'digital

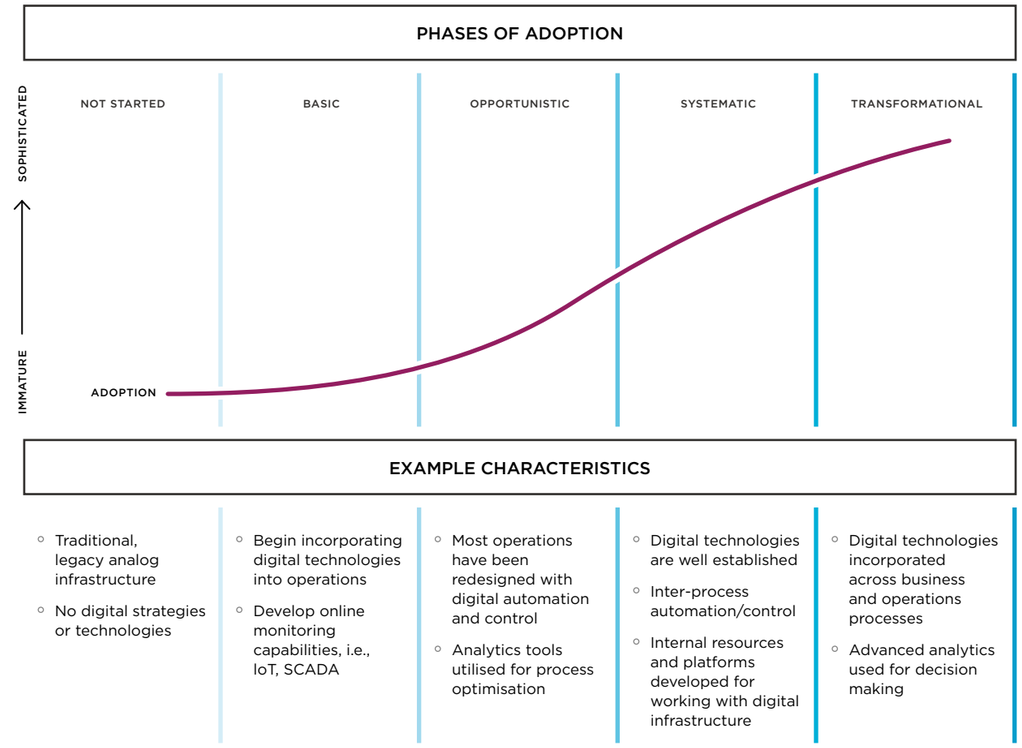
6. International Water Association and Xylem Inc (2019), "Digital Water - Industry leaders chart the transformation journey"

water adoption curve', which begins with utilities that are in an immature digital development phase and need a strong push from top management to recognise digitisation as a priority and conduct pilots. As utilities move along the adoption curve, they must increasingly align themselves with data-driven goals and ensure that their processes evolve with changing technology requirements.

Digitising systems may have a knock-on effect leading to faster progress toward a "transformational" stage of adoption as shown in Figure 3.

Figure 3 Source: International Water Association

Digital water adoption curve



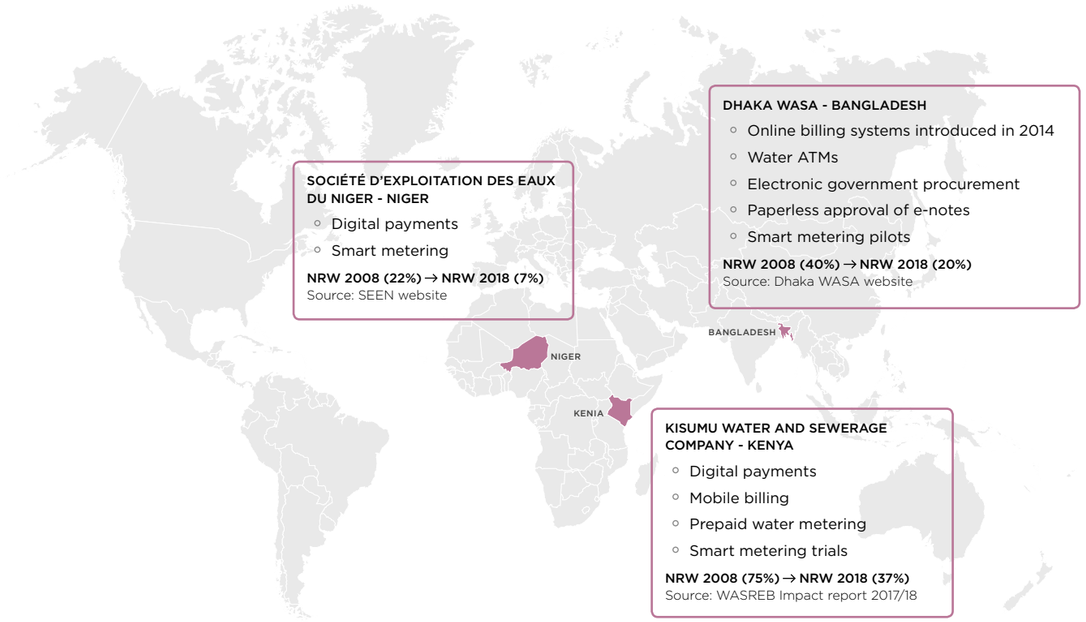
Hearing from the utilities

To understand what drives utilities to digitise processes and the challenges they encounter, we conducted short interviews with three utilities that are working with our grantees and operate across Africa and Asia:

- Kisumu Water and Sewerage Company (KIWASCO) in Kenya;
- Société d'Exploitation des Eaux du Niger (SEEN) in Niger; and
- Dhaka Water and Sewerage Authority (Dhaka WASA) in Bangladesh.

Figure 4

The Impact of digitisation in KIWASCO, SEEN and Dhaka WASA



1. Digitising payments can be a first step in reducing operational costs and inefficiencies

Back in 2006, the water supply and sewerage authority in Dhaka, Bangladesh, Dhaka WASA was struggling with acute water shortages, poor water quality and a failing infrastructure. According to a report by the Asian Development Bank, nearly 90 per cent of slum dwellers at this time were using Dhaka WASA-supplied water through illegal channels. Physical loss of water was over 50 per cent, but improper metering in a low-pressure, intermittent supply system made it difficult to quantify accurately. Poor revenue collection processes meant that only a third of water entering the system was ever paid for by users.[7]

As part of a broader policy-driven turnaround project, Dhaka WASA launched an online billing/e-billing system — a first in Bangladesh for any public sector enterprise — to provide services to its customers more easily with minimum time and effort. Since January 2012, the utility has also been collaborating with nine banks in Bangladesh to offer real-time online billing for water and sewerage services. Under this system, consumers can pay their bills online via mobile money or at any bank branch using electronic debit or credit cards.

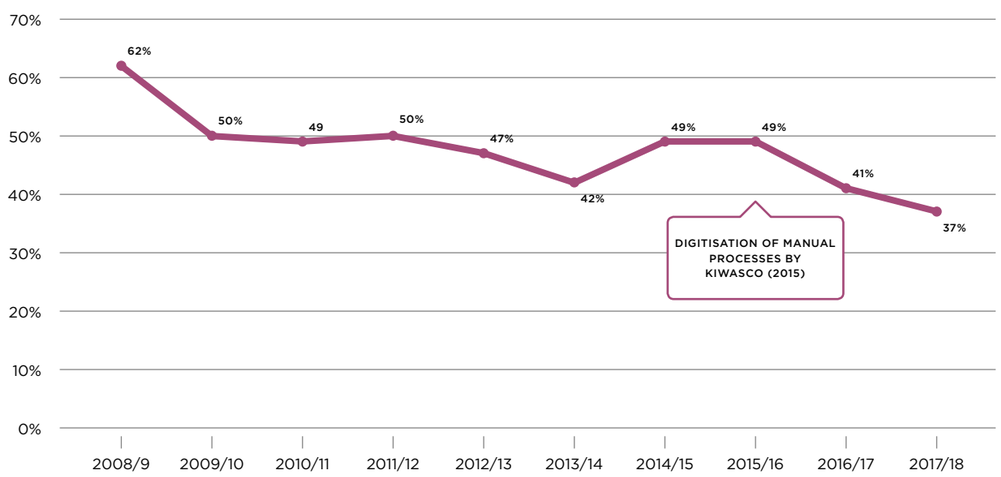
In Kenya, KIWASCO was also struggling with high levels of non-revenue water — nearly 49 per cent in 2015 — which became the impetus for a digital transformation at the utility. KIWASCO found the manual processes of onboarding customers, meter reading, billing, and customer suppport, inefficient, time consuming and tedious. It began offering digital payments as a payment option back in 2015 with the help of GSMA

7. Asian Development Bank (2017), "The Dhaka Water Services Turnaround"

M4D Utilities grant recipient Wonderkid and, as of June 2019, ***KIWASCO collects all its revenues digitally, mainly through mobile money***. After introducing mobile services for billing, collections and customer care through a GSMA grant, KIWASCO saw an eight percent increase in revenue billed and 28 per cent increase in revenue collected between August 2015 and December 2016.[8]

Figure 5 Source: International Water Association

Trends in non-revenue water (%), 2008–2018



> *We used to have very long queues at the head offices [as people were coming to pay by cash]. In order to reduce this traffic, reduce the risk linked to money transfer and to offer convenience to customers to be able to pay from the comfort of their homes, M-Pesa was the way to go.*
>
> **Eldah Odhiambo, KIWASCO**

2. Educating customers is an important second step

Digitisation does not stop when processes are moved to digital channels. The next, and arguably more difficult, step is to ensure customers adopt these services. Dhaka WASA is currently grappling with low adoption of digital payment services — less than five per cent of its customers currently pay their water utility bills using digital payment channels (mobile money via Surecash, Telecash or credit/debit cards). Part of the issue is that it has yet to integrate with the biggest payment provider in the country, bKash. However, in our interview, the utility emphasised that the biggest challenge is building customer trust in digital payment channels and supporting them in giving up paper bills.

For Niger's national water utility, SEEN, the nascent mobile money/digital payment services in the country is an even bigger challenge. In our interview, SEEN pointed to a lack of digital literacy and low customer awareness of digital channels as the biggest barriers to the digitisation of water payments. The utility began trialling digital payments about four years ago, with a view to reduce administrative costs and facilitate payments for clients, but usage has not increased significantly. However, SEEN is partnering with GSMA M4D Utilities grant recipient start-up, CityTaps, to trial smart prepaid metering at the household level in Niamey (see case study on page 17). With a total of 1,161 CityTaps meters installed by April 2019, SEEN has contracted CityTaps to install an additional 10,000 meters to scale their services in the city. As of June 2019, 100 per cent of local SEEN customers using a CityTaps meter pay for their water via Orange mobile money services. This success is due to the persistent efforts of CityTaps and Orange Niger to educate customers and build trust in mobile payment services.

Another digitisation challenge is that mobile money services are often delivered over USSD (essentially a language comprised of numbers and asterisks that is used to communicate between mobile phones and the mobile operator's computers). This is not a user-friendly interface and often requires users to rely on a third party/agent to conduct the transaction for them, eliminating the time and cost-saving benefits of digitisation. According to research by CGAP, Safe Water Network, a water service provider in Ghana and a GSMA M4D Utilities grant recipient, discovered that although 85 per cent of its customers had a mobile money account, only 10 percent had ever initiated a payment of any kind, mainly due to user experience challenges (language, complexity, technical issues, etc.).[9] In response, Safe Water Network collaborated with the country's leading mobile money provider, MTN Ghana, to conduct workshops for its customers on how to make mobile payments. In the months immediately following the workshop, it saw a 20 percentage point jump in the share of revenue coming through mobile channels.[10]

3. Training and motivating employees is also vital

Digitisation of any part of the utility value chain affects employees of the utility, either directly or indirectly. Employee education is therefore very important to help them adapt to a new way of working. It is equally important to design digital solutions with the workforce in mind and to make them user-friendly and intuitive.

Dhaka WASA trains its staff regularly in modern training centers where they learn about using information technology in their day-to-day work. M4D Utilities grantee, Wonderkid (Kenya), which provides software solutions for water utilities, also conducts in-depth training sessions with employees to not only build their skills, but also to alleviate any fears about digitisation displacing their jobs.

> *Our employees stay with us until they retire and so it is important that we include 100% of our manpower in the digitisation drive.*
>
> **Md. Year Khan, Dhaka WASA**

8. GSMA Mobile for Development Utilities (November 2017), "Wonderkid Multimedia LTD: Digitising water utilities in Kenya".

9. Waldron, Daniel, Caroline Frank, Akanksha Sharma, and Alexander Sotiriou. 2019. "Testing the Waters: Digital Payments for Water and Sanitation." Washington, D.C.:CGAP

10. Daniel Waldron (2018), An Innovator's Dilemma: Teaching Mobile Payments

4. Partnering with mobile operators

The near ubiquity of mobile phones makes mobile technology an essential part of any digitisation drive by a water utility in emerging markets. Besides mobile payments, this technology can enable smart water metering, provide feedback channels to help customers self-report faults and leakages and help utilities interact with customers to alert them about supply disruptions, unpaid bills and other information. This requires the utility to partner with mobile operators.

Enabling wider customer adoption of digital payments requires a utility to partner with as many payment providers as possible. However, it is also important to ensure that customers are not burdened with the increased cost of shifting to digital. For instance, in many cases, mobile money providers levy a small fee per transaction. This is particularly common for first-time mobile money users and in nascent mobile money ecosystems where fees are often seen as an insurmountable cost of entry.[11] In such cases, this burden on the customer can be reduced either by reaching agreement with the mobile operator to introduce a new tariff structure or to ensure that the fee is absorbed in part or in full by the utility or mobile operator (read more in our blog on page 31).

Conclusion

The digitisation of water utilities has already shifted from being an option to an imperative.[12] A major issue in the water sector has been information gaps about payments and non-payments, service breakdowns, leakages, fraud and logistical challenges. Mobile technology offers an affordable and ubiquitous way to close these information gaps in real or near-real time. We believe that mobile technology has a big role to play in the digitisation journeys of water utilities through simple communication services like SMS and USSD, but also through mobile payments facilities and the ability to offer remote monitoring of piped and non-piped infrastructure using machine-to-machine (M2M) connectivity. For water utilities, this journey to digitisation can be a complex but rewarding one.

11. GSMA Mobile for Development Utilities (January 2019), Mobile money transaction fees and utility bill payments in emerging markets
12. International Water Association and Xylem Inc (2019), "Digital Water - Industry leaders chart the transformation journey"

Mobile-enabled innovation in the water sector: Case studies of our grantees

CASE STUDY

CityTaps:
Enabling prepaid water services for the urban poor

About CityTaps

- **Location:** Niger
- **Use of mobile channels:** Mobile money, M2M connectivity (LoRa)
- **Mobile operator partner:** Orange Niger
- **Website:** https://citytaps.org

Disconnection from the water supply due to non-payment is a common issue for urban residents of Niamey, Niger.[13] For Niger's national water utility, it is a challenge to serve the poor with affordable and clean running water while also reducing the physical and commercial losses it needs to remain financially sustainable. CityTaps has developed a water utility subscriber management solution that includes a smart prepaid water meter known as CTmeter, which relies on mobile money to help households make micro-prepayments for their water at any time. It also provides a software management system and subscriber management dashboard to monitor usage and meter performance remotely, together known as CTSuite.

About our grant

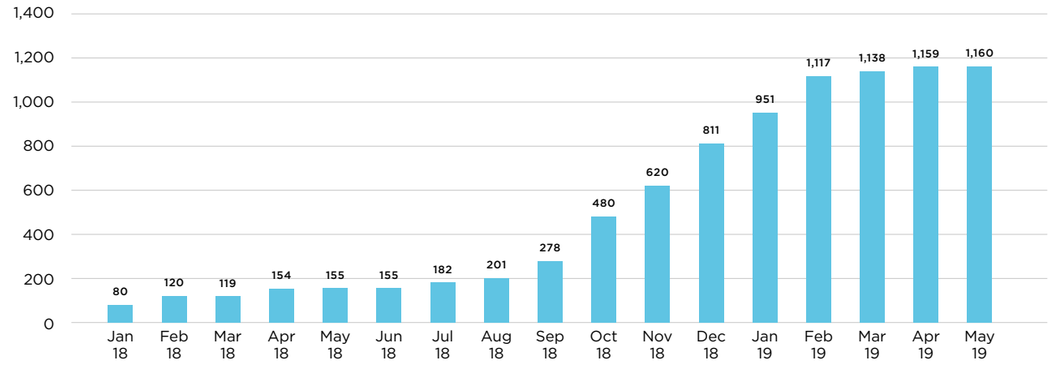
In September 2015, the GSMA M4D Utilities Innovation Fund awarded CityTaps a grant to launch its smart prepaid water meters in Niamey, Niger, in partnership with the local water utility, Société d'Exploitation des Eaux du Niger (SEEN) and Orange Niger for mobile money payments. In May 2017, CityTaps received another GSMA grant to continue scaling this service. By May 2019, GSMA funds had supported the installation of 1,161 smart meters with a target of over 150 more meters to be installed by December 2019.

Building on the project funded by the GSMA M4D Utilities Innovation Fund, CityTaps plans to reach 200,000 people by the end of 2019 and more than two million by the end of 2022. The company has also been selected to participate in the OrangeFab France program, which will provide support to integrate and deploy its solution in other Orange-footprint countries, such as Senegal and Côte d'Ivoire. In October 2018, CityTaps raised one million Euros and has received an order for 10,000 meters from SEEN to scale its service.[14]

13. Our baseline surveys before the start of this project indicated that nearly 40 per cent of respondents had their water cut in the past year, with 80 per cent citing non-bill payment as the reason.
14. Christoph Haushofer (6 December 2018), "Niger: CityTaps raises € 1 million and signs with Veolia Africa for prepaid water", Afrik 21.

Figure 6 Source: International Water Association

Number of CityTaps meters installed through GSMA grants



How does it work?

REGISTRATION

- User gets the smart prepaid meter (CTMeter) installed at their home and registers for a mobile money account (if not already registered).

PAYMENT

- User can add credit to their CityTaps account using their mobile money account independently or with the help of a mobile money agent.
- The minimum top-up amount is $0.85.

USAGE

- User can receive water so long as their CityTaps account has credit. Once topped up, the water supply can take up to 30 minutes to resume.

MONITORING

- The CTMeter transmits data every 30 minutes to the CTCloud software, which controls water access and collects information about usage, leaks and fraud.
- Users get notifications from CityTaps when their credit is running low or if a leak is detected on their plot.

Results and impact

To evaluate the lessons of the grant, we measured the project indicators before the onset of the grant through a baseline survey of 201 households. This was followed up with an end-line quantitative survey of the same households[15] that are now using CityTaps services. The following is a summary of what we learned.

1. Benefits for end users

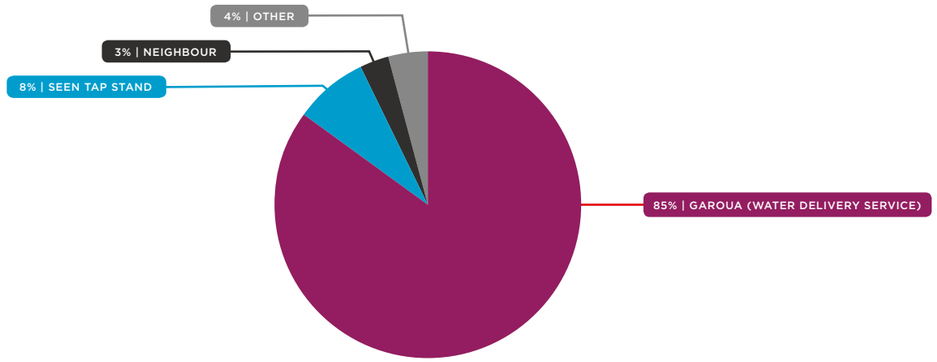
Through our grant, CityTaps connected three types of users: former SEEN customers who had their post-paid meters transitioned to pre-paid meters; former SEEN customers who had their water supply disconnected in the past; and new customers who had been using alternative sources of water. CityTaps solved the problems of each of these customer groups by providing the following service features.

a. **Cheaper water:** For those not connected to piped water services in their homes, the most common alternative water source is 'garouas' — pushcart vendors who deliver water from SEEN tap stands to homes in 20–25 litre containers.[16] The additional cost of delivering to homes makes the water 15 times more expensive than that sold at the SEEN tap stands (2,000 vs. 127 FCFA per m3).[17] In fact, in Niger, those with a household connection pay less per litre of water than those who get water in the community. In other words, water is cheaper for the wealthy than for the poor.[18]

CityTaps is solving this problem by helping to bring clean water directly to homes at a social-tiered tariff offered by SEEN while allowing users to pay per use instead of receiving a large bill at the end of the month. Mobile money payments have further reduced the extra costs incurred by consumers, such as commuting to pay bills in person and paying commissions. Monthly water bills have gone down by $2.81 USD per household since CityTaps services were introduced.

Figure 7 Source: CityTaps Project Update, Winter 2018–19

Alternative sources of water for those without piped water access in Niamey

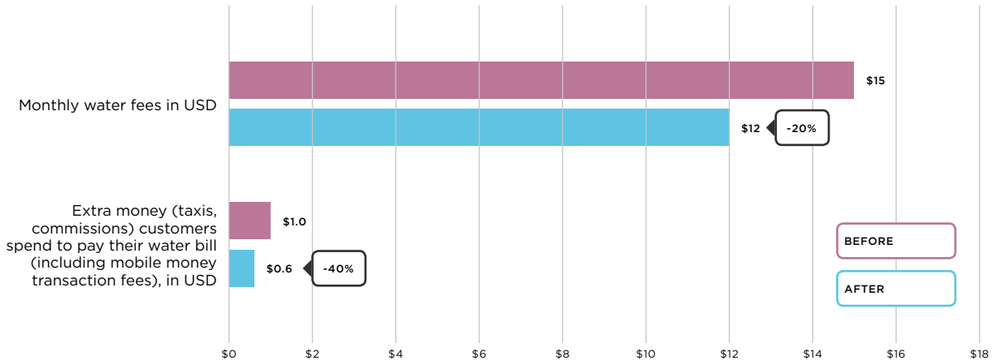


15. The survey was conducted with 193 households; 201 SEEN subscribers were interviewed during the baseline survey and the remaining seven during the City Taps mini-baseline survey conducted by the CityTaps team.
16. Sara Beth Keough and Scott M. Youngstedt (February 2018), Pure water' in Niamey, Niger: the backstory of sachet water in a landscape of waste
17. CityTaps (November 2018), Niamey, Niger Project Update-Winter 2018/19
18. Ibid

> *Previously we used to buy water from garouas. One day they brought me a bill pf 40,000 FCA ($70) and that made me sick! Before this (CityTaps) system, I did not control my bills, but now I don't spend a lot of money.*
>
> **Female CityTaps user, Niamey**

Figure 8

Costs of paying water bills before and after CityTaps

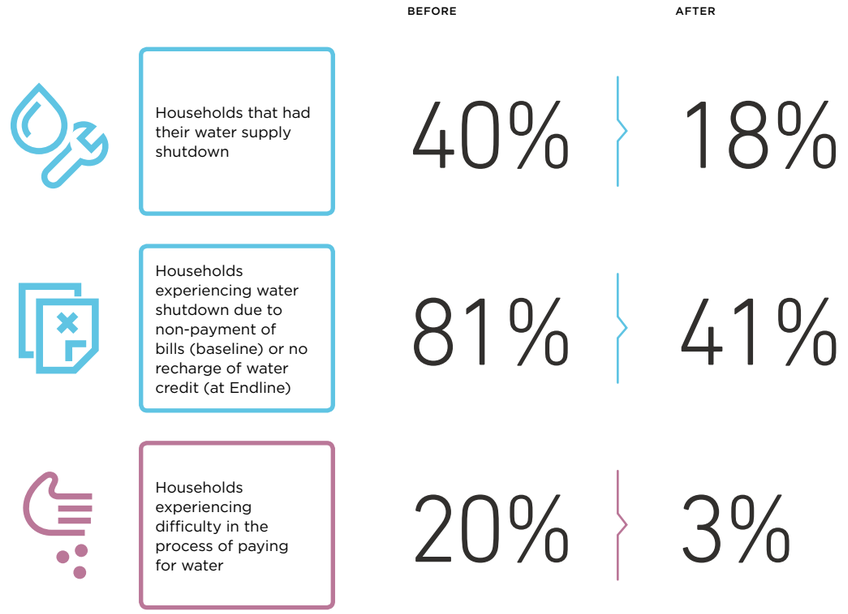


b. Uninterrupted water supply: CityTaps has helped to bring piped water to new subscribers who have never lived with running water at home, to reconnect subscribers who have accumulated debt and have been disconnected, and to provide flexibility to existing clients who appreciate the convenience and transparency of pay-as-you-go (PAYG) meters. Our survey showed that the number of households that experienced water disconnections decreased from 40.1 per cent before the use of CityTaps, to 18.7 per cent at the end of the grant, a reduction of 21.4 per cent.

> *Since the new meter has been installed we have control over what we consume. We can do projections for a month or two months, if we have the money or we can do for a week or two weeks.*
>
> **Male CityTaps user, Niamey**

Figure 9

CityTaps has made water payments easy and affordable for new subscribers



c. Less time spent collecting and paying for water: Ninety per cent of prior SEEN subscribers who were paying monthly bills described having to wait in line at the SEEN office. CityTaps eliminated the need for this by making payments available through mobile phones using mobile money. This is particularly important for women, who tend to fetch water more than men and who have reported saving time.

2. Benefits for water utilities

CityTaps services are not only building a new subscriber base for SEEN, but also ensuring that they are paying for water before consuming it. Ensuring timely payments for water services is critical for SEEN to reduce operational losses incurred due to non-revenue water. But equally, CityTaps services have helped build trust among users. Our surveys at the end of the grant showed that 85 per cent of respondents who have a new meter would definitely recommend SEEN services to others.

> *Citytaps is an innovative solution for us and we have been working with them for two and a half years. The prepaid solution is welcomed by SEEN. With the prepaid contract system, SEEN collects before customer consumes.*
>
> **Mounkaila Dandakoye, Customer services Director, SEEN**

3. Working with mobile operators

CityTaps has partnered with Orange Niger to enable mobile money payments for its services and has been part of Orange Fab France program, which will provide support to integrate and deploy its solution in other Orange-footprint countries, such as Senegal and Côte d'Ivoire.

The GSMA grants with CityTaps have consistently shown a positive impact on Orange mobile money adoption as a result of the CityTaps project. In our initial pilot with CityTaps it was found that 18 prepaid water connections made 223 mobile money transactions in approximately six months of operations (an average of two payments per month for each connection) compared to a possible 108 transactions that would have been made through traditional, monthly post-payments. The mobile payment values for pre-paid water ranged widely, from $1.47 to $20.34 with a median transaction value of $4.06.[19]

The end of grant survey after our current grant has shown that users have expressed high levels of customer satisfaction, showing increased trust in Orange Money, and reported no problems with the service.

Figure 10 Source: Endline quantitative survey (sample size 193)

CityTaps services have driven mobile money adoption among its customers

All payments for CityTaps are made using mobile money

50% of CityTaps customers were first-time Orange Money users

More than 95 of those already using mobile money reported increased use of it after becoming CityTaps clients

All customers, whose water connection was re-established through CityTaps, reported increasing their mobile money transactions as a result of being CityTaps clients.

Another notable achievement of this partnership was an agreement to lower mobile money transaction fees for end users of CityTaps. Previously, the smallest tariff bracket offered by CityTaps was between CFA 1,001 and CFA 2,000, and transaction fees for this bracket were about CFA 100 or $0.20 per transaction. Since CityTaps users were in the low-income bracket and paid for water in very small amounts, the mobile money transaction fee accounted for a significant proportion of their payments.

To address this, CityTaps and Orange agreed to introduce a new tariff band for transactions between CFA 500 and CFA 1,000 with a significantly lower transaction charge of CFA 50. Customers are now able to make smaller but more frequent payments, without a disproportionately high transaction fee. On average, CityTaps customers make between two and three top-ups per month with an average value of approximately $6 per subscriber.

> *Orange Niger has been at the heart of the support this young start-up that operates in Niger (CityTaps). The double impact allows CityTaps and Orange Niger to efficiently support the growth of the local digital ecosystem.*
>
> **Alkerou Hassane, Director, Orange Money service**

19. GSMA Mobile for Development Utilities (February 2018), "Bringing water to every urban home with the power of mobile – an update on our grantee, CityTaps"

CASE STUDY

Drinkwell: Building a network of purified water ATMs in Dhaka

About Drinkwell

- **Location:** Bangladesh
- **Use of mobile channels:** Mobile apps, M2M
- **Mobile operator partner:** Robi Axiata
- **Website:** http://drinkwellsystems.com/

According to the World Bank, 98 per cent of Bangladesh's population have access to water from technologically improved water sources. Despite this, water quality is poor and 41 per cent of all improved water sources in Bangladesh are contaminated with E. coli bacteria, which suggests a high prevalence of faecal contamination.[20] About 13 per cent of the country's water sources also contain arsenic levels above Bangladesh's legal limit.[21]

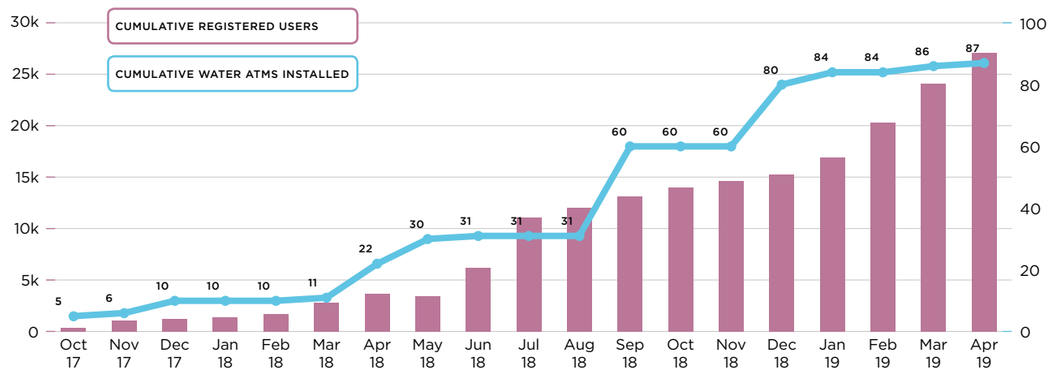
Established in 2013, Drinkwell addresses this problem by removing contaminants from water using a gravity-fed process that lowers energy costs and wasted water. Drinkwell has developed a water treatment solution for purifying water that it distributes through water ATMs. The ATMs automatically dispense the designated amount of water, for which customers prepay. The ATMs are M2M-enabled and real-time monitoring is currently being tested in their latest systems. Drinkwell has so far delivered over a million litres of water to over 200 water ATMS across India, Bangladesh, Laos, Cambodia and Nepal, providing safe water to over 250,000 people.

About our grant

In October 2017, the GSMA M4D Utilities Innovation Fund awarded a grant to Drinkwell in partnership with Dhaka Water Supply & Sewerage Authority (Dhaka WASA) and mobile operator Robi Axiata. Through the grant, Drinkwell has installed 87 water ATMs at Dhaka WASA's existing pumps, where water is purified even further, eliminating the common practice of boiling collected water at home. As of April 2019, Drinkwell was serving nearly 27,000 users across Dhaka through these ATMs.

Figure 11

Growth in water ATMs installed and cumulative user base for Drinkwell



20. World Bank (11 October 2018), "Bangladesh: Access to Clean Water will Reduce Poverty Faster".
21. Ibid.

How does it work?

REGISTRATION

- User submits application form showing national ID to Water ATM Caretaker (caretaker) and pays security deposit of 200 Taka ($0.24) to register.
- Caretaker gives a Radio-Frequency Identification (RFID) card known as 'smart card' that can be used to dispense water.

PAYMENT

- Caretaker transfers water credits to customer's Water Card using Near-Field Communication (NFC) technology on their smartphones, in exchange for cash payment.

USAGE

- User taps the Water Card at a sensor on the Drinkwell ATM to dispense water. The amount of water can be pre-selected or dispensed continuously until the card is removed.
- At the end of each day, an agent from the mobile money provider comes to collect cash from caretakers and credits Drinkwell's account using mobile money.

Results and impact

To evaluate the lessons of the grant, we measured project indicators before the onset of the grant through a baseline survey of 350 registered Drinkwell users. This was then followed up with an endline survey of 326 Drinkwell users who had been using the service for at least six months.[22] We also conducted qualitative research, including surveys, focus group discussions and ethnographic studies covering 12 sites included in the project.

1. Benefits for end users

The endline qualitative surveys indicated that users were very satisfied with Drinkwell's services and found the water collection process quicker, more orderly and convenient than the pumping stations they had used previously. Water quality was also appraised as good and free of iron and arsenic impurities. The number of respondents reporting water-related health issues also decreased from 79 per cent during the baseline survey to 10 per cent in the endline surveys 12 months later. However, it is important to emphasize that these are user perceptions and not based on their health history.

98%
of end users reported being satisfied using the Drinkwell ATM system

90%
of households reported an improvement in health (eg. reduction in instances of diarrhoea etc.)

67%
of households switched to clean water sources, fully displacing the use of other illegal water sources after using Drinkwell services

22. Due to changed mobile numbers, inactivity of some baseline booths and other reasons, the endline survey did not include the same customers as the baseline survey. The respondents for the endline survey were chosen among customers who had used the Drinkwell service for at least the last six months.

> *When we were in the village, my son was here for admission test, he used to live in student's hostel. The water supply was so poor there that once it caused diarrhoea to three of the students at the same time. From then I became very cautious about pure drinking water. I used to collect water from Dhaka WASA's tap, and then when it stopped and the booth [Drinkwell ATM] started, now I collect it from there. Both are deep ground water, so no such bad incident occurred again.*
>
> **Female Drinkwell user, Mugdapara**

2. Benefits for Drinkwell and Dhaka WASA

As mentioned earlier, the Drinkwell water ATMs were located at sites where Dhaka WASA pumps had served as community water collection points. The purpose of this project was to further purify the water provided by Dhaka WASA and offer prepayment prepayment option using mobile money, thereby reducing the costs and risks of cash collection. While integrating the water ATMs with mobile money services could not be completed during the course of the project, some other benefits were observed for both Drinkwell and Dhaka WASA.

a. **Expanded user base:** The quantitative survey results showed a 10 percentage point (pp) reduction in non-registered Dhaka WASA line users who collected water from the WASA line (illegally tapped mostly), but did not pay for the water, and a five pp reduction in registered Dhaka WASA users. Drinkwell, on the other hand, saw a 69 pp increase in usage.

The survey further showed that while users had not completely replaced other water sources for cooking/washing/bathing, etc. with Drinkwell water, 98 per cent were solely using Drinkwell water for drinking purposes.

b. **Improved brand perception:** Since Drinkwell ATMs replaced Dhaka WASA's earlier supply points, the users attributed the cleaner water to Dhaka WASA (and not Drinkwell), improving Dhaka WASA's credibility among existing users. In the quantitative survey, 90 per cent of users reported a more positive perception of WASA because of the Drinkwell ATM system.

c. **Reduced water wastage:** Interestingly, in the qualitative survey, end users acknowledged a tendency to waste resources if they were received for free (which was the case with prior Dhaka WASA pumping sites). They reported that Drinkwell's service, where customers pay per use, has led them to be more accountable for the water they use and to reduce waste.

> *(While dispensing water) I remove the card few seconds prior to (my can) filling up, as the water continues to flow for a little longer after the card is removed. This saves water from being wasted. I am accustomed with timing and now I know when to punch out the card.*
>
> **Male, Azimpur**

3. Working with mobile operators

Drinkwell sought to collaborate with mobile operators on two aspects of their service: mobile money payments for end users and GSM-enabled real-time monitoring of the water ATMs. Unfortunately, during the grant, Drinkwell ran into hardware and software issues that meant that the systems were not cloud-based which prevented both aspects from functioning.

Additionally, the 1.5% mobile money transaction fee was prohibitive considering the low cost of water and the small amounts in which customers make purchases. Drinkwell felt it's customers would be unwilling to pay this and Dhaka WASA also was not willing to cover this. Instead, Drinkwell had their agents collect cash from customers and send the money to Drinkwell at the end of the day or this was collected by banking agents. Drinkwell still sees value in remote monitoring and cashless customer payments. The company is currently trialling new hardware and software to support the originally intended cloud-based solution.

Despite these challenges, Drinkwell has found great value in Robi's service to remotely monitor its staff (surveyors, caretakers and maintenance staff) using SIM-enabled location tracking services. This is helping Drinkwell efficiently allocate reported errors in the water ATMs to service engineers in the vicinity, rather than calling each service engineer to check their availability and proximity to the ATM. This has reduced the time it takes to respond to a service issue by approximately 20 minutes. The location tracking services are also helping Drinkwell ensure that service engineers are not out of their work zone for more than 30 minutes during the day, helping them manage travel and daily allowance expenditures more effectively.

> *Robi has been a true partner for Drinkwell as we grew our footprint across Dhaka by powering the communications backbone via services such as Robi Enterprise Resource Locator through which we are able to manage our field team who service over 100 water ATMs ensuring clean water to over 40,000 households.*
>
> **Minhaj Chowdhury, CEO and Co-Founder, Drinkwell**

> *Working with Drinkwell has allowed Robi to not only expand our corporate client footprint as Robi powers water ATM booths across Dhaka but also aligns our growth alongside SDG 6 around ensuring safe water for all — a win-win for both business and society.*
>
> **Adil Hossain, EVP, Enterprise business, Robi**

Catching up with our past grantees: Wonderkid

About Wonderkid

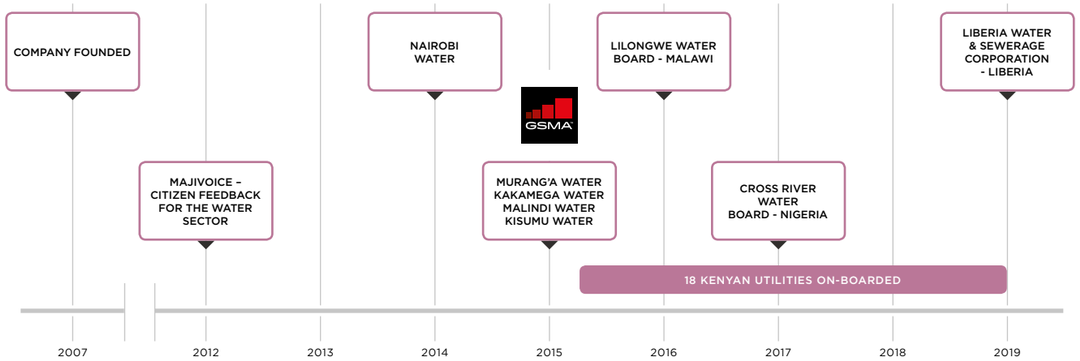
- **Location:** Kenya, Malawi, Nigeria and Liberia. Also active in Mozambique and DRC with non-utility-focused technology products
- **Use of mobile channels:** SMS, mobile apps, mobile money
- **Mobile operator partner:** Safaricom
- **Website:** https://www.wonderkid.co.ke/

The National Development Plan of Kenya seeks to make basic water and sanitation available to all by 2030. Currently, nearly 60 per cent[23] of Kenyans have access to basic water sources.[24] Kenyan water utilities lose 30 to 85 per cent of their revenues due to commercial or infrastructure problems.[25]

Established in 2007, Wonderkid tackles water and sanitation challenges in Africa by providing software-as-a-service solutions to over 30 utilities across the continent. It offers a range of solutions to support digitisation, from meter reading (by customers and meter readers) to billing, customer management, accounting and human resource management. These and other solutions help public and private sector enterprises gain real-time insights into their operations.

Figure 12

Wonderkid's journey to date



About our grants

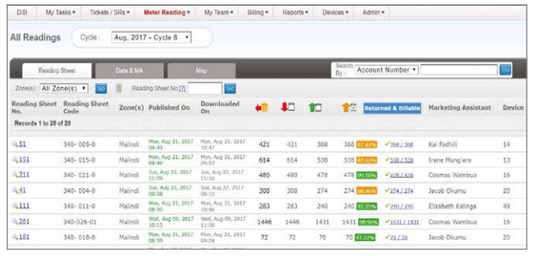
In May 2015, the GSMA M4D Utilities Innovation Fund awarded a grant to Wonderkid to help it develop a suite of mobile tools for four water utilities in Kenya: Kisumu Water and Sanitation Company (KIWASCO), Muranga Water and Sanitation Company (MUWASCO), Kakamega Water and Sanitation Company (KACWASCO) and Malindi Water and Sanitation Company (MAWASCO). The grant supported Wonderkid to develop a complaint management and tracking system that allows customers to report maintenance and upkeep issues. It also offered a mobile app for meter readers that allows them to enter the meter reading and supplement it with a photograph of the meter reading for verification purposes in real time. A self-meter reading and payment system also allows users to send their own meter reading via SMS and receive a preliminary bill with instructions for paying via mobile money using Safaricom's M-Pesa.

23. Society for International Development Kenya (2018), "Abridged Report".
24. WHO, JMP and UNICEF data
25. WASREB (August 2018), "Non-Revenue Water Audit of WSPs: Final Report".

Examples of Wonderkid's solution interfaces

Screenshot of Wonderkid's mobile app interface for meter-reading staff

Marketing flyer for customers explaining the use of self-meter reading features



Snapshot of KIWASCO's complaint management platform

Results and impact

1. Benefits for end users

The end users of Wonderkid's solutions are both utility employees and water users. For example, via its Integrated Mobile Utility Management (IMUM) platform, customers can report an issue with the utility by sending an SMS, calling customer support, filling in an online form or visiting the office. This enables customers to receive timely and accurate updates using a complaint reference number, and enables staff to accurately monitor the resolution time for each complaint and have an overview of the entire process to assign the complaint to the relevant department, such as billing, technical or finance.

> *Previously, logbooks were used and a lot of documentation and filing [was done; these were then] dispatched to different offices [and field zones]. It was quite a process compared to now — complaints are logged first on the computer then passed on to the right person for action [via computer or mobile phone], which is fast and direct.*
>
> **KIWASCO customer care staff, Kisumu, Kenya**

> *I am ranked high among staff meter readers because of the shorter time frame I read meters and the quality of pictures taken. The digital system makes work easy, there is less paperwork, it is accurate and eliminates doubts in reading [because supervisors] can counter-check easily. It enhances work output thus I can do 180 readings per day.*
>
> **KIWASCO meter reader, Kisumu, Kenya**

2. Benefits for water utilities

a. **Improved revenue collection:** Wonderkid's software solutions were instrumental in helping many utilities reduce their non-revenue water. Through the GSMA grant, KIWASCO, one of four utilities supported by the project, recorded a 28 per cent increase in revenue collected and an eight per cent increase in revenue billed. After the grant, a sustained bill collection efficiency of 94 per cent helped KIWASCO senior management prioritise investments, including increasing employee salaries in 2017.

   In 2016, Wonderkid developed a mobile billing app for Lilongwe Water Board in Malawi. The project has helped enhance billing efficiency, revenue management and staff productivity. The seamless customer experience (receiving an instant accurate bill), coupled with an aggressive utility marketing campaign, resulted in an eight percent increase in revenue collection.

b. **Improved customer complaint management processes:** In 2012, Wonderkid developed a customer complaint management system, MajiVoice for Nairobi City Water and Sewerage Company Ltd (NCWSC), which received support from Kenya's Water Services Regulatory Board. It was observed that the number of customer complaints recorded at NCWSC rose almost ten-fold, resolution rates climbed from 46 per cent to 94 per cent and time to resolution halved between 2013 and 2015. Since this project, with the support of the Water Services Regulatory Board of Kenya (WASREB), , the MajiVoice system, has since been extended to 18 water service providers in Kenya.

c. **Mobile payments help reduce the cost of cash collection:** In partnership with Wonderkid, KIWASCO prioritised the implementation of digital payments for its services and has managed to close all cash collection tills in its utility offices. The partnership with LWB in Malawi saw a significant rise in the value of mobile money payments: 156 per cent within a year of implementation.

   In 2016, Wonderkid partnered with MAWASCO to install its IMUM platform, which provided a suite of mobile tools for water utilities to improve the quality of their customer care and billing services. This project also led to a 31 per cent increase in the value of mobile money payments made by the customers between 2016 and 2017.

3. Working with mobile operators

Wonderkid's association with mobile operators began in 2012, when it rolled out mobile-based utility tools while providing software solutions to the water sector. Since then, Wonderkid has worked with several mobile operators, including Safaricom, Airtel Kenya, Airtel Malawi, TNM Malawi and MTN Nigeria. With a strong focus on the use of core messaging services, mobile apps and mobile money services, partnership with mobile operators has been instrumental in Wonderkid's success.

> *"Collaborating with the utilities and mobile operators, we were able to create building blocks to enhance adoption of digital payments. Our partnership with the mobile operators leverages on joint marketing efforts to market these products to customer segments. Mobile operators have expertise in marketing and designing clear and concise customer journeys for different market segments and through their existing channels. As our partnerships progress, we have shared potential hurdles to further adoption including transactional fees for the use of mobile money platforms."*
>
> **Halima Murunga, Head of Business Development, Wonderkid**

Our quarterly blog selection

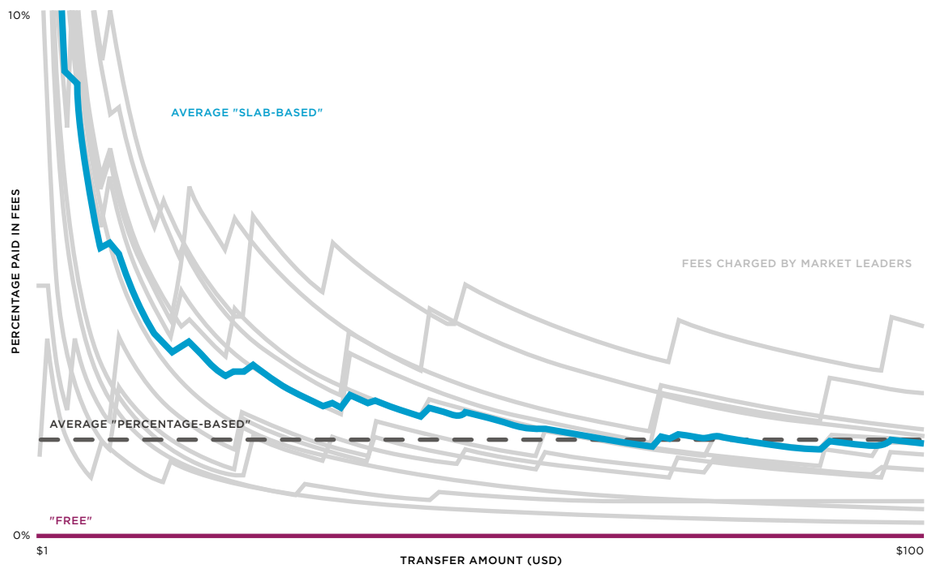
Mobile money transaction fees and utility bill payments in emerging markets

Authors: Leonard Kore and George Bauer

According to the GSMA 2017 *State of the Industry Report on Mobile Money*, Sub-Saharan Africa alone has 135 live mobile money services processing $19.9 billion transactions in value per year. The growth and increased sophistication of mobile money ecosystems across the globe has progressively allowed for the adoption of (pay-as-you-go) mobile utility bill payments in the energy, water and sanitation sectors.

Mobile utility bill payments benefit utility service providers and end users by increasing payment transparency, reducing leakage, curbing operational cost and providing avenues for financial inclusion, but they also benefit mobile operators by helping to drive mobile money adoption, average transaction value and transaction frequency. For instance, in May 2015, Wonderkid received a grant from the GSMA Mobile for Development Utilities Innovation Fund to deploy mobile tools, including mobile payments solutions for four water utilities in Kenya. Between August 2015 and December 2016, the Kisumu Water and Sewerage Company, one of the water utilities supported by the project, increased revenue collection by 28 per cent. Meanwhile, operators benefitted from an increased number of mobile money transactions to pay bills (71 per cent increase), and a 50 per cent increase in the value of these transactions over the same period.

However, when mobile money transaction fees account for a significant proportion of the average end user utility bill payment, it can be a significant barrier to widespread adoption. Generally, mobile money transaction fee pricing models can be broken down into three categories: "(1) slab-based pricing, where transactions within a predefined range are charged a flat fee; (2) percentage-based pricing, whereby the user pays a flat percentage of the amount sent, regardless of amount; and (3) free, with no transaction cost incurred by the user." Slab-based pricing, the most widespread mobile money pricing model, is the most expensive one (on a percentage basis) for the smallest transactions."



Source: CGAP, *How Do Mobile Money Fee Structures Impact the Poor?*

Though a slab-based pricing model is more user-friendly than a percentage-based model, especially among users with low levels of numeracy, it can also weaken the economic case for mobile money adoption in the context of pay-as-you-go utility payments, which are often characterised by small, but frequent transactions. This is particularly true in the context of first-time mobile money users and in nascent mobile money ecosystems, where fees are often interpreted as an insurmountable entry cost.

This has important implications for both utility service providers, and potentially, mobile operators. Rather than passing on the entire cost of the transaction fee to the end user, utility service providers could, for instance, consider whether there is a business case to absorb part of the transaction fee. For example, mobile operators might test if losses from a reduced transaction fee could be offset by higher mobile money penetration (especially in the long run). Three of our GSMA M4D Utilities Innovation Fund grantees (and their MNO partners) addressed this through different innovative partnership models:

Introducing a new tariff: CityTaps, in partnership with Société d'Exploitation des Eaux, a water utility in Niger, deployed smart meters that let subscribers pay for household water on a pay-as-you-go basis using mobile money. Given that CityTaps' customer base is largely made up of low-income households, the company quickly realised that the lowest transaction fee charged by their MNO partner Orange Niger (100 CFA, approximately USD 0.20) for payments between 1,001 and 2,000 CFA) was too high since the average value of individual household water payments was significantly below Orange Niger's 1,001 to 2,000 CFA tariff. To address this, CityTaps successfully negotiated with Orange the introduction of a new tariff of 500 to 1,000 CFA with a significantly lower transaction charge of 50 CFA. Customers are now able to make smaller but more frequent payments without facing a disproportionally high transaction fee.

Fee absorption by the utility service provider: Safe Water Network (SWN) is improving access to water services by deploying mobile money services for pay-as-you-go household meters and water ATMs in rural Ghana. Similar to CityTaps, the majority of SWN's customer base are low-income users who pay for water in frequent micropayments. Given the immense revenue gains from introducing mobile payments, SWN decided to absorb the transaction fee in order to ensure widespread adoption.

Fee reduction by the mobile operator: Fenix designs, manufactures and distributes ReadyPay Solar, a mobile payment-enabled solar panel, which empowers off-grid residents with affordable access to clean electricity. MTN Uganda's decision to reduce transaction fees for ReadyPay Solar services not only facilitated the expansion of off-grid solar solutions, but also positively impacted MTN Uganda's revenues. In 2014 alone, Fenix's 13,000 customers made over 100,000 mobile money transactions, which made Fenix the third largest bill pay account by transactions for MTN Uganda. MTN Uganda also increased its customer base, as 13 per cent of ReadyPay Solar customers were previously not MTN Mobile Money customers.

In certain contexts, MNOs have already established special transaction fee categories to facilitate mobile money adoption for small merchants, utility bill payments or businesses displaying a high social impact potential. For instance, in Kenya, Safaricom introduced M-Pesa Kadogo, a permanent tariff that scraps all transaction fees for both P2P and merchant transactions below Ksh 100 (approximately 1 USD). Safaricom also reduced the lowest transaction value possible from Ksh 10 to Ksh 1 (the lowest monetary denomination in Kenya) to facilitate frequent micropayments.

As these cases exemplify, there is no "one-size-fits-all approach". Crucial factors, such as average utility bill payment value, mobile money penetration and MNO pricing power, are highly context-contingent. Despite this contextual diversity, the Mobile for Development Utilities programme recently held a mobile operator workshop in Kigali, Rwanda, to identify best practices for transaction charges in the context of utility bill payments. Some takeaways included:

i. Operators identified the need to scrutinise transaction costs for utility bill payments given that they are a regularly occurring essential service.

ii. Utility service providers are expected to clearly highlight the operator-business case for lowering transaction fees. Beyond obvious indicators, such as a utility service's ability to drive mobile money transaction frequency and value, this could also include a given service's potential to scale, or its alignment with alternative MNO KPIs. (For more, please consult our Mobile Money Payment Toolkit).

Though utility bill payments already generate some revenues for MNOs, the growth of pay-as-you-go utility service provision (the pay-as-you-go solar industry

is projected to reach over $6 to $7 billion in annual revenues in 2022) and smart meter applications (the global smart meter market is estimated to grow by 9.3 per cent annually from 2017 to 2022) highlight that utility bill payments can be even more substantial drivers of MNO revenue growth in the future. In the public sector, several cities and municipalities are launching utility service payment platforms. In 2017, OR Tambo District Municipality in South Africa introduced the Thetha Nathi and Link platforms in partnership with Vodacom, which allow citizens to request, provide feedback or pay for municipal utility services using a mobile application. Similarly, in Bangladesh, Practical Action received a grant from the GSMA Mobile for Development Utilities Innovation Fund to launch a mobile-based utility services platform, '1Service', in partnership with Robi Axiata Ltd.

For this potential to be realised, utility service providers and MNOs have to continue to collaborate to find practical context-specific solutions. More widespread mobile utility bill payment adoption could also play an important role in achieving the mobile money industry's stated aim of transitioning from a transaction-fee driven business model to a platform-based business model. WeChat's successful app-within-app platform business model, which allows third parties to embed their content or their own functionalities through a mobile money platform, shows where the future of the platform payment industry could be headed. Given that utility use cases necessitate the collaboration of different actors across different ecosystems, they have to be recognized as a key enabler of moving to such a platform-based business model.

MOBILE OPERATORS' ACTIVITIES IN ENABLING ENERGY, WATER AND SANITATION ACROSS EMERGING MARKETS (JANUARY–AUGUST 2019)

LATIN AMERICA

These Cell Towers Run on Solar Power

SENEGAL

Research with Sonatel to show how data collected from mobile phones can help electricity planning

CÔTE D'IVOIRE

Solar energy in Côte d'Ivoire – Orange is its battleground

SOUTH AFRICA

Vodacom Foundation and Partners Present a New Education Ecosystem

INDIA

BuffaloGrid brings mobile power to rural India

KENYA

Safaricom targets utility firms in new IoT network plan

Ekenywa improving WASH in Nakuru public schools

TANZANIA

Tanga Water Authority customers to use Tigo to pay bills through GePG

MALAWI

Malawi's national water utility announces partnership with mobile operator

Airtel Money pairs with Lilongwe Water Board on prepaid electronic bill payments

CAMBODIA

Smart Axiata's VC arm SADIF invests in Cambodian start-ups Okra Solar, Sousdey

ENERGY WATER SANITATION

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