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Influence of infrastructure financing on financial sustainability of water service providers in Kenya

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Purpose. To establish the influence of infrastructure financing on financial sustainability of water service providers (WSPs) in Kenya.

Design/Method/Research approach. The study adopted the pragmatism research philosophy and an explanatory sequential mixed design targeting some senior managers selected from the eighty-eight registered WSPs in Kenya. A structured questionnaire was used to collect the quantitative data while an interview schedule was used to collect the qualitative data from key informants. The data analysis was done on the bases of descriptive and inferential statistics; the nature and size of relationship was tested using correlation and the regression analysis while the results are presented using tables and graphs.

Findings. The study concludes that Infrastructure financing has a positive and statistically significant influence on financial sustainability of WSPs in Kenya.

Theoretical implications. The research proves that infrastructure financing has a statistically significant effect on financial sustainability of WSPs in Kenya.

Practical implications. Taking into account the findings, it is recommended that the National government via the National treasury and WWDAs should ensure that all funding proposals capture end-to-end financing so as to increase the last mile connectivity.

Social implications. The study also identifies the need for the Ministry of Water, Sanitation and Irrigation (MWSI) to collaborate with key stakeholders in order to tap into local resources and development grants.

Originality/Value. The study makes a unique contribution by establishing that infrastructure financing significantly influences financial sustainability of water service providers in Kenya.

Research limitations/Future research. There is need to explore the possibility partnerships with communities and NGOs as the sector is highly indebted and unable to service the current loan portfolio.

Paper type. Empirical.

Keywords: financial sustainability; infrastructure deficit; water; last mile connectivity; stakeholders.

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Вплив фінансування інфраструктури на фінансову стійкість постачальників послуг з водопостачання в Кенії

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Мета роботи. Встановити вплив фінансування інфраструктури на фінансову стійкість постачальників водних послуг (ПВП) у Кенії.

Дизайн/Метод/План дослідження. Застосовано філософію прагматичних досліджень і пояснювальне послідовне змішане проектування, що націлені на керівників вищого рівня серед вісімдесяти восьми зареєстрованих ПВП у Кенії. Для збору кількісних даних застосовано структурований опитувальник, для збору якісних даних від ключових інформаторів проведено співбесіди. Аналіз даних проведено на основі описової та інференційної статистики; характер і розмір взаємозв'язку перевірено за допомогою кореляційного та регресійного аналізу, результати представлені у вигляді таблиць та графіків.

Результати дослідження. Проведений аналіз дозволяє стверджувати, що фінансування інфраструктури має позитивний та статистично значущий вплив на фінансову стійкість ПВП у Кенії.

Теоретичне значення дослідження. Дослідженням доведено, що фінансування інфраструктури має статистично значущий вплив на фінансову стійкість ПВП в Кенії.

Практичне значення дослідження. Беручи до уваги висновки, національному уряду рекомендовано забезпечити процес, щоб всі пропозиції щодо фінансування охоплювало наскрізне фінансування, а також збільшення підключення до «останньої милі» через Національну скарбницю та агенцію з розвитку водних робіт.

Соціальне значення дослідження. Визначено потребу Міністерства води, санітарії та зрошення (MWSI) в розширенні співпраці з ключовими стейкхолдерами з метою використання місцевих ресурсів і грантів на розвиток.

Оригінальність/Цінність/Наукова новизна дослідження. Встановлено, що фінансування інфраструктури істотно впливає на фінансову стійкість постачальників послуг водопостачання в Кенії.

Обмеження дослідження/Перспективи подальших досліджень. Потрібно вивчити можливість партнерства з громадами та неурядовими організаціями, оскільки цей сектор має велику заборгованість і не може обслуговувати поточний кредитний портфель.

Тип статті. Емпіричний.

Ключові слова: фінансова стійкість; дефіцит інфраструктури; вода; last mile connectivity; зацікавлені сторони.

Влияние финансирования инфраструктуры на финансовую устойчивость поставщиков услуг водоснабжения в Кении

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Цель работы. Установить влияние финансирования инфраструктуры на финансовую устойчивость поставщиков водных услуг (ПВУ) в Кении.

Дизайн/Метод/План исследования. Использованы философия прагматических исследований и объяснительное последовательное смешанное проектирование, нацеленные на руководителей высшего уровня среди восьмидесяти восьми зарегистрированных ПВУ в Кении. Для сбора количественных данных применен структурированный опросник, для сбора качественных данных от ключевых информаторов проведены собеседования. Анализ данных проводился на основе описательной и инференционной статистики; характер и размер взаимосвязи проверялся с помощью корреляционного и регрессионного анализа, тогда как результаты представлены в виде таблиц и графиков.

Результаты исследования: Проведенный анализ позволяет утверждать, что финансирование инфраструктуры имеет положительное и статистически значимое влияние на финансовую устойчивость ПВУ в Кении.

Теоретическое значение исследования. Доказано, что финансовая устойчивость ПВУ в Кении существенно зависит от финансирования инфраструктуры.

Практическое значение исследования. Учитывая результаты исследования, национальному правительству рекомендуется обеспечить процесс, чтобы все предложения по финансированию охватывало сквозное финансирования, а также увеличение подключения к «последней мили» через Национальную казну и агентства по развитию гидротехнических сооружений.

Социальное значение исследования. Определена потребность Министерства воды, санитарии и орошения (MWSI) в расширении сотрудничества с ключевыми стейкхолдерами с целью использования местных ресурсов и грантов на развитие.

Оригинальность/Ценность/Научная новизна исследования. Исследование делает уникальный вклад, установив, что финансирование инфраструктуры существенно влияет на финансовую устойчивость поставщиков услуг водоснабжения в Кении.

Оригинальность/Ценность/Научная новизна исследования. Необходимо изучить возможности партнерства с общинами и неправительственными организациями, поскольку этот сектор имеет большую задолженность и не может обслуживать текущий кредитный портфель.

Тип статьи. Эмпирический.

Ключевые слова: финансовая устойчивость; дефицит инфраструктуры; вода; last mile connectivity; заинтересованные стороны.

1. Introduction

Globally, water is considered a basic human right, a key input in the industrial and commercial sectors as well as a major contributor to economic development *(Montgomery, Bartram, & Elimelech, 2009; Chitonge, 2010; Tsitsifli et al., 2017)*. It is also considered a source of life for all living things, it is a medium of transport, a key input in agricultural production, a solvent and a temperature regulator *(Aung, Jiang, & He, 2018; Martínez-fernández, Neto, Hernández-Mora, Del Mora, & La Roca, 2020)*. This recognition contributed towards the push for efficiency, public participation, accountability and financial stewardship in the provision of water *(Langford, 2005; Means, Ospina, & Patrick, 2005)*. In the process, water was eventually important under the UN Millennium Development Goals (MDGs) with the objective of reducing by half the population without access to water and basic sanitation *(Hering et al., 2015; Lester & Rhiney, 2018)*. The focus was turned towards increased investment in the sector aimed at improving access to water across the globe *(UNICEF & World Health Organization, 2015)*.

Under the Sustainable Development Goals (SDGs), economies, sought to track the broader aspects of water service provision including access, quality, efficiency, integrated management, transboundary cooperation and public participation *(Ait-Kadi, 2016)*. The SDGs also put more emphasis on financial sustainability in the provision of the various aspects of water *(Satterthwaite, 2016)*. The need for sustainability, emanated from the fact that, some countries reported regressive access rates as of the end-term review of MDGs (*Satterthwaite, 2016*).

As a result, within the SDG, the economies under SDG 6, committed towards addressing accessibility and sustainability of water management for all by the year 2030 as provided for under the sustainable development goal number six *(Satterthwaite, 2016; Alaerts, 2019)*. Despite the commitment to increase global access to water and sanitation, the access rates in Kenya have remained very low, 59% and 17% and with annual growth rates of 0.9% and 0.2% for water and sewerage respectively (*WASREB, 2020*). *Fig. 1* shows the water and sewerage coverage over the period.

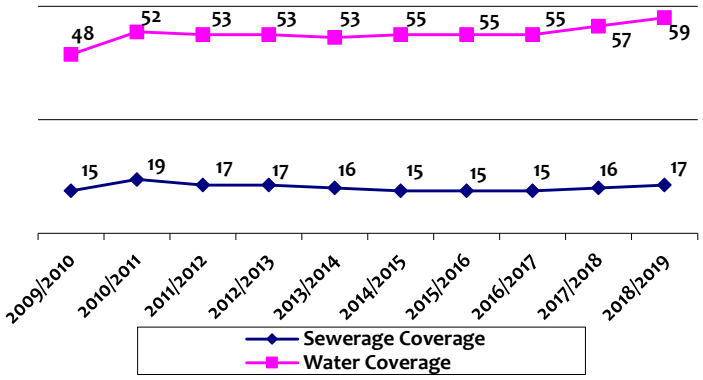

Figure 1: Water and Sewerage coverage, 2009-2019, %*

**Source:* compiled by the author based on *WASREB (2020)*.

Financial sustainability in water service provision is not only important in ensuring universal access to water, but also a major consideration by development partners interested in financing the sector (*Schwartz, Tutusaus, & Savelli, 2017*). The level of operation and management (O&M) cost recovery is an input in the assessment for credit worthiness of water service providers, while high levels of O&M cost coverage enables WSPs to have some retained earnings which can be utilized for extension and continuity of services provision (*Mitlin & Walnycki, 2019*). The need for realization of financial sustainability partly contributed towards the global move to commercialize water service provision in addition to realizing increasing access and equity in the 1990s (*Rusca & Schwartz, 2017*). The success of the push for financial sustainability through commercialization of water service provision is, however, yet to be ascertained because utilities across the globe continue to report a declining trend in O&M cost coverage *(Van den Berg & Danilenko, 2011)*. In a study by the World Bank to establish the performance levels for water and waste water utilities across the world, it was established that the global O&M cost coverage declined from 1.11 in 2000 to of 1.05 in 2008 (*VAN den Berg & Danilenko, 2011*). Similarly, O&M cost coverage in Sub-Saharan Africa declined from 1.26 in 1995 to 1.16 in 2009 *(Marson & Savin, 2015)*.

In Europe, a study covering 162 utilities across 4 countries established that the O&M cost coverage declined from 0.74 in 2007 to 0.66 in 2011 (*Tsagkaraki et al., 2014*). In Asia, a study by the Asian Development Bank (ADB) found out that cost recovery declined from 1.03 in 1995 to 0.89 in 2001 *(Asian Development Bank, 2004)*. The study covered 50 utilities in 34 ADB member countries (*Asian Development Bank, 2004)*. In addition to the declining financial sustainability trends, none of the countries has consistently attained the acceptable O&M cost coverage benchmarks which varies from 1.30 to 2.00 depending on the reference geographical area (*Marson & Savin, 2015*). In Kenya, the need to ensure sustainability of the water sector was initiated in the late 1990s by the government (*Van de Loo, 2011*). In the Sessional paper no. 1 of 1999, lack of attainment of full recovery by water utilities across the country was identified as a major setback to attainment of the MDGs (*GoK, 1999*). In the document, various challenges were identified including overreliance on public financing for operation and maintenance, fragmented management of the water schemes across the country, lack of a clear legal framework. Others were inadequate resources for network expansion and rehabilitation, cost insensitive tariffs, and uneven water resource distribution (*GoK, 1999*). The government proposed four key solutions including water resource conservation, supply of adequate quantities of good quality water and safe disposal of waste water, establishment of effective and efficient institutional framework, development of sound and sustainable financing mechanisms for the sector (*GoK, 1999*).

This was finally actioned through formulation and operationalization of the Kenya's Water Act 2002 *(Schwartz et al., 2017)*. In the Act, the government provided the legal framework necessary for the implementation of the strategies laid down under the sessional paper no. 1 of 1999 (*Rampa, 2011*). Institutional framework was created that separated policy, regulation, resource management and water service provision in order to foster financial sustainability of the sector (*Schwartz et al., 2017*). The Act became operational in March 2003 and the regulator started tracking the performance of the Water Service Providers (WSPs) from 2005/2006 financial year. Among the parameters that were tracked was the level of Operation and Management

(O&M) cost recovery as a key parameter for the financial sustainability. A WSP is assumed to have attained the financial sustainability once 150% O&M cost coverage is attained. Since its implementation, it is estimated that 99% of the WSPs in Kenya are yet to attain the set full cost recovery (FCR) level of 150% of O&M cost coverage (*WASREB, 2018*).

Inability to realize sustainability could be attributed to high levels of inefficiency, sub-optimal water pricing, overreliance on subsidies, failure to implement current technology in the management of water and low water coverage. For instance, according to the *EWFD* (*2000*), financial sustainability is influenced by pricing, efficiency, investment financing, asset management, subsidies, implementation of the right policies and public participation. This notwithstanding, however, there is limited current, empirical and domesticated research linking infrastructure financing to financial sustainability of WSPs. For instance, although governments have increased infrastructure financing to the water sector, it is worrying that the infrastructure financing gap continues to grow *(Wu, 2011; Unnerstall & Messner, 2015)*.

A few studies exist in terms of infrastructure financing, however, they focus on affordability at household level *(Montgomery et al., 2009)*. The few that have explored on infrastructure financing and financial sustainability at WSP level, only sought to quantify the financing gap (*Vučijak, Pašić, & Bijelonja, 2018*). Kenya's Vision 2030 envisages attainment of 100% coverage by the year 2030 and the estimated cost of the required new investment is Kshs 100 Billion annually against an available budget of Kshs 40 Billion annually (*WASREB, 2019*). Whereas investments in the sector have been envisaged, the issues of how sustainability will be realized in order to assure realization and continuity in the realization of the policy pronouncements, remain silent. There was therefore need to undertake a study aimed at establishing the influence of infrastructure financing on the financial sustainability of WSPs to inform policy discourse, debate and dialogue.

2. Theoretical background

Lack of universal coverage for water and sanitation assets continues to be a common problem for the sector primarily due to insufficient financing for new asset development and also to rehabilitate ageing ones *(Ruiters, 2013; Bhattacharya et al., 2012)*. Given the long repayment period and the low creditworthiness of water companies, the bigger financing for water and waste water assets continue to be from government budgets and to some extent concessional loans and grants (*Alaerts, 2019*). Despite the rising budgetary contributions from governments, the impact of such financing is minimal because the actual financial requirement is close to 500% of the current provision (*Alaerts, 2019*). This calls for diversification on the sources of financing and also for improvement of the WSP revenue earning capabilities to enable self-financing of infrastructure (*Alaerts, 2019*). Owing to the growing need for water infrastructure development and renewal, several studies have been undertaken in this area.

A global review that sought to find out the main sources of water infrastructure financing established that the choice of financing was informed by options available, the cost of financing and the credit rating (*Alaerts, 2019*). The study was undertaken using secondary data covering the years from 1990 to 2015 and projections for up to 2020. The results show that the richest countries financed their infrastructure development through the national budgetary provisions, while most developing countries financed their water infrastructure development through debt. Some rich countries like France, however, manage water through concessions in partnership with private players; England and Wales embraced full privatization while others like Philippines and China employed public–private partnerships in selected cities. Such arrangements are possible in rich economies because the sector is able to earn and collect enough to sustain itself.

Another major source of water financing in the developing nations is multilateral and bilateral financing usually advanced through the ministry of finance who then cushions the utilities from risks. While the public water sector in the developed nations has attracted commercial sector financing, it is still a rare occurrence among the developing nations. The good credit rating of public water utilities, stable markets, strong regulatory regime and convincing proposals are cited to have contributed to the attractiveness of public water utilities to commercial financing. The poor credit rating results from the inability of the water utilities to raise adequate funds to finance their operation and maintenance costs and loan repayment. This study used descriptive statistics due to the limitations presented by the available data with only trends and proportions being established. The study sought to explain the reason for the choice of financing as opposed to the influence of the financing on financial sustainability as is the case with the current study.

While some studies have been undertaken to find the motivation for adopting certain water infrastructure financing options, some studies undertaken on water infrastructure financing have sought to establish the various financing options adopted by different countries. In Japan, *Shibuya, Hernández-Sancho, & Molinos-Senante* (*2014*), sought to establish the status of water management across the country, and found that for the years between 1991 and 2010, the Municipal Bond redemption formed more than 50% for water service providers' financing, followed by subsides by local governments, subsidies by national government, contribution from customer revenues, and other sources respectively. This study was done through trend analysis and using data obtained through the Japan Water Works Association (JWWA) database. The study recommended that the tariff rates should be enhanced so that it covers all the developmental and asset renewal costs because of the continuously declining subsidies from both levels of the government *(Shibuya et al., 2014)*. The inability to raise adequate financing which would cover asset renewal costs was identified as a main cause of decreased efficiency levels which led to reduced cost coverage hence poor financial sustainability. This study failed to measure the size of influence because only the association of variables could be measured through trend analysis.

In West Virginian Municipalities, it was established that the preference for grant financing was informed by the additional loan repayment burden imposed on the water users in the case of loan financing (*Erfanian & Collins, 2018*). The study was undertaken to find out what informed water charges in West Virginia by utilizing secondary data collected from reports and the analysis was done using descriptive statistics and regression analysis. The results of the study showed that debt financing caused an increase in water charges by $2 for every 4,500 gallons which informed the recommendation that the investment in water infrastructure should be financed through grants as opposed to loans. The preference for grant financing was motivated by the desire to keep water prices at affordable levels *(Erfanian & Collins, 2018)*. Since not all countries have embraced full cost recovery pricing for water, this finding is considered applicable in the countries which allow water charges to include loan repayment. This study focused on the cost of access to water by customers and thus failed to link infrastructure financing to financial sustainability as is the case in the current one.

Similarly, a study undertaken in the United States to examine the impact of pay-go and debt infrastructure financing on the volatility of capital investment recommended the use of either of the two sources as guided by the economic performance of the country (*Wang & Hou, 2009*). The study reports that both cash-financing and debt-financing reduced capital expenditure volatility. According to this study, many states borrowed heavily in the 19th century in line with the Keynesian theory but defaulted to pay (*Wang & Hou, 2009*). The study was undertaken using panel data analysis, using a robust model to correct autocorrelation while fixed effects were used to take care of unobservable factors. The model regressed capital spending against the time

with an assumption that expenditure is randomly distributed around the trend line. The study recommended the use of more internal financing (pay-go) for infrastructure financing under normal circumstances and the use of debt during the economic downturn. This study used secondary data to find the relationship between infrastructure financing and financial sustainability while the current study uses primary data.

In order to find the optimal financing model for water infrastructure in South Africa, *Ruiters* (*2013*) undertook a study which identified several management challenges that led to water infrastructure investment gaps including: the economic feasibility of water infrastructure, lack of proper strategic planning, incomprehensive financing and economic analysis and sub-optimal pricing policies (*Ruiters, 2013*). The study was undertaken through surveys, interviews, review of reports, observations, focus group discussions and case studies. In South Africa, water infrastructure is majorly financed by the government grants as water pricing has continued to be charged either at or below marginal cost of supply and the deficit is covered by tax revenues (*Ruiters, 2013*). Although the country had other existing infrastructure financing options including: government through revenue fund, infrastructure grants (municipal and regional) and through water pricing; the study recommended the use of alternative financing models including: financial markets, public-private partnerships (PPPs), private sector markets, demand risk funding model and by approaching water infrastructure funding institutions (*Ruiters, 2013*). This study concentrated in identification of infrastructure financing gaps as opposed to assessing the influence of the financing on financial sustainability.

A follow-up study in South Africa revealed that the infrastructure development in south Africa was majorly financed though: water charges, guaranteed loans, government grants and donor grants (*Ruiters & Matji, 2015*). In the study which was done to offer a solution to the growing infrastructure financing gap. The data for this study was collected by using surveys, interviews, document review, observations, focus group discussions and case studies with a sample of 46 participants drawn from different institutions including: The National Treasury, water management institutions, Funding agencies, local government and municipalities. The analysis was undertaken by way of a scenario analysis with models considering different infrastructure financing mix. According to this study, South Africa's annual depreciation was estimated at R160 million, while the financing gap stood at R600 billion with an estimated resource infrastructure development cost of R66.3 billion. The deficit was attributed to: the inability of the Department of Water Affairs to raise commercial funding, inadequate maintenance of the existing infrastructure, and lack of implementation cost reflective tariffs, lack of integrated water management and being public sector driven there is a poor customer focus, and inability to retain appropriate skills. This study focused only on establishing the different financing model and its impact on the access to water without linking the financing models to the WSP's financial sustainability.

Unlike other countries which face an ever-growing water infrastructure financing gap, China is one of the countries that has managed to cover the infrastructure deficit (*Wang, Zhang, Zhang, & Zhao, 2011*). The results of a study undertaken to examine the impact of using unconventional water infrastructure financing in China, showed that such models led to revenue volatility for water utilities. The data used for the study was collected through a contextual review of the Chinese institutions and policies on urban infrastructure financing, and through interviewing relevant government officials; and analyzed using descriptive statistics inform of percentages. According to this study, there are two main financing sources: internal and external. Internal sources comprise of taxes, user charges and fees while external sources comprise of loans and grants. However, the government can transfer the burden on such investments by the use of Public Private Partnership (PPP) arrangements. Of the total financing the government sources funded up to 34%, water charges and fees accounted for about 2% of infrastructure financing while off-budget funding financed up to 58 % by year 2007. Even though other sources take up the highest infrastructure financing budget, they are volatile and therefore affect the revenue stability aspect of financial sustainability (*Wang et al., 2011*). The study focused on a review of the infrastructure financing based on secondary data which was analyzed using percentages unlike the current one which uses primary data analyzed using the descriptive and regression analysis. It also fails to link the infrastructure financing options to financial sustainability as is the case in the current study.

A global comparative study undertaken with an aim of establishing an acceptable leverage level for water utilities recommended a debt ratio of between 0.4 to 0.6 (*Hassanein & Khalifa, 2007*). The study was undertaken using ratio analysis including: current ratio, asset turnover, debt to equity ratio, return on sales, return on equity, and working ratio for water drawn from the USA, the UK, Egypt, Africa, South East Asia and Latin America (*Hassanein & Khalifa, 2007*). The results of the study on leverage levels were that, in the USA the debt-to-equity ratio amongst public utilities was found to be 0.58 and 0.71 for water only utilities and water and sewer utilities respectively, while for water only private utilities it was 1.2; in the UK the ratio amongst private water utilities was 0.49 and 0.67 for water only utilities and water and sewer utilities respectively. In Africa, for water only utilities the debt to ratio was 0.87, south East Asia had 0.09 and 0.51 for water only utilities and water and sewer utilities respectively. In Latin America, for water and sewer the ratio was 0.47 while in Egypt the debt-to-equity ratios were 0.85 and 0.31 for water only utilities and water and sewer utilities respectively. The recommended ratio is 0.4-0.6 indicating the high dependence on loan financing. Water and sewer utilities in the USA had a higher debt to equity ratio of 0.71. The inability to get data relating to similar reporting periods across the globe resulted in the analysis being undertaken on a non-uniform period; the inconsistency of the periods under investigation might have resulted in some discrepancies. Additionally, the study used the ratio analysis with the information drawn from financial statements; it is therefore prone to the weaknesses linked with the use of accounting estimates in financial reporting. It also fails to use sector-specific measures for the various variables under study as used in the current study.

In Ghana, a study on infrastructure financing established that water and sanitation infrastructure is majorly financed through user water charges through the establishment of a reserve fund which was set up in 1994 (*Badu, Edwards, Owusu-Manu, & Brown, 2012*). The data was collected through the use of structured interviews and a questionnaire given to infrastructure development agencies; the data was factor analyzed for reliability while the nature of relationships was determined using the mean and standard deviation (*Badu et al., 2012*). The financing model was found to be such that revolving fund amounts were invested in both treasury bills and high interest earning investments (*Badu et al., 2012*). Water price in Ghana was based on full cost recovery covering asset renewal, loans provisions and administrative costs. The study established that the water sector in Ghana was able to consistently raise adequate funds for the infrastructure development (*Badu et al., 2012*). The implementation of the full cost pricing was, however, accompanied by the rebates of up to 5% to cushion water users who are not able to pay (*Badu et al., 2012*). The results of this study support the use of own revenue generation in ensuring the revenue stability aspect of financial sustainability of water utilities. Compared to the current study, this study only shows relationships and fails to link infrastructure financing to cost recovery of water service providers.

In trying to establish the linkage between cost recovery and access to water, *Marson and Savin* (*2015*) undertook a study covering 225 urban centers in Africa. The data used from this study was obtained from IBNET and national reports; the analysis was undertaken through both ratio and panel data analysis using data ranging from 1995-2012, with data collected relating to 22 countries. The study hypothesized three possible relationships

between cost recovery and investment financing: high-cost recovery provides is own revenue for investment financing, it provides adequate support from grants and fiscal support, and finally it enables utilities to quickly meet the conditions precedent to grant and loan financing from donors. The results advocated to incorporation of the tariffs, taxes, and transfers otherwise known as 3T-infrastructure financing framework to enable financial sustainability *(Marson & Savin, 2015*). The study failed to provide an optimal mix of the 3Ts; it failed to show the influence of infrastructure financing on financial sustainability. Compared to the current study, this study used secondary data; it concentrated on urban centers neglecting the rural areas because of the possible lack of information and coverage while the current study used primary data collected from senior management for the WSPs across the country.

On community water project financing, a study undertaken in Tamil Nadu, India to find out how communities financed Rural water supply, established that the revenue raised by the community water supplies was inadequate to cover the operation and maintenance costs; there were no funds to extend the services and to rehabilitate an ageing infrastructure (*Ramesh, 2016*). The study interviewed a total of 255 water customers spread across 17 villages as a source of primary data. It also reviewed existing financial records in its attempt to establish the adequacy of the income generated from service provision to finance operation and maintenance costs. Revenue variability was examined to assess if the revenue earned was either equal or greater than the budgeted amounts; the results showed that the actual revenue was lower than the budgeted amounts across all the villages under study (*Ramesh, 2016*). Whilst, the villages never achieved their revenue targets, their costs remained within the budget which impaired their cost recovery and their ability to finance infrastructure development for a majority of them (*Ramesh, 2016*). This study focused on the rural water supplies and incorporated water users in the survey while the current one focused on water utilities. In a study that sought to find out whether the Kenya's legal framework created an enabling environment for infrastructure financing, it was established there was need to explore innovative sources of financing like PPPs, concessions and *(Mureithi, Luwesi, Mutiso, Förch, & Nkpeebo, 2018*). The study used the trend analysis of the infrastructure financing in use by the sector, together with the financing need identification for all the entities in the sector and review of the legal framework while the results were presented using charts (*Mureithi et al., 2018*). This study failed to link the influence of infrastructure financing to financial sustainability because it concentrated on establishing the gap and linking it to the legal framework. In Kenya, *Mburung'a* (*2018*) undertook a study to assess the possible influence of capital structure on the sustainability of community water projects in Kieni constituency. The results showed that the source of infrastructure financing affects the sustainability of the water projects (*Mburung'a, 2018)*. The data was collected through questionnaires, interviews and observations from a sample size of 466 respondents distributed as follows: 382 community water project beneficiaries, 73 community water project chairmen, two district water officers and 9 bank managers. The data was analyzed using analysis of variance (ANOVA) and linear regression. It was established that there was a positive relationship between equity and internally generated revenue while there was a negative relationship between grant financing and the sustainability of the community water projects (*Mburung'a, 2018*). This study has limited geographical and institutional scope whereby it is limited to just a single constituency and to community water projects which are privately managed with minimal regulation, this may limit the ability to generalize the findings especially among regulated WSPs. Compared to the current study, it had a limited geographical scope, a constituency, and also targeted water users for the survey unlike the current which targets the water utilities spread across the country.A lot of studies have concentrated on identification of the financing gaps facing water utilities and also their current indebtedness *(Hassanein & Khalifa, 2007*); others have concentrated on the effects of infrastructure financing on the cost of water at house hold level (*Ramesh, 2016*); the few studies which linked infrastructure financing and financial sustainability were done in other countries *(Wang et al., 2011)* or had limited geographical scope (*Mburung'a, 2018*). Thus, there is limited research linking the infrastructure financing and financial sustainability of WSPs in Kenya.

3. Problem statement and Hypothesis

The purpose of this study is to establish the influence of infrastructure financing on financial sustainability of water service providers (WSPs) in Kenya.

Hence the hypothesis that:

H0: Infrastructure financing has no influence on the financial sustainability of water service providers in Kenya.

4. Methodology and data sources of research

This study was anchored on pragmatism philosophy since the researcher was interested in providing empirical based solutions to the financial sustainability concerns among the water service providers in Kenya (*Parvaiz, Mufti, & Wahab, 2016*). The study used mixed methods of data collection whereby quantitative data was collected from WSPs and qualitative data was collected from the water services regulator, water works development agencies and from the policy makers (*Creswell, 2014*). An explanatory sequential mixed design was used whereby; quantitative data was collected and analyzed, followed by qualitative data collection and analysis (*Creswell, 2014*). A mixed research design has been extolled for its ability to tap into the strengths of both the qualitative and quantitative data resulting in a better study (*Creswell, 2014*). It enables an in-depth understanding of the phenomenon being studied (*Leavy, 2017)*.

The target population for the quantitative data comprised of the seven senior managers from each of the eighty-eight registered WSPs, the specific respondents were as presented by *Tab. 1*:

Table 1: The Sample Size for Quantitative Data

Job Title	Sample size
1. Managing Directors	88
2. Manager, Finance and Accounts	88
3. Manager, Commercial Department	88
4. Manager, Technical Department	88
Total	*352*

***Source:** compiled by the authors.

The respondents were identified through multi-stage sampling whereby census sampling was used to identify the WSPs followed by purposive sampling to identify the managers responsible for the variables under study. The target population for the qualitative data comprised of the CEOs from WASREB representing the regulator and all water works development agencies (WWDAs) as the sector asset developers. The Principal Secretary and/or Water Secretary from the Ministry of Water, Sanitation and Irrigation (MWSI) were the policy makers. Purposive sampling was used to identify one participant from each of the participating organization category. The quantitative data was obtained through self-administered structured questionnaires, using the constructs developed from the Water Service Provider Toolkit for Commercial Financing of the Water and Sanitation Sector in Kenya and the Financial Sustainability Rating Tool for Urban Water Systems (*Hoffjan, Federico, Liserra, & Müller, 2014; World Bank Group, 2015*); the qualitative data was undertaken through interviews with industry experts drawn from the MWSI, WASREB and WWDAs.

The data collected was cleaned, coded and analyzed to obtain both descriptive and inferential statistics. Descriptive statistics included mean scores and standard deviation, charts, among others. Inferential statistics included statistical tests (normality, linearity, normality, correlation analysis), regression analysis and analysis of variance (ANOVA) aimed at establishing the nature and the magnitude of hypothesized relationships. In the regression analysis, the relationship was considered statistically significant if the P-value was ≤ 0.05. Prior to undertaking inferential analysis, diagnostic tests for normality, linearity and to rule out heteroscedasticity and multicollinearity were done; while factor analysis was done to establish the adequacy of the sample in explaining the relationship.

5. Research results

5.1. Reliability, response rate and other generalized tests

5.1.1. Reliability test

The reliability of the structured questionnaire was measured using a Cronbach's alpha so as to demonstrate whether the tests and scales constructed were fit for the research purposes. According to *Taber* (*2018*), a Cronbach's alpha of between 0.45 and 0.98 is acceptable. *Tab. 2* illustrates the reliability results of the questionnaire.

Table 2: Reliability Statistics*

Variable	Cronbach's Alpha	*N* of Items	Reliability
Infrastructure financing	0.836	20	Acceptable

*__Source:__ compiled by the authors.

The results in *Tab. 1* indicate that the Cronbach Alpha was 0.836, denoting the reliability of the questionnaire in relation to infrastructure financing.

5.1.2. Response rate

The analysis of the response rate is presented in *Tab. 3*.

Table 3: Response Rate*

Response Rate	Frequency	Percentage
Returned	252	71.59
Not returned	100	28.41
Issued	*352*	*100.00*

*__Source:__ compiled by the authors.

Out of 352 questionnaires that were administered to the respondents, 252 of them were returned for the analysis which translates to 71.59 percent return rate of the respondents. In overall, the response rate was considered high and sufficient for the study (*Baruch & Holtom, 2008*).

5.1.3. Job title of the respondents

The department and job title of an employee was sought in the study. *Tab. 4* provides a summary of positions of the respondents.

The results in *Tab. 4* show that the majority of the respondents (79.4%) were from finance and accounts followed by commercial managers (7.9%), managing directors (4.8%), technical managers (1.6%), while the remaining 6.3%, did not specify the job titles.

Table 4: Job Title of the Respondents*

Job Title	Frequency	Percentage
Finance Manager	200	79.4
Technical Manager	4	1.6
Managing Director	12	4.8
Commercial Manager	20	7.9
Job title not disclosed	16	6.3
Total	*252*	*100*

*__Source:__ compiled by the authors.

These results indicate that the majority of the respondents in this study were in senior management. It was therefore a considered opinion that the respondents were able to articulate the issues relating to the WSP financial sustainability.

5.1.4. Gender of the respondents

Gender is assumed to influence decision making and thus overall company's performance on financial sustainability. *Fig. 2* presents the gender of the respondents.

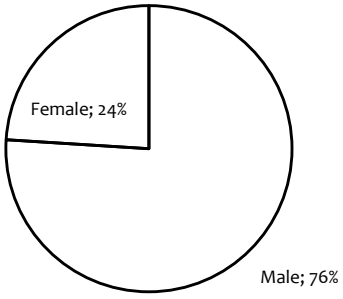

Figure 2: Gender of the Respondents*

*__Source:__ compiled by the authors.

The results in *Fig. 2* show that majority of the respondents (76%) were male, while 24% were female. This indicates that there are more male compared to female involved in financial management and decision making across the water service providers.

5.1.5. Education of the respondents

The level of education was important in this study because it enabled the researcher to confirm if the respondents understood the concepts that were being evaluated by the tool. *Tab. 5* gives the results of the respondents' education level.

Table 5: Education of the Respondents*

Education	Frequency	Percentage
Certificate/Diploma	12	4.8
Degree	172	68.3
Masters	68	27.0
Total	*252*	*100.0*

*__Source:__ compiled by the authors.

The results reveal that 95.3% of the respondents had Bachelor's degree and above, while 4.8 % had a Certificate/Diploma. It was considered that majority of the respondents could understand the concepts being evaluated thus increasing the reliability of their responses (*Tourangeau, Yan, & Sun, 2020*).

5.1.6. Years worked in the company

The study sought to understand the length of time the respondents had worked for the particular water service provider.

The period is considered important because it is an indication of how well the respondent understands the company. The respondents' length of time working in the firm is also associated with knowledge and experience of the issues at hand and thus helps in improving the overall company's experience.

Fig. 3 gives a breakdown number of years the respondents had served in the particular companies.

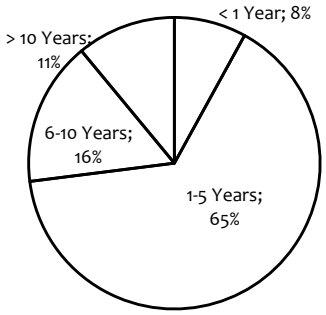

Figure 3: Years worked in the company*

**Source:* compiled by the authors.

In terms of years worked in the respective organization, 8% had worked for less than one year, 65% worked for between one to five years, while 16% and 11% had worked between six to 10 years, and over ten years, respectively. Given the statistics, there is an indication that the respondents had some understanding of the operations of the company and could therefore be able to provide necessary information on the subject matter.

5.1.7. Years worked in water sector

The respondents' experience in the sector was found important in this study because it gives an indication of how well one understands the sector. *Fig. 4* gives the breakdown of the years served in the sector:

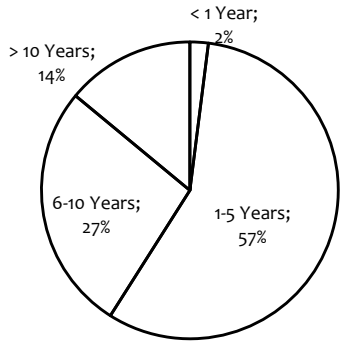

Figure 4: Years worked in water sector*

**Source:* compiled by the authors.

The results indicate that the respondents had worked in the water sector for less than one year (2%), between one to five years (57%), between six to ten years (27%) and for over ten years (14%). These results indicate a mix in terms of sectorial experiences implying that their contributions on the various issues represent the sectorial views.

5.1.8. Category of the company

This study sought to understand the category of the water service providers under study because that would be considered an important aspect when determining the financial sustainability of the company. The results were presented by *Fig. 5*.

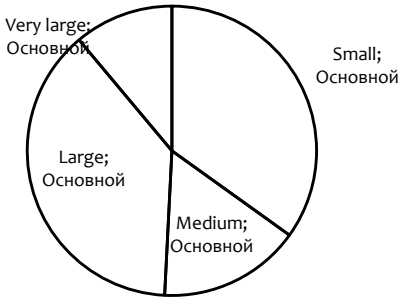

Figure 5: Category of the company*

**Source:* compiled by the authors.

Fig. 5 shows that 34.9% of the respondents constituted small WSPs, 15.9%, medium WSPs, while 38.1% and 11.1% were from large and very large WSPs, respectively. The findings show adequate representation for WSPs under the four categories. The representation from the various categories is critical since it is expected that their operational environment varies with the company size.

5.1.8. Billable Service

The study sought to establish the services offered by the various WSPs because diversity means more sources of revenue which would be expected to enhance the financial sustainability of the company. *Tab. 6* presents the analysis of the results.

Table 6: Billable service by the Company*

Billable service	Frequency	Percentage
Water only	84	33.3
Water and sanitation	28	11.1
Water, sanitation and sewerage	116	46.0
Water, sanitation and others	24	9.5
Total	252	100.0

**Source:* compiled by the authors.

The results show (*Tab. 6*) that 33.3% of the respondents provided water services only, 11.1% provided water and sanitation, 46% provided water, sanitation and sewerage while 9.5% provided water, sanitation and others (9.5%).

5.2. Descriptive statistics for infrastructure financing and financial sustainability

To determine the extent to which infrastructure financing influenced the financial sustainability of WSPs in Kenya, the respondents were required to rate several statements based on a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

Tab. 7 presents the results of the descriptive analysis tabulated in percentages, means and standard deviations.

The average mean was 3.95 with a standard deviation of 0.984. The statement with the highest mean was 'Lack of infrastructure development funds limits the company's access to the benefits of economies of scale' (*M*=4.60, *SD*= 0.552).

The other statements got the following means and standard deviations in a descending order: The revenue earned per year is not adequate for all the annual planned investments (*M*=4.42, *SD*=0.925); Given the competing needs, water infrastructure financing receives less attention at the county government level (*M*=4.26, *SD*=0.896).

Table 7: Means and standard deviations for infrastructure financing and financial sustainability*

	N	Mean	*SD*
The revenue earned per year is not adequate for all the annual planned investments	252	4.42	0.925
Lack of infrastructure development funds limits the company's access to the benefits of economies of scale	252	4.60	0.552
Given the competing needs, water infrastructure financing receives less attention at the county government level	252	4.26	0.896
The prerequisite conditions for loan financing from development partners limits the WSP ability to access such funds for asset development	252	3.79	1.049
The source of infrastructure financing affects the company's ability to break-even	252	3.52	1.186
Most of the new infrastructure being developed in the company's area of jurisdiction is funded through the loans from development partners	252	3.52	1.160
Lack of water and sanitation infrastructure ownership documents limits the ability to access loan financing	252	3.50	1.434
Financing infrastructure development through loans impairs the financial sustainability of WSPs	252	3.60	1.069
Partnerships like PPPs with beneficiary communities can greatly bridge the infrastructure financing gap being experienced by WSPs	252	4.10	0.654
On average, water infrastructure coverage has improved over the last 5 years	252	4.19	0.800
Average	252	3.95	0.984

*__Source:__ compiled by the authors.

On average, water infrastructure coverage has improved over the last 5 years (*M*=4.19, *SD*=0.800); Partnerships like PPPs with beneficiary communities can greatly bridge the infrastructure financing gap being experienced by WSPs (*M*=4.10, *SD*=0.654); The prerequisite conditions for loan financing from development partners limits the WSP ability to access such funds for asset development (*M*=3.79, *SD*=1.049); Financing infrastructure development through loans impairs the financial sustainability of WSPs (*M*=3.60, *SD*=1.069); Most of the new infrastructure being developed in the company's area of jurisdiction is funded through the loans from development partners (*M*=3.52, *SD*=1.160); The source of infrastructure financing affects the company's ability to break-even (*M*=3.52, *SD*=1.186) and finally 'Lack of water and sanitation infrastructure ownership documents limits the ability to access loan financing' had the lowest score of (M=3.50, *SD*=1.434).

5.3. Factor analysis for infrastructure financing and financial sustainability

Infrastructure Financing was measured using ten (10) items which were subjected to factor analysis in order to establish their adequacy in the measurement of the relationship. The factors are considered adequate if the KMO value>0.5. The results are presented by *Tab.* 8.

Table 8: KMO and Bartlett's test for infrastructure financing*

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.546
Bartlett's Test of Sphericity	Approx. Chi-Square	126.316
	df	187
	Sig.	0.000

*__Source:__ compiled by the authors.

The KMO value for the factors under infrastructure financing was 0.546 and Bartlett's test, x^2=126.316, *p*=0.000. These results confirmed the adequacy of the sample since *KMO*=0.546>0.5.

The study also carried out the Eigen values for the factors under infrastructure financing. The findings are shown in *Tab.* 9.

The findings revealed that the first four factors accounted for 65.960% of the variance in infrastructure financing.

The results from the scree plot indicated that the 4 components had Eigen values that were greater than 1. The results are shown in *Fig.* 6.

The findings support the total variance of explained results for infrastructure financing which implies that each successive factor accounts for smaller and smaller amounts of the total variance of explained results for infrastructure financing. Similarly, the study sought to find out the factor loadings for infrastructure financing. The findings are shown in *Tab. 10*.

The results show that lack of water and sanitation infrastructure ownership documents limits ability to access loan financing with the highest factor loading of 0.884 while 'revenue earned per year seems not adequate for all the annual planned investments' had the highest factor loading in the first component with 0.679.

5.4. Correlation analysis for financial sustainability and infrastructure financing

Pearson correlation was carried out to establish the association between infrastructure financing and financial sustainability. *Tab. 11* shows Pearson correlation (*r*=0.331).

This indicates a strong positive correlation between the infrastructure financing and financial sustainability indicating a positive association between the infrastructure financing and financial sustainability of WSPs in Kenya.

5.5. Regression analysis for influence of infrastructure financing on financial sustainability

In order to establish the influence of water pricing on financial sustainability, a regression analysis was done. The results of the analysis are presented in *Tab. 6-8.*

5.5.1. Model summary results for infrastructure financing and financial sustainability

Tab. 12 provides an R square of 0.11. This means that 11% of the financial sustainability is explained by variation in infrastructure financing.

5.5.2. ANOVA for infrastructure financing and financial sustainability

The analysis of variance was undertaken to establish if infrastructure financing was a good predictor of the financial sustainability among water service providers in Kenya.

Table 9: Total variance explained for infrastructure financing*

Component**	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.221	22.211	22.211	2.221	22.211	22.211	1.990	19.900	19.900
2	1.684	16.838	39.049	1.684	16.838	39.049	1.655	16.545	36.445
3	1.449	14.486	53.535	1.449	14.486	53.535	1.601	16.014	52.459
4	1.243	12.426	65.960	1.243	12.426	65.960	1.350	13.501	65.960
5	0.955	9.546	75.506						
6	0.739	7.395	82.901						
7	0.622	6.222	89.123						
8	0.543	5.429	94.552						
9	0.336	3.362	97.914						
10	0.209	2.086	100.000						

*__Source:__ compiled by the authors.
**__Note:__ extraction method is principal component analysis.

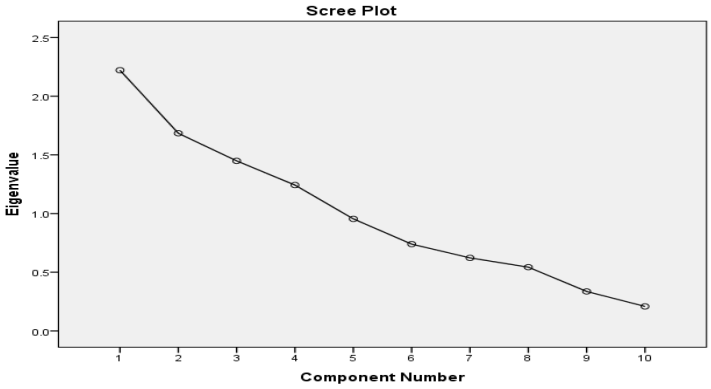

Figure 6: Scree plot for infrastructure financing*

*__Source:__ compiled by the authors.

Table 10: KMO matrix for infrastructure financing and financial sustainability*

Component Matrix[a]	Component**			
	1	2	3	4
The revenue earned per year is not adequate for all the annual planned investments	-0.291	0.679	0.368	0.130
Lack of infrastructure development funds limits the company's access to the benefits of economies of scale	0.117	0.329	-0.505	-0.642
Given the competing needs, water infrastructure financing receives less attention at the county government level	0.369	0.242		-0.566
The prerequisite conditions for loan financing from development partners limits the WSP ability to access such funds for asset development	0.499	-0.147	0.602	0.191
The source of infrastructure financing affects the company's ability to break-even	0.598	0.223	-0.360	
Most of the new infrastructure being developed in the company's area of jurisdiction is funded through the loans from development partners	0.636		-0.337	0.431
Lack of water and sanitation infrastructure ownership documents limits the ability to access loan financing	0.884	0.122		
Financing infrastructure development through loans impairs the financial sustainability of WSPs	0.327	0.498	0.600	-0.214
Partnerships like PPPs with beneficiary communities can greatly bridge the infrastructure financing gap being experienced by WSPs	-0.266	0.628	-0.176	0.263
On average, water infrastructure coverage has improved over the last 5 years	-0.128	0.570	-0.233	0.372

*__Source:__ compiled by the authors.
**__Note:__ extraction method is principal component analysis; 4 components extracted; a threshold of 0.1 was used in this study thus no component was dropped.

Table 11: Correlation analysis for infrastructure financing and financial sustainability*

		Financial sustainability	Infrastructure financing
Financial Sustainability	Pearson Correlation	1	0.331*
	Sig. (2-tailed)		0.010
	N	252	252
Infrastructure financing	Pearson Correlation	0.331**	1
	Sig. (2-tailed)	0.010	
	N	252	252

*__Source:__ compiled by the authors.
**__Note:__ correlation is significant at 0.05 level (2-tailed).

Table 12: Model summary for infrastructure financing and financial sustainability

Model	*R*	R square	Adjusted R square	Std. error of the estimate
1	0.331**	0.110	0.094	3.29898

*__Source:__ compiled by the authors.
**__Note:__ predictors are constant; infrastructure financing.

The control function was F>3.841, p≤0.05. *Tab. 13* provides the ANOVA results for infrastructure financing. The results indicate an *F*=7.020 (1,250df) and a p-value of 0.010>0.05. The critical value of *f-statistics* is (1,250df)=7,020<3,841, the value of *P*=0.01<0.05. This confirms that the model is a good fit and that infrastructure financing is a good predictor of the financial sustainability of WSPs in Kenya.

5.5.3. ANOVA for infrastructure financing and financial sustainability

The analysis of variance was undertaken to establish if infrastructure financing was a good predictor of the financial sustainability among water service providers in Kenya.

The control function was F>3.841, p≤0.05. *Tab. 13* provides the ANOVA results for infrastructure financing.The results indicate an F=7.020 (1,250df) and a p-value of 0.010>0.05. The critical f-statistic is at (1,250df) =7.020>3.841, P-value=0.01<0.05. This confirms that the model is a good fit and that infrastructure financing is a good predictor of the financial sustainability of WSPs in Kenya.

5.5.4. Regression coefficients for infrastructure financing and financial sustainability

The regression analysis yielded a regression coefficient of 0.262, with a p-value of 0.010<0.05 (*Tab. 14*).

5.5.5. Regression coefficients for infrastructure financing and financial sustainability

The regression analysis yielded a regression coefficient of 0.262, with a p-value of 0.010<0.05 (*Tab. 14*). Given that the model was tested at 5% level of significance, a *P-Value* of 0.01<0.05 suggests that there exists a statistically significant relationship between the infrastructure financing and financial sustainability of WSPs in Kenya whereby, a unit change in infrastructure financing leads to a 26.20% increase in the financial sustainability of water service providers in Kenya. Based on these findings, the study rejects the null hypothesis that states that Infrastructure financing has no influence on the financial sustainability of water service providers in Kenya and concludes that Infrastructure financing has a statistically significant influence on the financial sustainability of WSPs in Kenya. These results could be due to the fact that infrastructure financing increases access to water which in turn enhances revenue earning capacity of WSPs. Given the high infrastructure deficit in Kenya, an increase in infrastructure financing would increase water coverage which in turn enhances the WSP revenue earning capacity hence increases financial sustainability.

5.6. Interview analysis results on influence of infrastructure financing on financial sustainability

The interviewees confirmed that infrastructure financing is a major driver for financial sustainability of WSPs in Kenya. The infrastructure deficit is high and keeps increasing because WSPs are not in a position to fund the infrastructure development. The interviewees noted that in the period between 1990 and 2000, the infrastructure development was financed through communities and the NGOs and with minimal government or loan financing. According to the experts, the water sector reforms (2002) introduced overreliance on government and loan financing. They were, however, optimistic that the reforms did not erode the good spirit of partnership with the beneficiaries on small water projects and NGOs. The experts confirmed that there are still many stakeholders willing to partner with the water sector in-a-bid to finance water investment. The reason for the strong good will by stakeholders is because water is a key requirement in all sectors of the economy including health, agriculture, industry and commercial sectors.

Table 13: ANOVA results for infrastructure financing and financial sustainability*

Model**		Sum of squares	Df	Mean square	F	Sig.
1	Regression	76.399	1	76.399	7.020	0.010***
	Residual	620.347	250	10.883		
	Total	696.746	251			

*__Source:__ compiled by the authors.
**__Note:__ Dependent Variable: Financial Sustainability.
***__Note:__ predictors are constant; infrastructure financing.

Table 14: Regression coefficients for infrastructure financing and financial sustainability*

Model**		Unstandardized coefficients		Standardized coefficients	t	Sig.
		B	Std. error	Beta		
1	(Constant)	34.208	3.905		8.760	0.000
	Infrastructure financing	0.262	0.099	0.331	2.650	0.010

*__Source:__ compiled by the authors.
**__Note:__ dependent variable is financial sustainability.

6. Conclusions and recommendations

6.1. Conclusions

This study indicates that infrastructure financing has a statistically significant influence on financial sustainability. The correlation analysis revealed that infrastructure financing is positively associated with financial sustainability while the regression analysis indicated that infrastructure financing has a statistically significant influence on the financial sustainability of WSPs in Kenya. The significance could be due to the fact that government investment is still insignificant despite the sector's heavy capital investment. The study further established that the source and application of the infrastructure financing determines the nature and size of influence. According to the industry experts interviewed, the infrastructure development that has happened in the recent past has had minimal impact on the financial sustainability of WSPs because it is at the mega level with limited last mile connectivity. This has affected WSPs ability to finance the infrastructure development through tariff financing since the majority of them were barely able to meet their O&M costs. There is need therefore for the country to explore partnerships with communities and NGOs while loan financing should be reduced because the sector was highly indebted and unable to service the current loan portfolio.

6.2. Recommendations

Water is a very important ingredient of life. It is also a human right and therefore sustainable access is critical. The sustainable access to this vital commodity requires the providers of the service to be financially sustainable. This study sought to establish the determinants of the financial sustainability of WSPs in Kenya as an ingredient to sustainable access to water. Based on the findings, the study recommends the following: There is need for the National Treasury and Planning and the Water Works Development Agencies (WWDAs) to ensure that infrastructure financing proposals cover the project from end-to-end. That means it should finance from source to the customer yard. Additionally, the National Treasury and Planning should ensure increased government financing for last mile connectivity. Further, the Ministry of Water, Sanitation and Irrigation (MWSI) needs to pursue enhanced collaboration with local communities and NGOs in order to tap into local resources and development grants which would reduce the indebtedness of the sector.

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8. Competing interests

The authors declare that they have no competing interests.

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