

FACTORS INFLUENCING CUSTOMER ACCESS TO PIPED WATER AND SANITATION SERVICES IN LOW INCOME URBAN AREAS: A CASE OF MERU TOWN, MERU COUNTY, KENYA

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ABSTRACT

A large number of urban residents in sub-Saharan Africa live in slums often characterized by lack of basic services such as water, sewerage and electricity. This is as a result of pressure due population growth, aging infrastructure, climatic change and unsustainable convention water management mostly employed in the region thus posing a huge challenge in managing the unreliable and scarce water resource. Meru Town is not exemption to this phenomenon as in that there are few sanitation facilities and also many people do not access to safe drinking water source. The purpose of this study was to establish the factors that influence customer access to piped water and sanitation services in low income urban areas in Meru Town. The study aimed at determining the influence of; physical parameters, affordability, institutional and structural constraints on customer access to piped water and sanitation services in low income urban areas. The research design used in the study was descriptive research. The target population comprised of 1080 households and 15 staff members of Meru Water and Sewerage Services. The sample size was from two stakeholders namely (i) 105 households and (ii) Purposively sampled 15 staff members of Meru Water and Sewerage Services. To determine the validity and reliability of the interview schedule, a pilot- testing was carried out in a different slum (Kigore) with similar characteristics like those other three. During the field study, information was collected from randomly selected households from three urban poor areas on accessibility and affordability of piped water and sanitation

services. The instruments used were questionnaires and interview. Data analysis was carried out using SPSS. The study sought to determine how physical parameters influence customer access to piped water and sanitation services in low-income areas of Meru town. The study was interested in assessing the influence of Cost of water on customer access to piped water and sanitation services in low-income areas of Meru town. The study further sought to find out the influence of institutional constraints on customer access to piped water and sanitation services in low-income areas of Meru town. The study further sought to determine the influence of structural constraints on customer access to piped water and sanitation services in low-income areas of Meru town. The study concluded that physical parameters, and the influence of cost of water positively and significantly influence customer access to piped water and sanitation services in low-income areas of Meru town. The study further concluded that institutional and structural constraints moderately influence positively and significantly the customer access to piped water and sanitation services in low-income areas of Meru town. The study recommends that water, sanitation and hygiene education programmes should be in place. The study also recommends that community should be sensitized to participate in water supply development needs to be fostered through expression of the demand, the selection of technology and its sitting, the provision of labour and local materials, cash contribution towards project costs and the selection of the management type. The study further recommends that the

WSPs should focus on building the capacity of the community on the maintenance of existing water sources.

Key Words: *customer access, piped water, sanitation services, low income urban areas, Meru Town, Meru County, Kenya*

INTRODUCTION

Water is essential for drinking and other domestic uses, such as bathing, cooking and other washings. Almost 1.1 billion people worldwide do not have access to clean water and over 2.2 billion lack access to basic sanitation facilities, 80% these people being in Asia and Sub-Saharan Africa (Zuinet al., 2011). In a WHO of 2010 study, it was reported that only 35% of the urban population in sub-Saharan Africa have access to a piped water connection in their households (Zuinet al., 2011)

The focus of this research project will be to examine the factors affecting accessibility of water and sanitation service provision in low in-come areas of Meru town, Meru County, Kenya. Kenya's development of the water sector has been based on the fact that water is fundamental human right and basic needs essential for ecological and socio-economic development. The need to provide access to good quality water and sanitation services to low-income urban residents cannot be overemphasized. Many governments in sub-Saharan African countries concentrate their priorities on middle and upper income households to the detriment of the poor (Kahkonen 1990) mainly due to political power of the middle and upper classes. Access to water is a key factor in improving health, economic productivity and social well being of the human populace as both social and economic activities rely heavily on the quality and quantity of water. Access to water is therefore an essential component of any effort to alleviate poverty. The eight millennium Development Goals (MDGs) are directly or indirectly related to (access to) water. For example, Goal 7, target 10 of MDG – providing sustainable Water Services aims at halving the proportion of world population without access to sustainable safe drinking water by 2015. The water sector reforms currently being implemented in Kenya are also considered an essential pillar in the government's poverty reduction strategies, the economic Recovery strategy for Wealth and Employment Creation (Kenya, 2003), and the ambitious Vision 2030. The government recognizes that in order for the country to achieve the MDGs there is need to make water available, accessible and affordable to all consumers.

The water Act No.8 of 2002 requires a county government to form autonomous water companies with independent boards of directors. The companies should be formed to provide water and sewerage services, and re-invests accrued revenues in service delivery and improvement. Ironically, these companies do not own both the water resources and capital investment, these are owned by the licensors constituted as regional Water Service boards and in this case Tana water Services Board (TWSB). The boards are also vested with powers to license private water companies. Water is one of the most important public services that any government should strive to avail to its citizens. Human beings at whatever stage of development and social economic conditions have the right to access drinking water in quantities and quality equal to their basic

need. Prior to enactment of Water act 2002, the government had in place a policy paper that intended to ensure water for all by the year 2000. However, it was not achieved and hence the current reforms took effect. (Ministry of water and Irrigation, 2007; Water Sector Reform in Kenya and human Right to Water)

Despite recent increase in sector investments due to water sector reforms, improvements in water supply services, coverage have not kept pace with population growth. This implies that the overall water supply provision is not adequate (Ministry of Water and Irrigation; 2009; Water Services for Kenya, National Water Services Strategy and Pro-poor Implementation plan). Provision of water especially in the rural areas remains the biggest challenge facing the water sector. This is because most of the people who live in rural areas are poor and may not be able to meet water bills as they have no regular source of income.

STATEMENT OF THE PROBLEM

Water, being an essential part of human life is required for day to day activities. However, the problem lies in accessing and affording it. Many people in developing countries lack access to clean and affordable water (Millennium Development Goals report, 2008). Commercialization of water services has increased the inaccessibility of water services (Multinational, monitor, 2001). In developing countries like Kenya, withdrawing public services only creates a vacuum in social services since the private actors operate on commercial or market principles which may not necessarily take care of social responsibilities that the state is supposed to take care of. (Ba, 2006). In Kenya, the government has set up a regulatory body to regulate and monitor the operations of the water supply services, but this does not absolve government's obligations. Both regulator and the service providers have to complement and not replace government measures to ensure equal and adequate access to water for all. The price of water has tremendously increased following commercialization of water service provision. The service provider pegs any investment on value for money and return on investments. The high price for water will result in the use of untreated water, which will ultimately affect the health, social and lives of the people.

In Meru town, there is very low connectivity to the public water distribution system, and even when water Kiosks are introduced to serve in areas where pipe networks are not possible, it does not stay in operation for long. The kiosk ends up being shut by water service provider for non-payment and people result to getting water from other sources. This is common in the three proposed study area. These residents are not fully benefitting from the current water utility because of myriads of drawbacks. The big question to be posed to this study will be; 'what are the main factors affecting accessibility and affordability of water and sewerage services to residents in these areas. This research project will focus on finding out what constraints there are and the strategies needed by water service provider to make water and sewerage accessible and affordable to residents as a means of improving their livelihood.

GENERAL OBJECTIVE

The study aimed to establish the factors influencing customer access to piped water and sanitation services in low-income areas of Meru town.

SPECIFIC OBJECTIVES

1. To determine the influence of physical parameters on customer access to piped water and sanitation services in low-income areas of Meru town.
2. To assess the influence of Cost of water on customer access to piped water and sanitation services in low-income areas of Meru town.
3. To find out the influence of institutional constraints on customer access to piped water and sanitation services in low-income areas of Meru town.
4. To determine the influence of structural constraints on customer access to piped water and sanitation services in low-income areas of Meru town.

THEORETICAL FRAMEWORK

This study shall be based on two theories: Technological acceptance model and the Brett Fischmanns economic theory of infrastructure. A theory as defined by (Mugenda and Mugenda, 2003) is a set of concepts and interrelations that are presumed to exist among concepts. Theoretical Framework is a collection of interrelated ideas based on theories- a reasoned set of propositions which are derived from and supported by data or evidence (Kombo and Tromp, 2006).The two theories will complement each other in this study.

Brett Fischmanns Economic Theory of Infrastructure

Brett Frischmanns economic theory of infrastructure and common management offers a comprehensive new proposal about managing types of resources by providing public access to them on an obligatory and non-discriminatory basis. It critiques any systematic right to exclude as inappropriate a right that would be an integral of a typical resource management scheme based on private property for many resources that are broadly shared and reusable. Brett argues, open access will be more conducive to maximizing the production of public and non-market goods on an ongoing basis. The beneficial process of shared use and re-use, with their many positive spillover effects, would be impeded by granting property right to an owner who then could exclude potential downstream users, based on inadequate signals about demand. Brett concludes that fundamental infrastructure should instead be shared. His theory is important and helpful in addressing current issues of management, organization structure and information

Technological Acceptance Model

This is one well-known model related to Technology acceptance and use. It originally, was proposed by Davis in 1986.Technology Acceptance model provides a basis with which one traces how external variables influence belief, attitude and intention to use. Two cognitive beliefs

are posited by TAM; Perceived usefulness and perceived ease of use. According to TAM, on actual use of technology system is influenced directly or indirectly by the user's behavioral intentions, attitude, perceived usefulness of the system, and perceived ease of the system. The study will adopt this model to explain the role of information in enhancing efficiency and effectiveness of water and sanitation services

RESEARCH METHODOLOGY

Research Design

This study was a cross-sectional survey of households in the three low-income areas of Meru town. The studies were descriptive one meant to describe the relationship of affordability and accessibility with physical, institutional and structural constraints. The major purpose therefore of employing this design, was to describe the nature of the condition as it is at the time of this study so as to explore the associations of a particular condition (Orodho, 2004), thereby giving a snapshot of the conditions of this study. The selection of this study design is in consideration by the researcher to acquire first-hand information from the respondent so as to formulate rational and sound conclusions and recommendation for the study.

Target Population

The target populations were the entire residents of those three areas: Majengo with population of 380, Mjini/Salama with 480 and Shauri Yako with 220, all who reside and have houses there. They form a total of 1080 households with each household having an average of 5.3 occupants (Source; Maji data). The study also covered 15 staff members of MEWASS, the WSP purposively sampled to obtain the information.

Sample Size

The sample size composed of 105 numbers of households, randomly selected from the three slum areas of Meru town and 15 Number of MEWASS staff purposively sampled to give the required information. The reason for this size of sample considered appropriate given the size of the population and complexity of the area, need to get precision, cost and budget consideration. The number of sample size from each slum was distributed as follows:

$$\text{Majengo } 380/1080 \times 105 = 37 \text{ households}$$

$$\text{Mjini } 480/1080 \times 105 = 47 \text{ households}$$

$$\text{Shauri Yako } 220/1080 \times 105 = 21$$

The total number of households in the three areas being 1080, with confident level of 85, marginal error of ± 7 , and a standard deviation of .5

$$\text{Necessary sample size} = (\text{critical value}) \times 2 \times \text{SD} \times (1 - \text{SD} / \text{marginal error}) \times 2$$

$$= (1.44)^{2 \times 5} (.5) / (0.07)^2 = 2.0736 \times 25 / 0.0049 = 105 (\text{Sample size})$$

Sampling Procedure

The sample size was composed of 105 numbers of households, randomly selected from the three slum areas of Meru town and 15 Number of MEWASS staff purposively sampled to give the required information. The reason for this size of sample considered appropriate given the size of the population and complexity of the area, need to get precision, cost and budget consideration.

Data Collection Instrument

The study used structured interview schedule/questionnaires to illicit information from respondents. The questionnaire involved closed-ended questions that were pre-coded; this enabled or allow placement of the respondent's response in the provided set of codes for each of the question. The interview schedule utilized questions that attract likert scale response, which ensured that the tool is adaptable, builds trust and rapport with respondents thereby making it possible to obtain information that respondents probably would not reveal by any other data collection methods. The schedule was administered to the households with help of research assistants due to the anticipated low level of literacy (Orodho, 2004), in addition it ensured collection of accurate information by minimizing respondents interpretation of the questions in the case of self-administered.

Pilot Testing

For the purpose of determining the validity and reliability of the interview schedule, pre-testing was carried out within indifferent slum with similar characteristics like those other three (Ntugumira) which is also within Meru town. The pilot slum did not participate in the study. A purposive sampling of 10 respondents was picked for the pilot test. The household interviewed was measured for consistencies with the test items and to which degrees the test items attract similar and related response from samples in pilot testing exercise-The questionnaire was sent out for external review of the items before and after pre-testing to ensure the tool is valid.

Validity

Validity is the extent which a tool measure measures what its purport to measure (Borg and Gall, 1989) Validity is concerned with whether the findings are really about what they appear to be about. It's the relationship between two variables a causal relationship. Validity of a test instrument therefore is defined as the accuracy and meaningfulness of the inferences which are based on the research. For this study a pilot –study was administering a questionnaire to a small section of the respondent in Ntugumira slum in order to determine the validity of the tool. The indication of the variables was clearly defined and scrutinized and instruments developed to match the study objectives. After analysis of the pilot study, items which needed amendments were amended and those requiring to be removed were removed accordingly. This confirmed the

reliability of the structure, question sequence and logical questions and the one which can elicit the required response. To further enhance validity of the instrument, the questionnaire was reviewed with the help of research experts on its relevance to the topic under study.

Reliability

Reliability refers to the consistence of a measure (Mugenda and Mugenda, 2003). A test is considered reliable if the same results are achieved repeatedly. The test re-test method was applied in the sample to test reliability.

Data Collection Procedures

The data collection involved self-administered questionnaires during the interview schedule to guide selected respondents. Explanation of the purpose of the study was done followed by seeking individual consent to participate in the study. Interviews were conducted in unstructured manner so that the research could be able to collect reliable data by building rapport the respondents. The research assistant was meeting at the end of the day to compare notes and edits their works as well as handing over.

Data Analysis Techniques

It involved both descriptive statistics and inferential statistics to analyze the data and present them.

RESEARCH RESULTS

Inferential Statistics

Data was analyzed using Statistical Package for Social Sciences (SPSS Version 21.0). All the questionnaires received were referenced and items in the questionnaire were coded to facilitate data entry. Inferential data analysis was done using Pearson correlation coefficient.

Pearson Correlation Coefficient

This was used to determine the strength and the direction of the relationship between the dependent variable and the independent variable. The analysis using Pearson's product moment correlation was based on the assumption that the data is normally distributed and also because the variables are continuous.

Results in table 1 reveal that there is a strong, positive and significant correlation between nature of physical parameters and access to water and sanitation ($r = 0.836$). In addition, the study reveals that the correlation between affordability and access to water and sanitation is positive and significant ($r=0.724$). Again the study reveals a significant relationship between institutional constraints and access to water and sanitation ($r=0.716$). Finally the study reveals that the correlation between structural constraints and access to water and sanitation is positive and

significant ($r=0.613$). This implies that all the variables had a positive and significant correlation with access to water and sanitation at Meru County

Table 1: Correlation Matrix

		Access to water and Sanitation	Physical Parameters	Affordability	Institutional Constraints	Structural Constraints
Access to Water and Sanitation	Pearson Correlation	1				
	Sig. (2-tailed)	0.000				
Physical Parameters	Pearson Correlation	0.836	1			
	Sig. (2-tailed)	0.026	0.000			
Affordability	Pearson Correlation	0.724	0.512	1		
	Sig. (2-tailed)	0.023	0.018	0.000		
Institutional Constraints	Pearson Correlation	0.716	0.732	0.586	1	
	Sig. (2-tailed)	0.022	0.016	0.015	.	
Structural Constraints	Pearson Correlation	0.613	0.552	0.516	0.324	1
	Sig. (2-tailed)	0.025	0.026	0.015	0.003	-

DISCUSSION

Physical Parameters

The study sought to determine how physical parameters influence customer access to piped water and sanitation services in low-income areas of Meru town. The study found that most of the residents live in Majengo an area in Meru and that they have access to public roads. It was further indicated that the terrain and site conditions affect pipe network in the area and the drainage pattern of the area are severe problems. These findings are in line with Bosch et al (2001) who argue that difficult sites and terrain; complicated site layouts; and overreliance on conventional service-delivery systems. More often than not the water and sanitation needs of the poor urban communities are hardly incorporated into urban and region planning.

It was also indicated that compatibility of service (Technology) delivery system used is a minor problem. This concurs with Franceys and Gerlach (2008) who indicate that though most of the urban poor are housed in slums, many such areas are often denied access or face cumbersome administrative procedures when it comes to connecting them to official water sources partly because of lack of security guarantees for land and pipelines as well as the problems of affordability.

Affordability

The study was interested in assessing the influence of Cost of water on customer access to piped water and sanitation services in low-income areas of Meru town. The study found that the slowing down of commercial & domestic activities and high water price from vendors was a severe problem. This concurs with the Hermanson and Owens (1990) who claim that poor families living in the informal settlements end up paying more than the higher-income families living in the formal sector, because the costs of extending a water line today is considerably higher than the cost of installing a system of pipes was 20 years earlier.

They also indicated that cost of one M³ billed by MEWASS is a minor problem while time wasted fetching water is not a problem. It was also revealed that Meru residence always observe hygiene. This is similar to Serageldin (1989) who argue that urban upgrading has traditionally been highly subsidized and, as a result, cost recovery has not been a major issue in such projects. It was also revealed that level of tariff / price encourages the MEWASS in its efforts to improve services to the urban. The study further found that there are competitors involved in the provision of water to Meru town area, that they need water supply provision from any alternative providers to supplement your efforts in water supply, operation and maintenance should be handled by a Private company Tuberculosis. These findings are in line with Reed and Coates (2003) who claim that the other drawbacks is the lack of knowledge and skills about accessible and inclusive design among water engineers in low-income countries, mainly because this is not part of their training and because they are unlikely to have seen real examples of inclusive design.

Institution Constraints

The study further sought to find out the influence of institutional constraints on customer access to piped water and sanitation services in low-income areas of Meru town. The study indicated that that the stakeholder's consultation in water service provision is a severe problem. This concurs with Jones and Reed (2005) who claim that the majority of the engineers are male and they traditionally design and construct facilities for the 'average' person, with no user consultation and without considering that, in real communities, people come in a wide range of shapes, sizes and ages and with a wide variety of needs.

It also indicated that corruption and politicization of water service in the area used is a minor problem and that there has been a problem with the water supply and delivery. The study further indicated that Meru residents have access to MEWASS water supply. This is in line with Reed and Coates (2003) who claim that the other drawbacks are the lack of knowledge and skills about accessible and inclusive design among water engineers in low-income countries, mainly because this is not part of their training. The study further indicated that that insecurity, that land with no distinct boundaries, that lack technical knowhow, that frequent breakdown of infrastructure, that illegal connections, that unplanned housing for community, people built on pipeline and that lack of adequate water resources are major problems. It was also indicated that land owners do not

want pipelines to pass through their land and that lack of financial support are minor problems. These findings are in line with Leni Wild et al, (2012) who claim that common constraints and incentives problem in service delivery. The respondents further indicated that inaccessibility, that vandalism and that that difficulty landscape. On the same issue the respondents indicated that MEWASS has ever involved chiefs & elders/ residents/ other stake holders in Meru town area in discussing water supply and delivery issues and many meetings have been held since the last 2 years. These findings correlate with World Bank (2009) who argues that there are the constraints that are at the heart of urban sector definitions and development objectives and devolved services have really devolved everything including nepotism in the workplace.

They also indicated that carrying out sensitization and talking to stakeholders will be helpful in solving some of your water supply problems. They also thought that water bills should not be increased in order to recover the cost and delivery service. It was also indicated that that there is a pro-poor policy in the organization as a service provider. This is in line with Peterson (1987) who claims that the utility company that introduces an effective profit motive into its operations tends to view investment in poor neighborhoods as increasingly unattractive.

Structural Constraints

The study further sought to determine the influence of structural constraints on customer access to piped water and sanitation services in low-income areas of Meru town. The study concurs with Aqua Consultant (2002) who argue that there are constraints that are the most difficult to address, let alone resolve, because they involve conflicting values and policy viewpoints.

The findings show that the population growth and water connection, that the privatization of water provision effect service delivery in the area and that ownership affect connection to water supply are severe problems. De Soto (1989) concurred with these findings by claiming that the legal issues are such that most projects have had to skip over legalization if they are ever to get on with the physical upgrading. Most finish without ever processing a single title. The respondents indicated that children fail/late to go school because they fetch water far, that levels of infrastructure security, that high prices from vendors are major water problem issues. They further indicated that risk of getting hurt while drawing water in difficult terrain/source and that slowing down of both commercial and domestic activities are minor problems. The study findings concur with Hamer (1985) who said that the plan, developed by a U.S. firm, is notable for stating flatly that no population change had been considered for the future of Bogotá because London, England, had a minimal growth rate at that time.

They further indicated that it is not a problem to supply water 24/7 in the supply area, that risk of getting untreated water from unknown source is not a problem and that a lot of time wasted searching for water is a not a problem. This is in line with SomikV,Lall et al (2006) who argue that the Mexican urban land market, one of the most distorted in the region, is a case in point.

CONCLUSIONS

The study concluded that physical parameters positively and significantly influence customer access to piped water and sanitation services in low-income areas of Meru town. The study deduced that most of the residents live in Majengo an area in Meru and that they have no access to public roads. It was further deduced that the terrain and site conditions affect pipe network in the area and the drainage pattern of the area are severe problems. It was also indicated that compatibility of service (Technology) delivery system used is a minor problem.

The study concluded that the influence of cost of water on customer access to piped water and sanitation services in low-income areas of Meru town is positive and significant. The study deduced that the slowing down of commercial & domestic activities and high water price from vendors/wsp are severe problems. They also indicated that cost of one M³ billed by MEWASS is a minor problem while time wasted fetching water is not a problem. The study further deduced that there are competitors involved in the provision of water to Meru town area, that they need water supply provision from any alternative providers to supplement your efforts in water supply, operation and maintenance should be handled by a Private company Tuberculosis.

The study further concluded that institutional constraints positively and significantly influence customer access to piped water and sanitation services in low-income areas of Meru town. The study deduced that the stakeholder's consultation in water service provision is a severe problem. It was also indicated that corruption and politicization of water service in the area used is a minor problem and that there have been a problem with the water supply and delivery. The study further indicated that that insecurity, that land with no distinct boundaries, that lack technical knowhow, that frequent breakdown of infrastructure, that illegal connections, that unplanned housing for community, people built on pipeline and that lack of adequate water resources are major problems. It was also indicated that land owner do not want pipelines to pass through their land and that lack of financial support are minor problems. The respondents further indicated that inaccessibility, that vandalism and that that difficulty landscape. The study also deduced that carrying out sensitization and talking to stakeholders will be helpful in solving some of your water supply problems. The study also deduced that water bills should not be increased in order to recover the cost and delivery service. It was also indicated that that there is a pro-poor policy in the organization as a service provider.

The study further concluded that influence of structural constraints on customer access to piped water and sanitation services in low-income areas of Meru town is significant. The study deduced that the population growth and water connection, that the privatization of water provision effect service delivery in the area that high prices from vendors are major water problem issues. It was also deduced that it is not a problem to supply water 24/7 in the supply area, that risk of getting untreated water from unknown source is not a problem and that a lot of time wasted searching for water is a not a problem.

RECOMMENDATIONS

The study recommends that water, sanitation and hygiene education programmes should be in place. The education given to the community should focus on attitudinal changes towards water treatment using water treatment tablets and building their own toilets, and there should also be a focus on creating awareness concerning consequences of using poor quality water.

The study also recommends that community should be sensitized to participate in water supply development needs to be fostered through expression of the demand, the selection of technology and its sitting, the provision of labour and local materials, cash contribution towards project costs and the selection of the management type.

The study further recommends that the Meru residents should focus on building the capacity of the community on the maintenance of existing water sources. This can be achieved through training and strengthening of the water user's committee. From the study, the water users committees were found to be inactive in water resource management.

The study also recommends the residents to demand for more water sources especially boreholes and tap water is high as they were the main source of clean and safe water and also reliable during the dry economic factors that were seen to affect accessibility to portable water supply included low household income which hindered the ability of the community to purchase clean 50 seasons. The Government, NGOs and donors should help in the construction and the community members contribute towards maintenance.

The study recommends that for MEWASS to satisfy its customers it should improve on customers complains to lack of water, do regular line inspection and attend to reported leak and bursts within the shortest practicable time and on the illegal water connection, the study recommends that MEWASS improve on field surveillance to detect, disconnect and monitor all re-connections to minimize loss of water through illegal connections.

The study also recommends that revenue base should be improved by dispatching the bills in time and all money due collected in time. The study further recommends that bills to be paid through other institutions such as banks and other money transfer systems. The study in particular recommends that the Meru officials should focus more on loss of water through storage and conveyance, illegal water connection, efficiency in revenue collection and increased demand for water to ensure provision of water to its customers.

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