Mobile for Development Utilities

The role of mobile for improved water services in urban Pakistan

WATER AND SANITATION AGENCY RAWALPINDI

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Mobile for Development Utilities

The Mobile for Development Utilities Programme promotes the use of mobile technology and infrastructure to improve or increase access to basic utility services for the underserved. Our programme focuses on any energy, water or sanitation services which include a mobile component such as mobile services (voice, data, SMS, USSD), mobile money, Machine to Machine (M2M) communication, or leverage a mobile operator's brand, marketing or infrastructure (distribution and agent networks, tower infrastructure). The Programme receives support from the UK Government.

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The Innovation Fund

The Mobile for Development Utilities Innovation Fund was launched in June 2013 to test and scale the use of mobile to improve or increase access to energy, water and sanitation services. In two phases of funding, grants were competitively awarded to 34 organisations across Asia and Africa. Seed grants were awarded for early stage trials, Market Validation grants for scaling or replication of business models, and Utility Partnership grants to foster partnerships between utility companies and innovators.

The specific objective of the Innovation Fund is to extract insights from the trial and scaling of these innovative models to inform three key questions for growing the sector:

How can mobile support utility services?
For a mobile-enabled solution to be adopted at scale, what building blocks are needed?

What are the social and commercial impacts of delivering community services to underserved mobile subscribers?

These insights, as well as grant-specific learning objectives, are included in individual case studies and thematic reports that will be published throughout 2016.

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Introduction

Access to improved water sources in urban areas is stagnating. Global trends show that between 1995 and 2015, access to piped connections has remained the same – at 79% of the urban population.[1] In Pakistan, water utilities – Water and Sanitation Agencies (WASAs) – only partially cover the urban population and do not have the capacity to provide a fully reliable service. This situation leads both to unsatisfied customers and to high levels of non-revenue water (i.e. water that is not paid for, due to leakages, theft or inefficient billing). As population grows and people continue to migrate to urban areas, poor service delivery of water to customers and utilities' revenue losses will worsen if utilities do not improve their operations.

In contrast with the unreliable water supply networks, mobile networks have become the predominant infrastructure and the ubiquity of mobile services presents a growing opportunity for water utilities in urban and peri-urban areas to improve the delivery of water. Mobile-enabled smart solutions, from two-way communication services (e.g., SMS reminders, notifications between customers and the utility) to improved management of piped connections (e.g., GSM-enabled machine-to-machine remote monitoring and control of the network) and more efficient billing processes (e.g., mobile bill payment), can help WASAs tackle some of their main challenges and reduce their non-revenue water losses – which can amount up to 40% or higher.[2] Recovered revenues could, in turn, be re-invested to improve their existing networks and connect more households. Currently, approximately 39% of Pakistan's total urban population does not have access to a piped water source[3] and revert to non-piped improved water or non-improved water sources (as does 6% of the urban population, an increase from 3% in 1990) such as unprotected wells or surface water.[4]

In this light, the GSMA Mobile for Development Utilities programme (M4D Utilities), with the support of the UK Government, began working with Etisalat, to explore the opportunity for Mobile Network Operators to develop smart management solutions for water utilities to improve their services to piped connections in Pakistan. Based on desk research and field visits, Pakistan's telecom sector presents a very dynamic market, fulfilling several of the technology requirements needed to leverage mobile solutions for improved delivery of water services. However, this improvement will only be realised with the support of the government, the willingness of utilities to change their business models, as well as with the support of international donors to finance technology improvements.

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1. WB & JMP, 2015 Update, http://www.wssinfo.org/fileadmin/user_upload/resources/JMP-Update-report-2015_English.pdf
2. Meeting with Faisalabad WASA
3. World Bank estimates the urban population at 74.1 million people (39% of total 2015 population of 190 million)
4. WB & JMP, 2015 Update

Recommendations to Mobile Network Operators

Mobile Network Operators (MNOs) should continue to develop their mobile money services to ensure WASAs' customers have access to an efficient way of paying for their water bills, which could in turn improve utilities' payment collection rates. In parallel, there is a great potential for MNOs to leverage their technology expertise to support WASAs transition to metering solutions and develop machine-to-machine (M2M) communication services that can be adapted to the utilities' needs.

Recommendations to Water and Sanitation Agencies

Two WASAs, Faisalabad and Rawalpindi, are pushing to upgrade their network to improve water services through mobile technology – from complaint management platforms to metering solutions. They have the ability to lead the way for the urban water sector and WASAs to change their business models and adopt more performance-driven approaches.

Recommendations to the government

The Government of Pakistan should continue to play an active role to drive changes in the water sector, and provide incentives for WASAs to evolve their business models in order to reduce their losses, as well as train their staff to adopt more efficient processes for collection and reporting of water consumption, including the use of technology and mobile solutions.

Recommendations to Donors

In line with Sustainable Development Goal 6 to implement integrated water resources management, international organisations have an essential role to play to improve the delivery of water services. Through targeted funding and the promotion of efficient management methods, technology upgrades and training, donors can support the Government of Pakistan to lead reforms in the urban water sector.

1. The role of mobile for improved urban water access

In Pakistan, where there has been rapid growth of mobile services, MNOs are well positioned to act as enablers and strong partners for water utilities to improve service delivery and increase connections. As MNOs continuously innovate and expand the functionality of mobile networks, they can provide new socially impactful services for the water sector. Beyond providing basic mobile communications, they can bring secure, integrated services as well as large-scale network management experience.

1.1 Mobile channels for water access

In the water sector, the strongest mobile offering lies in the bundling of services, specifically communication, monitoring and payment to water utilities:

- Mobile services: to improve customer relationship management with two-way communication (e.g., complaints management systems, alerts on water rates, or on shortages) between the customer, the utility and its staff.

- Manual or remote monitoring of water service delivery: to report, in real or near-real time, on water flow, consumption and quality through mobile-enabled sensors / smart meters, mobile apps or SMS;

- Mobile billing and payment systems: to allow for flexible, multiple and smaller payments from customers as well as to provide an effective tool for water utilities to improve revenue collection.
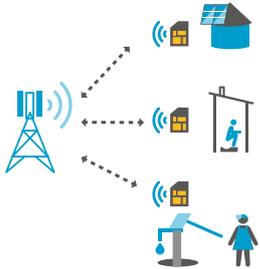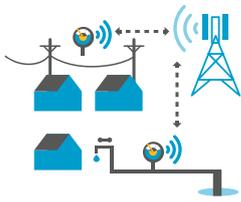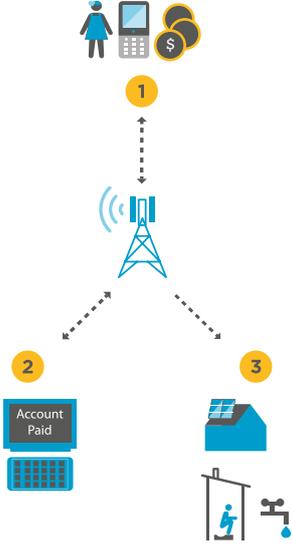
FIGURE 1
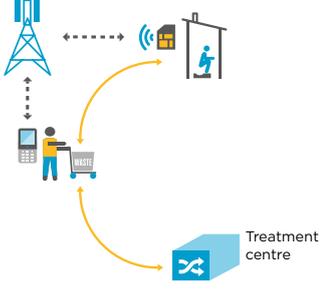
Mobile channels for water access

Machine-to-machine (M2M) connectivity	Mobile payments	Mobile services
Smart metering and monitoring of utility systems over GSM networks improves their lifetime and efficiency, triggers more responsive maintenance and repair, and provides insights into customer behaviour. It also enables on/off control of services to customers on a pay-as-you-go (PAYG) arrangement.	Mobile payments (mobile money services, SMS payments, airtime) can enable the development of PAYG models and other innovative financing schemes. In addition to supporting remote and secure collections, mobile payments are also can also create a digital record of payments, for those without a prior credit history.	Mobile services (voice, SMS, USSD, apps) can be used by communities, village agents, and service providers to report service delivery status, improve field operations, optimise supply chains, or provide customer support.

Metering and monitoring of decentralised utility services

Mobile payments for energy, water and sanitation products and services

Two-way communication platform to collect and disseminate critical utility systems information

Smart metering and monitoring of grid energy and piped water services

Optimise supply chain logistics for improved sanitation with SMS, USSD and mobile web platforms

Table 1 summarises the use cases where mobile technology can help tackle some of the main water service delivery challenges utilities face. These will be developed further in section 2 of the report.

TABLE 1

Using mobile solutions to address water service delivery challenges

Service delivery challenge	Mobile channels for service improvement
Poor monitoring and maintenance of infrastructure leading to high technical and non-technical losses	• **Mobile services (voice/SMS/data):** for manual reporting of functionality, leaks or theft; • **GSM-enabled M2M technology:** Automated, remote, and real time monitoring of a system's functionality, leakage and/or volume by using mobile-enabled sensors for standpipes and smart meters for piped networks.
Weak cost recovery leading to limited investment in operations and maintenance	• **Mobile payments**: to allow flexible tariff structure and payments; • **Mobile applications:** to allow accurate meter reading and improved billing.
Lack of water quality control and customer dissatisfaction	• **Mobile services:** Manual reporting of water quality by trained users through testing kits • **Mobile services:** Two way communication, providing reminders, notifications bills, as well as complaint management systems to improve customer's satisfaction; • **GSM-enabled M2M technology:** Automated, remote reporting and monitoring of treatment processes.
Poor internal governance and non-cost reflective[5] tariffs	• **Mobile services or GSM-enabled M2M technology:** Manual or automated data collection for increased transparency that leads to more responsive stakeholders and more accurate bills.

1.2 The urban water addressable market

In South Asia, GSMA estimated that there are at least 58 million people who are covered by mobile networks but have no access to improved drinking water. In Pakistan, 39% of the urban population, or ~29 million people, do not have access to piped water networks yet are mostly covered by mobile networks. In addition, the population who is connected to the water grid will often experience a poor service and supply shortages. There is a strong opportunity for mobile-enabled solutions to help utilities efficiently reduce their non-revenue water losses. In the longer term, utilities could re-invest their recovered revenues to connect the remaining 4.4 million urban dwellers who currently do not have access to improved water sources.[6]

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5.   A tariff that is much lower than the actual cost of purchasing or generating, distributing and retailing water supply
6.   WB & JMP, 2015 Update – 6% of urban dwellers have access only to unimproved water sources

FIGURE 2 | Source: GSMA

Water addressable market in Asia, by population (2013)

>14 MILLION   8-14 MILLION   3-5 MILLION   1-3 MILLION   < MILLION

2.Pakistan: country overview

2.1 Demographic and socio–economic indicators

Pakistan is at the crossroads of South Asia, Central Asia, China and the Middle East. The country is divided into four provinces: Punjab, Sindh, Baluchistan, and Khyber Pakhtunkhwa. The capital is Islamabad. With 190 million people, an expanding economy and considerable natural resources, Pakistan has a strong economic potential to respond to the needs of the rapidly expanding working-age population. However, the GDP per capita remains low at USD 1,333 and an average growth of 3.8% a year (Table 2).

TABLE 2

Key regional indicators

Indicator	Pakistan	India	Bangladesh
Population[7]	190,000,000	1,295,000,000	159,100,000
GDP per Capita (current USD)[8]	1,333.5	1,595.7	1,092.7
HDI Ranking[9] (out of 187 country)	147	130	142
Rural population (%)[10]	62	68	66
Population living on less than USD 1.25/day (PPP) (% of population)[11]	21.0	32.7	43.3

Note: India and Bangladesh, two major markets of South Asia, were selected to provide a comparison.

Despite this potential, Pakistan ranks 147 out of 187 countries in the 2015 Human Development Index (HDI), lower than Bangladesh and India (Table 2). The country faces several governance, socio-economic and security challenges, which need to be overcome in order to reach the Government of Pakistan's target of accelerating its economic growth rate to 7% by 2017.

7. World Bank Data Bank, 2013
8. World Bank Data Bank, 2014
9. UNDP Human Development Index, 2015
10. World Bank Data Bank, 2014
11. United Nation Development Programme, 2009-2010

2.2 Telecoms

GSM coverage and mobile statistics[12]

As Table 3 shows, Pakistan largely has 2G coverage (80% of the population) while 3G coverage is concentrated in more densely populated urban centres (covering 73% of the population). While the market penetration is still low (47% of the total population is unique subscribers), the country's telecom market is competitive with 9 mobile network operators. The four leaders are Mobilink, (28.52% market share), Telenor (27.64%), Zong (18.41%) and Ufone – part of Etisalat Group – (16.37%). In April 2014, the Ministry of Information Technology successfully auctioned spectrum for 3G/4G services in Pakistan. Since then, there has been a rapid uptake of 3G services, which can be leveraged to develop innovative e-services such as mobile-enabled utility services and bring significant benefits to consumers and the national economy.

TABLE 3

Regional mobile statistics[13]

Indicators	Pakistan
GSM connections, including M2M	137,146,971
Unique subscribers	91,457,622
Market penetration, by unique subscriber	47.43%
Mobile money service providers	7
2G Network coverage	80%
3G Network coverage	72.86%
Machine-to-machine connections	480,004

Mobile money and bill payment solutions

Pakistan is one of the most competitive mobile money markets in the world with seven mobile money services providers overall. Mobile money service providers operate under a partnership model with banks. While market uptake has largely been focused on the over-the-counter (OTC) model, mobile money service providers have now shifted priorities to drive uptake of mobile wallets. Through an innovative and flexible approach, allowing biometrically verified SIM holders to open a mobile wallet through a simple USSD request, service providers have seen a rise in both registration and activity levels. OTC transactions are showing signs of saturation as they only increased by 20% from September 2014 to September 2015 while mobile wallet transactions grew by 278% in the same period.[14] MNOs are offering customers the ability to pay for their

12. GSMA Intelligence, Q2 2016
13. GSMA Intelligence, Q2 2016
14. State Bank of Pakistan, 2015, http://www.sbp.org.pk/publications/acd/BranchlessBanking-Jul-Sep-2015.pdf

utility bills, either via OTC or via their mobile money accounts and it is expected that the new regulations[15] will increase the volume of bill payment transactions done via mobile money accounts.
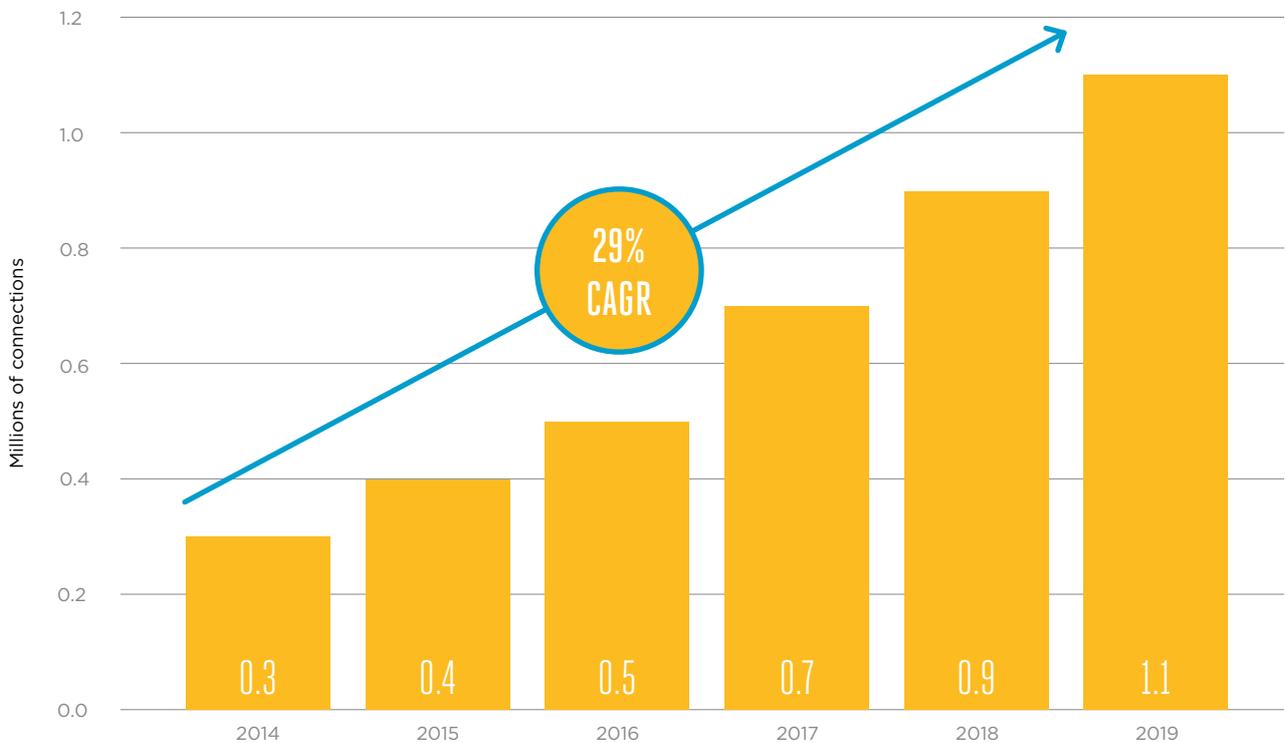
Machine-to-Machine: a nascent market for metering solutions

GSM M2M technology connects machines, devices and appliances together wirelessly via a variety of mobile communication channels, including SMS, to deliver services with limited direct human intervention. Currently, the main M2M services that are being implemented by MNOs in Pakistan are fleet management, security monitoring, and more recently telemetry for the energy sector. With over 415,000 M2M connections in 2015, the market is growing and expected to surpass one million connections by 2019.[16]

FIGURE 3

Growth of M2M connections in Pakistan (2014 – 2019)[17]

Despite a slow start, M2M services are progressively growing, opening up the potential for metering solutions to provide real-time data on customer behaviour and equipment performance. While this opportunity is maturing in the energy sector, most WASAs are not yet metering customers.

15.   Every customer, having a biometrically verified SIM, can open mobile account
16.   GSMA Intelligence data, 2015
17.   GSMA Intelligence data, 2014

2.3 Water access in Pakistan

Over the Millennium Development Goals (MDG) period (1995-2015), increase in access to improved water sources has mainly been driven by non-piped sources in Southern and South-eastern Asia. Since 1990, 471 million people in Southern Asia gained access to improved sources, such as wells and springs.[18] While Pakistan has halved its proportion of the poorest population without access to drinking water since 1995, it did not meet the MDG for access to drinking water.[19] The country is expected to become water scarce[20] by 2035, or earlier.[21] This alarming prediction is a result of a growing population, inefficient water supply management, distribution inequalities and the effects of climate change.

Urban water sources: focus on piped networks

There are three main types of urban water sources: piped, non-piped and unimproved, as illustrated in Figure 4. The main source of water used is piped water on premises, which represents 61% of used sources

(a ten-point increase since 1995). The second most used source is non-piped improved water, such as water taps or standpipes, boreholes, protected springs and rainwater collection, representing 33% of water sources used. There has been an increase from 3.3 million to 11.4 million in the number of people who only have access to unimproved water sources, such as unprotected wells, springs and surface water.[22] However, those who have gained access to an improved water source have done so mostly through piped water.

Alternative water solutions

A majority of poor village and urban slum dwellers in the country who still lack access to piped water systems revert to alternative water sources such as polluted rivers, lakes and shallow hand-dug wells. People who are not connected to a piped network but who can afford it, revert to private vendors who sell the water for up to six times the WASA's price.[23]

FIGURE 3

Urban water sources

Type of water source	Piped water on premises	Other improved water source	Unimproved water source	Surface water
Market share (of the urban population)	61%	33%	6%	-
Use case per type of source				

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18. WB & JMP, 2015 Update

19. The MDG target called for the proportion of the population without sustainable access to safe drinking water to be halved between 1990 and 2015.

20. Defined as less than five hundred cubic meters per capita per year

21. Pakistan Water Gateway, Managing water resources in Pakistan, http://waterinfo.net.pk/?q=node/76

22. WB & JMP, 2015, Update and World Bank: 111.1 million people in Pakistan

23. Meeting with WASA Rawalpindi

Key actors and urban water access initiatives in Pakistan

The water sector is complex and managed by several entities, at different levels. Government bodies are mainly responsible for ensuring a reliable and secure service to Pakistanis through funding, policies and training. Donors have also been playing an essential role in improving efficiencies of WASAs' services.

The Water and Power Development Authority and Water Vision 2025

The Water and Power Development Authority (WAPDA) is an autonomous body under the control of the Federal Government and is responsible for the efficient development of water and hydropower resources. WAPDA has formulated a comprehensive USD 25–33 billion National Water Resource and Hydropower Development Programme: Water Vision 2025. The goals of the programme include preventing water shortages, limiting drought and increasing water storage for a growing population.

Pakistan Council of Research in Water Resources

The Pakistan Council of Research in Water Resources (PCRWR) is under the control of the Ministry of Science and Technology. The PCRWR provides WASAs' staff with training support to improve water management and develop cost and quality effective monitoring solutions, as water contamination is a widespread issue with 80% of pipes contaminated and 60% of water supply schemes inoperative.[24]

Key donors

Several government and international organisations have been working on improving water and sanitation delivery in Pakistan. The Asian Development Bank (ADB) works, in partnership with the Government of Pakistan, on professionalising water management and transforming utilities into performance-driven service providers, focusing primarily on the Punjab and Sindh districts.[25] In August 2016, the ADB issued USD 810 million in funding to help Pakistan improve its grid management. Similar efforts are being led in the water sector by Australia's DFAT under the 12-year Sustainable Development Investment Portfolio. After a first investment of AUD 4 million to help strengthen the capacity of Pakistan's officials to take an integrated approach to water resource management, DFAT is now investing another AUD 11 million on improving energy and water management in the Indus Basin.[26] The World Bank, as well as the Japan International Cooperation Agency, are also supporting the implementation and monitoring of water access initiatives in Pakistan.

City Development Authorities and Water and Sanitation Agencies (WASA)

In the largest cities, City Development Authorities and Water and Sanitation Authorities (WASAs) are responsible for delivering water supply and sanitation services. In Pakistan's Punjab province, water services in the five largest cities— Lahore, Faisalabad, Gujranwala, Multan, and Rawalpindi — are provided by five publicly-owned WASAs. WASAs are accountable to both local and provincial-level authorities, but there is little oversight of their performance. In towns and villages, water supply facilities were built and operated by the provincial governments through their Public Health Engineering Departments.

WASAs' main challenges

Table 4 presents the main challenges water service providers face. The challenge of supplying water services in many cities in Pakistan is compounded by the fact that providers struggle to cover the costs of operation and maintenance due to low tariffs and poor system efficiency, with many dependent on government subsidies and external funding. No WASAs provide their customers with continuous water – water service coverage averages 66%, and in Punjab supply

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24. Meetings with PCRWR, September 2016
25. The Asian Development Bank, 2015 http://www.adb.org/results/keeping-water-flowing-pakistan-s-cities
26. Daily Time, 2016, http://dailytimes.com.pk/business/09-Aug-16/australia-helping-pakistan-in-water-resource-management

is approximately 10 hours a day – and supply is often of poor quality, contributing to illnesses.[27] With high non-revenue water losses – frequently above 40% – water is wasted and its consumption unbilled.[28] As a result, vast amounts of revenue are foregone by utilities instead of being available to improve and extend supply, a substantial loss in the context of growing water scarcity.

Metering is not yet commonly deployed by WASAs: just 3% of connections in Punjab WASAs have functioning meters and are being read.[29] Instead, customers pay a fixed tariff and there is no relationship between the prices customers pay for water, the volume they consume and the real cost of water supply in comparison to the expenditure of WASAs. Without comprehensive metering, utilities' efforts to track non-revenue water losses are compromised.

TABLE 4

Urban water service delivery challenges

Service Delivery Challenge
Poor monitoring and maintenance of ageing infrastructure leads to high non-revenue water • Piped networks lack real time monitoring to detect leakage and theft, as well as to ensure an equitable distribution to all customers • Remote hand pumps and boreholes remain broken for long periods without an active monitoring and maintenance programme • Reliance on manual field reporting and lack of IT systems – usually using excel sheets filled in manually which is prone to errors
Weak cost recovery leads to limited investment in operations and maintenance • Inability of some consumers to pay large monthly water bills • Limited access to in-person pay points • Cash collection not transparent
Lack of water quality control and customer dissatisfaction • Absence of water quality monitoring and dissemination of information to consumers • Lack of wastewater treatment and severe water contamination[30] • Limited information shared between utilities and customers, further undermining repayment rates
Poor internal governance • Fragmentation of the water market between different stakeholders leads to poor data sharing or data loss • Uneven commitment from utilities results in vast disparities in rates of access to water supply services • Lack of funding and need for strategic investment • Non-cost reflective water tariffs
Environment and demographic constraints • High risk of floods in some regions of Pakistan while others are arid • High rates of urbanisation

27. The Asian Development Bank, 2015 http://www.adb.org/results/keeping-water-flowing-pakistan-s-cities
28. The Water and Sanitation Program, 2010 http://www.wsp.org/sites/wsp.org/files/publications/WSP_benchmarking.pdf
29. Ibid
30. Meeting with the Pakistan Council for Research in Water Resources, September 2015

3. Mobile-enabled solutions for improved water delivery

Mobile technology can help in addressing some of the WASAs' operational and financial challenges and in turn improve the delivery of water services to customers. While most utilities are still mostly focused on improving their supply shortages, a couple of them are adopting a forward-looking approach, with the objective to improve the efficiencies of existing infrastructure with metering solutions. The WASA of Faisalabad is leading these efforts by developing their metering strategy.

These efforts will be supported by the development of a strong ecosystem of innovators who leverage mobile technology – from basic mobile communication (SMS, voice) to mobile payment and machine-to-machine technology – for improved water service delivery to urban areas of Pakistan. Dialogue between WASAs, MNOs and other key water stakeholders, need to be pursued in order to take advantage of this opportunity, in view of the significant addressable market.

3.1 A nascent opportunity for WASAs

Filling the absence of government oversight on WASAs' performance, in 2010, the World Bank (WB) and the Water and Sanitation Programme – South Asia produced a benchmark study evaluating WASAs' services and inefficiencies (non-payment, commercial and residential metering, leakages, etc.) in eight cities of Punjab.[31] This study was part of the WB's work to promote the country's economic potential, as the lack of proper water and sanitation services are a major impediment to fulfilling its potential.

Potential target utilities for the deployment of mobile-enabled water solutions

Table 5 presents some of the results from the study, focusing on WASAs' water coverage, average revenue, non-revenue water and metering capacity. The WASAs of Rawalpindi and Faisalabad underwent a detailed training and mentoring programme with the World Bank to identify and analyse the causes of problems or inefficiencies, as well as a rigorous assessment of ways to streamline and enhance operating procedures. Rawalpindi focused on leak detection and repair, as a means to achieving its broader goals of better water quality and lower non-revenue water while Faisalabad pursued revenue improvement through strengthening of its billing and collection systems.[32]

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31. The Water and Sanitation Program, 2010 http://www.wsp.org/sites/wsp.org/files/publications/WSP_benchmarking.pdf
32. Ibid

TABLE 5

Evaluating main WASAs' efficiencies[33]

Indicator	Karachi Water & Sewerage Board	Water and Sanitation Agency Faisalabad	Water And Sanitation Agency Gujranwala	Water and Sanitation Agency, Rawalpindi	Water & Sanitation Agency, Lahore	North Sindh Urban Services Corporation Limited	Directorate of Water & Sanitation, Peshawar Development Authority
Year	2010	2010	2010	2009	2010	2012	2010
Water Coverage (%)	90.00%	50.00%	32.00%	90.00%	89.02%	16.90%	100.00%
Average Revenue (USD/m³ water sold)	0.12	0.14	0.02	0.05	0.09	0.02	0.02
Non-Revenue Water (%)	29.06%	11.63%	46.20%	44%	45.11%	57.09%	22.64%
Water sold that is metered (%)	18.78%	1.32%	0.00%	0.00%	7.16%	0.00%	0.00%

Faisalabad WASA: a champion for Pakistan

Faisalabad is the third biggest city of Pakistan and the fastest growing economically. The WASA is planning to meter all its customers – currently 100,000 residential, 20,000 commercial and 1,000 industrial customers – and is interested in GSM-enabled M2M for metering, mobile payment and communication services to improve its efficiencies. Today, the WASA faces 40% non-revenue water and is working with the World Bank to reduce this to 20%.[34]

The WASA plans to invest PKR 1 billion (USD 9.7 million) in the next three years to equip all customers with smart meters, operating by zone. Customers are divided into 17 zones in order to best target their metering needs. The WASA will start with the industrial customers and then move on to commercial and household customers. During the time of the study, they were evaluating what communication channel they would use for their meters. The WASA is also interested in a two-way communication software

platform, where customers could communicate through SMS with the utility.

Changa Pani Programme: Improving water access to the underserved community of Faisalabad

Beyond their activities in the urban centre of Faisalabad, the WASA has also created the Changa Pani Programme to improve affordable water access in the outskirts of Faisalabad, where the service is often deficient. With the support of the Government of Punjab, the Programme is being developed to provide safe drinking water to the underserved community through metering services. The government has mandated the utility to cover 100% of those areas by 2018.

Rawalpindi Water and Sanitation Agency[35]

Rawalpindi, neighbouring the capital Islamabad, has 2,700,000 people, of which over 50% are customers of the WASA. Customers pay a flat

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33. The Water and Sanitation Program, 2010 http://www.wsp.org/sites/wsp.org/files/publications/WSP_benchmarking.pdf
34. Meeting with the Faisalabad WASA, September 2015
35. The Water and Sanitation Program, 2010 https://www.wsp.org/sites/wsp.org/files/publications/WSP_Rawalpindi_field_note_press.pdf

– non-cost reflective – fee of PKR 98 per month (versus approximately PKR 600 per month that private vendors charge).[36] A comprehensive survey of customers, undertaken with the support of the World Bank, allowed the WASA to notably upgrade its database of accounts, convert illegally connected households into paying customers and expand coverage to unconnected areas with improved services at lower prices. These measures improved revenue collection from 53% to 80% and the WASA is now financially self-sustaining.[37] A few of the proposed recommendations following the survey include:

- Creating water districts/offices and complaint call centres as well as an SMS-based service for customers to have two-way communication with the WASA

- Equipping agents with mobiles with an embedded mobile app to collect data and take snapshots of pipes (and meters when installed)

- Installing commercial (first) and domestic water metering for efficient operation and maintenance of supply. This last action will take time as funding is lacking.

The experience of the WASA of Rawalpindi illustrates both the obstacles and opportunities to support water utilities in improving their operational efficiencies. Even though this is still at a very early stage, there is a role for MNOs to partner early on with water utilities to support their initiatives starting with offering communication services.

3.2 Barriers to market

The opportunity to leverage mobile technology to improve water service delivery is still nascent. However, there is a solid potential, in the medium to long term, for MNOs to play a role in supporting water utilities, as the current barriers to market decrease and both the water sector and mobile markets mature in Pakistan.

Maturity of the water sector

The water sector in Pakistan is complex, governed by different state and local government bodies, each with little accountability to the Government. Poor governance is a major factor to the slow progress of urban water access.

Asset monitoring through metering of customers, although acknowledged as a solution to WASAs' challenges, has not been implemented in Pakistan, instead there is a flat fee which does not cover the cost of delivering water to customers. Currently, most WASAs are focused on filling the supply gap before thinking of technology solutions to improve networks.

However, a couple of WASAs are beginning to look at deploying meters, starting with Faisalabad's WASA, and have the potential to act as champions for the sector.

Maturity of the mobile market

Mobile money is one of the strongest propositions to tackle water utilities' inefficiencies through digital collection. There is a strong opportunity for WASAs to leverage the dynamic mobile money market in Pakistan to improve their revenue collection and ensure better payment rates.

In the longer term, GSM-enabled M2M could become an important part of the mobile value proposition to water utilities, offering real-time data and remote monitoring and control solutions. Although more MNOs are entering the M2M market in view of the significant opportunity (an estimated 25 billion devices could be connected globally through M2M by 2020[38]), there is still a need for MNOs to better define their offering – if they wish to create impactful partnerships with WASAs.

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36.   Meeting with Rawalpindi WASA, September 2015
37.   The Water and Sanitation Program, 2010 https://www.wsp.org/sites/wsp.org/files/publications/WSP_Rawalpindi_field_note_press.pdf
38.   GSMA Intelligence, 2015

3.3 Examples of innovative mobile-enabled water solutions in neighbouring countries

Examples across the region illustrate how mobile can be used to successfully improve water utilities' operations across the region, which could be replicated in Pakistan.

Sarvajal: mobile-enabled water ATM

Sarvajal uses a franchising model where it recruits local entrepreneurs to sell water to communities through water ATMs. Each ATM embeds nine sensors to monitor 25 operational parameters and a SIM card to transmit information (via SMS) in real-time in order to monitor water pressure and filtration performance, and enhance maintenance of the ATMs. Customers get 24x7 access to clean water using RFID-enabled prepaid cards, and can recharge their cards through Sarvajal-appointed agents – just like they buy airtime. About 350,000 people are served daily through 600 ATMs in rural villages, urban slums and schools in India.

FIGURE 5

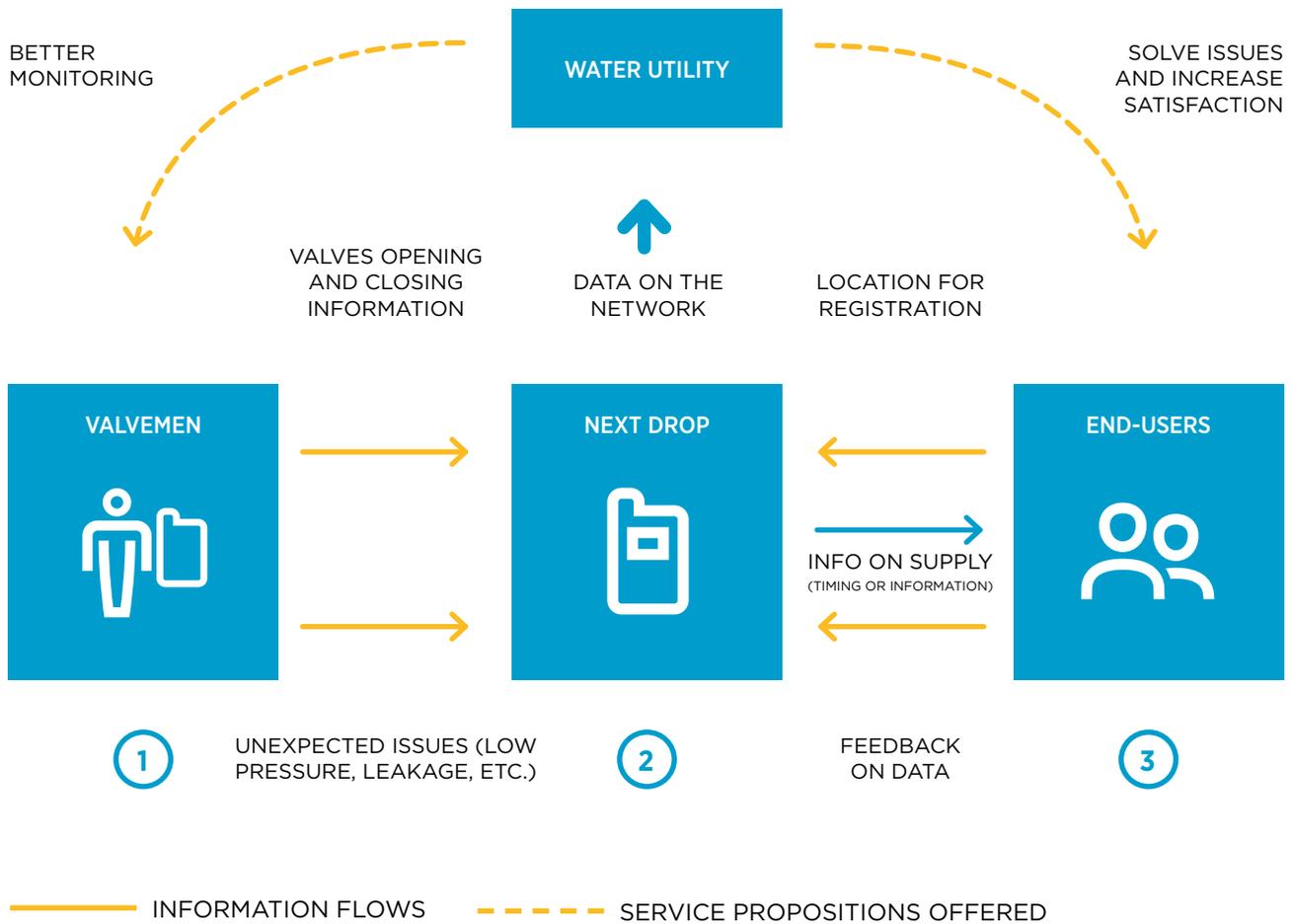## Woman collecting water at Sarvajal's water ATM, using her RFID-enabled prepaid card

NextDrop: mobile communication between the utility and the customer

The water utility of Bangalore operates 8,000 valves on a two-day supply cycle, and has one engineer per 100 valves manually monitoring the valves. While Pakistan's WASAs do not operate the same valve systems, NextDrop is an example of a successful mobile-enabled solution adopted by the utility. NextDrop created an Instant Voice Response (IVR) / Data platform to collect information from valvemen on the status of water delivery and used SMS to communicate it to consumers. This improves both the utilities' management of resources as well as the delivery of the service to customers.

FIGURE 6

Data transferred through NextDrop's service

BETTER
MONITORING

WATER UTILITY

SOLVE ISSUES
AND INCREASE
SATISFACTION

VALVES OPENING
AND CLOSING
INFORMATION

DATA ON THE
NETWORK

LOCATION FOR
REGISTRATION

VALVEMEN

NEXT DROP

END-USERS

INFO ON SUPPLY
(TIMING OR INFORMATION)

1 UNEXPECTED ISSUES (LOW
PRESSURE, LEAKAGE, ETC.)

2 FEEDBACK
ON DATA

3

—— INFORMATION FLOWS   - - - - SERVICE PROPOSITIONS OFFERED

4. Opportunity for MNOs to partner with water utilities

As the use of mobile technology for water services is relatively new, the solution that holds the most immediate potential for success is a mobile communication service between utilities and the end users as well as mobile payments. A two-way communication service not only has the best guarantee of success in the current market as it is relatively simple to put in place, it also replaces the current inefficient and manual complaint management service, and in turn could result in improved customer loyalty and improved payments to the utility.

Mobile payments also hold strong potential for utilities to improve their repayment rates offering an easy way for customers to pay for their bills. While the option already exists, there is more education to be done for customers to feel comfortable using mobile money for the payment of their water bills.

In the longer term, as the water sector evolves and utilities further adopt mobile technology to improve their efficiencies, MNOs should offer M2M services for remote monitoring. MNOs would benefit from increased mobile data traffic, mobile money transactions, and new revenue streams.

4.1 Short term benefits: Reduce customer churn

Customer loyalty is a critical point for MNOs, especially in a market where customers shift very easily from one operator to the other. According to a University of Oxford study on mobile water payments in Africa, 33% of revenue generated by MTN Mobile Money in Uganda was the result of a reduction in customer churn. In line with this, in Tanzania, both Vodacom and Airtel viewed mobile water payments more as an opportunity to build customer loyalty rather than a means to directly drive revenue.[39]

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39. University of Oxford, 2012 http://www.gsma.com/mobilefordevelopment/wp-content/uploads/2012/03/Mobile-Water-Payment-Innovations-in-Urban-Africa.pdf

4.2 Short term benefits: drive growth in mobile money adoption and use

Mobile payment of water services can become part of MNOs' key offering to water utilities to drive the growth in mobile money adoption and use. As a predictable monthly transaction, the water bill payment option is a natural fit within a mobile money provider's suite of products. The revenue generated by the mobile payment option varies by agreement but there is potential for new revenues from water bill pay.

4.3 Long term benefits: Increasing data traffic and number of connections

Offering a connectivity platform for water utilities to transmit data on customer consumption, water quality, systems' operations – remotely (M2M connection) or manually (SMS, voice, mobile app) – will require customers to have meters installed in their houses, at the point of connection. While some of the more advanced utilities are considering metering their customers, residential and commercial, the roll out is currently not fully underway and it will take time before MNOs can efficiently provide these solutions to water utilities and in turn increase the mobile operator's number of users consuming data.

5. Conclusion

While 61% of the urban population of Pakistan is covered by piped connections, water supply to customers remains unreliable and WASAs experience heavy losses due to their inefficiencies with poor billing and repayment rates. Most utilities do not have the budget nor the level of capability required to upgrade their solutions by leveraging technology and specifically mobile services. The WASA of Faisalabad is an exception to the rule and could act as a champion, provided it receives financial support from the Government and international bodies, as well as technology expertise from MNOs and technology providers. This example could lead the way for the rest of the sector to understand the opportunity and the benefits to be drawn from mobile payment, metering and communication solutions for improved revenues and reduced losses.