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Research

Technology in Solving Society's Water Problems in Kenya

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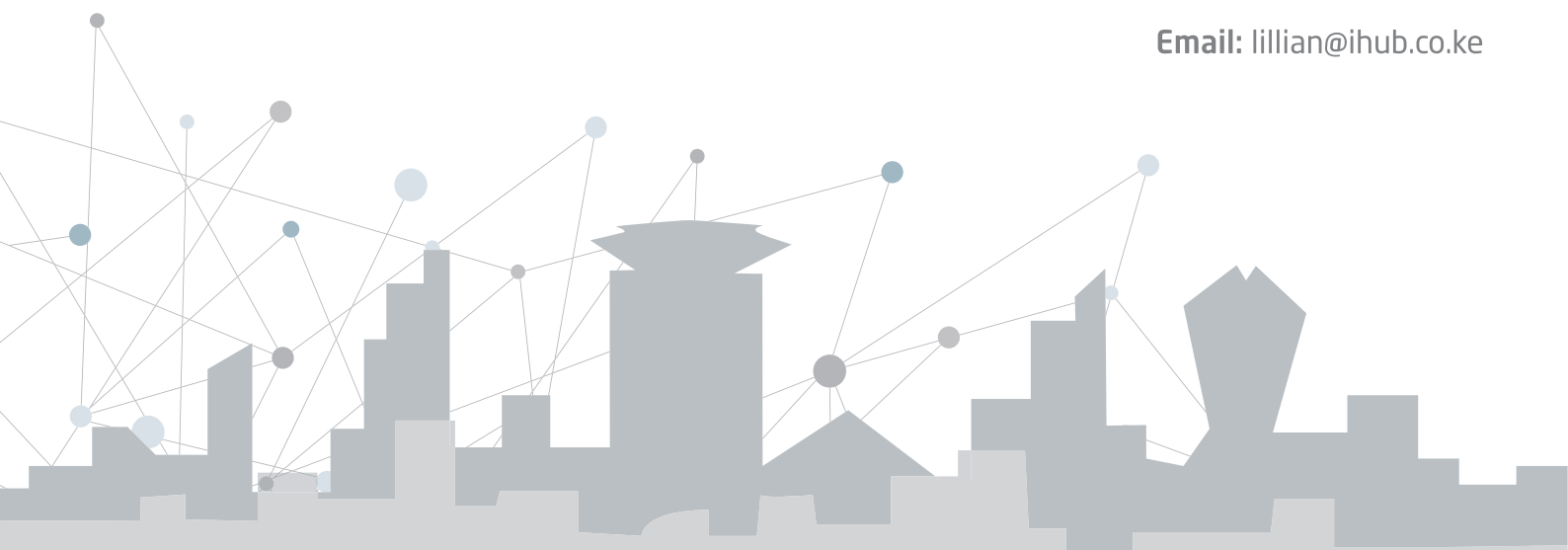**Authors**: **Hilda Moraa**, iHub Research
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Introduction

The potential of technology to solve societal water problems is vast. Water storage, drought, flooding, vague water policies, and lack of information transparency on access to water are some of the water-related problems that citizens face. Consumers and water vendors have spotted the potential of technology in solving water issues and have developed applications and services that can potentially ease water problems.

The technology community has utilized current trends in Information Communication and Technology (ICT) to build relevant applications for the local community. These applications are wide-ranging and include:

- Billing,
- Complaints management,
- Energy-saving systems,
- Information on where to access water.

Water mapping and water catchment solutions have also been used to monitor transparency and corruption related issues in the water sector. A key aspect worth remembering is that technology should be viewed as a strategic research and development tool, rather than a 'magic pill' that will solve all the challenges faced in the water sector.

Solving Water Problems Through Technology

Developing innovative technology solutions around water has gathered momentum within the past year. A thorough literature review was carried out to find out what water applications exist in Kenya.

A total of 20 applications were found that are solving citizens' issues around the theme of water. Of these, 10 of them are active - the target community is using them to reduce their water problems. The other 9 applications - most of which were developed in the context of tech competitions such as Water Hackathon, Appcircus, Mobile boot camps, among others - are inactive because the development team decided not to continue working on the project based on various challenges faced as mentioned below.

Challenges Faced in Water Application Development

Based on a series of interviews conducted with the developers of the 20 applications, the following challenges were identified as factors that resulted in the discontinuation of the applications:

01   Scalability

The 9 developers who did not pursue their ideas past the competition stage revealed that lack of capacity and absence of a clear sustainability model to further develop the idea contributed to its stagnation.

02   Lack of funding

Most of the entrepreneurs who developed the water applications have little financial capital for growth. They depend on the limited incentive they get from the competition that range from $1,000 to $50,000 - amounts not enough to sustain their ideas to scalability in the long run. With limited funding opportunities, they end up focusing on other businesses that generate quicker revenue.

03   Lack of Support

Only the participants who make it as the winners receive full support and follow-up attention. The rest end up with no mentorship or guidance support from the organizers of the competition or the general community to continuously improve on their innovation in aspects such as project management, business development, market research and design thinking among others. This jeopardizes their chances of future success.

04   Partnerships Required

For most of these applications to be successful, they require a partnership strategy that is well structured. Most of the interviewees did not have or did not know how to initiate partnerships. The important partnerships identified are from the state and private institutions, such as service providers and telecoms, for example to provide affordable rates of running the applications or to cost share with other partners of the project for the application to remain free and sustainable for the users.

05   Lack of Buy-in from the Government

More support from Government than currently exists is required. The water applications studied target the Base of the Pyramid where the Government is already heavily involved in policy-making and strategic planning. If the different ministries do not give support and collaborate with the entrepreneurs, then the success of the application slows down significantly.

06 For the Sake of a Competition

Many of the entrepreneurs who participate in competition are students or young startups who either have no clear vision of what they want to achieve or are doing it for the sake of competitions and not looking at the bigger picture. Many of these individuals are simply in it for the incentives and once the competition is over, are only thinking about the next competition. And when such people do win the incentive prize, there is no one to advise on how to invest back into their idea. The winners end up using it for their personal benefit, for example, buying a new computer or car and little to no effort is put to scale the prototype they developed during the competition.

Water Applications Case Studies

Applications built around the theme of water and currently being used around Kenya are profiled below in no particular order.

MajiVoice

Majivoice is a platform for two-way communications between citizens and water providers using affordable, accessible and user-friendly technologies. Through MajiVoice, water consumers can use a mobile phone or website to share their concerns with providers about service delivery, and receive timely feedback on how those issues are being addressed. MajiVoice is currently being piloted in Kenyan towns and cities by the Water Services Regulatory Board (WASREB) to strengthen dialogue between citizens and water service providers, and to ensure timely and transparent resolution of consumer concerns. The aim is to improve efficiency, accountability, responsiveness and transparency of urban water service providers in Kenya. All these ultimately lead to improved service delivery.

Watex System

Watex System is a Satellite technology used to explore underground water in Kenya-especially in Turkana to map water wells. Turkana is one of Kenya's most affected areas faced with chronic shortage of water. The satellite technology will map water wells in Turkana, among other areas. The water-drilling project, is financed by Japanese government, and is supported by Unesco.

M-Maji

M-Maji meaning," mobile-water" in Swahili, is a USSD mobile application to improve clean water access in the slums. M-Maji provides water information system that aims to empower under-served communities with better information about water availability, price, and quality. Water vendors use their mobile phones to advertise on M-Maji and water buyers query the M-Maji database to find the closest, cheapest, and cleanest water. All this is free and accessible on even the most basic GSM phones. M-maji is a project by a group of Stanford students who have teamed up with Umande Trust, an organization based in Kibera that addresses

water and sanitation issues. Because M-Maji is a novel approach to improving clean water access, it was critical to conduct a randomized, controlled evaluation of our system. Weza Tele's contribution to M-Maji involved requirements analysis, design, development, prototyping and testing.

Majidata

MajiData is an online database that aims to assist the Water Service Providers (WSPs) and Water Services Boards (WSBs) to prepare tailor-made water supply and sanitation proposals for the urban slums and low income planned areas located within their service areas. The online database covers all the urban low-income areas of Kenya, which has been prepared by the Ministry of Water and Irrigation (MWI) and the Water Services Trust Fund (WSTF) in cooperation with UN-Habitat, the German Development Bank (KfW), Google org. and GIZ. MajiData will provide the Water Sector with the information required measuring impact and progressing towards the achievement of the Millennium Development Goals and the targets set by our Vision 2030. By urban residents comparing their area with other low-income areas they will be in a position to motivate their providers to improve service levels or prepare project proposals.

SODIS

SODIS technology is a solar water disinfection project by KWAHO. The major goal of the SODIS project is to achieve sustainable improvement of health of the disadvantaged people in the slums by providing quality solar treated water to them. This project is pertinent in this area as one of the major problems for the residents of Kibera slum is having access to water as a whole and more so to safe drinking water, which the project is trying to solve. The project is funded by SANDEC of Switzerland and has a target of reaching 20,000 families (approximately 100,000 persons as direct beneficiaries). The project commenced in March 2004 and has reached more than three quarters of the target population. Families are now able to save on fuel that was previously used to boil drinking water. Savings are made from reduced expenses on medical care and other high cost methods of treating water i.e. chlorination. Safe drinking water has led to reduction in diarrhoea related diseases by about 20% according to the survey by KWAHO.

Ufahamu

Ufahamu is an award winning data visualization platform that creates awareness for water and health related issues. The idea was conceptualized and executed at the NASA Space Apps Challenge in April 21-22, 2012 at iHub. It tackles the data visualization challenge by providing a beautiful interface, which can visualize raw data from open data portal to a mapped visualization, which people can understand without straining. This has been possible, by ufahamu retrieving the data from local and international reliable repositories like opendata.go.ke from the Kenyan government and data.worldbank.org from the World Bank. Ufahamu works on various platforms: mobile, tablet and desktop enhancing diverse accessibility. To date, they have managed to visualize data from population, water to

health issues like malaria (observing the world malaria day on 25th April, 2012), typhoid and diarrhea.

Onkesean

A Complaints management system integrated with a mapping tool for water quality data. SMS Self-meter reading has been added to this, to allow for a fully integrated water quality management system. This application would provide Water Service and Regulation Board (WASREB) and utility companies with a system for a feedback mechanism from the public to ensure that people get quality water services. It also creates impact by enabling the citizens report water supply problems, address issues of public health and sanitation.

Water flow

A Webcam Water Flow system built to estimate the rate of flow of water using computer vision technology. Currently conducting research on how the solution can be made better by tweaking the already existing algorithms and adding some new components to improve it's accuracy. "The problem has not yet been tested in any real life situation hence it's still in 'the lab' and may take some time before it matures to reach a stable level" says one of the team member we interviewed.

Huduma

Huduma is a citizen feedback and monitoring system. It creates a co-ordinated mechanism that enables citizens to amplify their voices in the demand for services. Citizens can be able to use the web and mobile based platform (USSD) to channel their observations and concerns regarding service delivery via SMS, voice or video, this is then passed directly onto authorities and service providers for redress. Citizens can also be able to report on 6 key thematic areas: health, education, justice, infrastructure, governance and water being a key area as well.

mWater

A mobile app to enable water quality monitoring in low and middle-income communities at a very low cost in regions without municipal water monitoring infrastructures. The mWater app runs on Android phones that cost less than US$100. Users can add new water sources to a water quality network, view previous test results, or enter new results to a source. Results are automatically uploaded to the cloud for analysis.

Banki ya MAji (BYM)

The BYM mobile application is a household oriented utility that allows its users to track their water consumption on a monthly basis. Users can manually view the volume of water they consumed for each month they are subscribed to the BYM service. Additionally, the BYM service itself will send monthly updates to users without requiring their interaction. The BYM application will also display the points awarded to the user for any reduced monthly consumption. Partner

information will also be a key feature of the mobile application. The application is available in three varieties: A USSD-based version, an Android version, and in future possibly as a SIM-based application. An iOS version and a J2ME mobile web application may also be created at a later point in time.

Conclusion

Water is life! We need to join hands as different stakeholders in the water arena to support already existing applications and scale them into sustainable projects for development. Most importantly, the developers should work to move their ideas to viable projects, instead of having the mind set of working for the sake of a competition that presents itself in their environ. For the water applications that have stagnated in ideation or development stage, there is need for further monitoring and evaluation to understand why the developers did not invest their time further to scale their ideas to live projects. It is important to learn what needs to be rectified and, if they are feasible ideas, to invest further in them and push such ideas to another level.

Media should also be part of the ecosystem of stakeholders to play a key role to escalate the water stories through writing articles and sharing multimedia data. By supporting and connecting to developers, local media will be empowered to use the data gathered by the various applications to create stories that highlight the main issues reported by citizens. In this way, local media as well as the developer community will influence decision makers at a higher level through open data from the existing applications. Most importantly, because the technology used to develop these water applications does not change but acts as a strategic tool that amplifies citizens' voices through transparency, participation, accountability and service delivery components.

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