

Financing Practices and Sustainability in Kenya's Water and Sanitation Sector: An Empirical Study

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Abstract: Sustainability of water and sanitation services is categorized as a global problem. Water and sanitation is ranked top six in the UN's seventeen sustainable development goals and an enabler to the achievement of all the other SDGs. Watsan sustainability involves improved access, acceptable water quality against growing demand. Access to watsan is a primary challenge globally due to its multifaceted nature. At the global level, Africa has the lowest freshwater resources at 9%, followed by Europe at 15.5%, then Asia at 28% while America has the highest (45%). Kenya is classified as a water scarce country. It is projected that rising water scarcity will cost an estimated 6% of the GDP by 2050 due to its impacts on agriculture, health and employment. Approximately, 53% of the population has no access to safe water while 77% have no access to improved sanitation thus making watsan access a national problem. Government spending on water development has significantly reduced from approximately Kshs46b in 2021 to Kshs.45b in 2022. The achievement of sustainability in the watsan, financing of up to 5 times the present level is needed. WASCOs continue registering high water loss annually resting at Kshs.11.2b in 2022. These statistics makes sustainability of water and sanitation in Kenya a gross national problem. Empirical studies shows that effective financial management practices contribute to firm sustainability. This study examined the influence of financing practices on sustainability of WASCO in Kenya guided by the pecking order theory. A positivism research philosophy was adopted with a descriptive research design. A sample of 46 companies was purposely selected from the 91 licensed WASCOs in Kenya. A likert scaled questionnaire was used to collect primary data. Secondary data was obtained using a secondary data collection sheet. Instrument reliability was assessed using the Cronbach's alpha coefficient. Diagnostic tests included test of normality, test of outliers, tests of autocorrelation, multicollinearity and test of linearity using Q - Q plot, box plot, Durbin - Watson d statistics, Tolerance & VIF statistics and Pearson's correlation coefficient respectively. A multiple linear model was employed for inferential analysis. Results show the model explained approximately 77.6% of WASCO sustainability. ANOVA show F - statistics of 48.515 with a p - value of 0.000 indicated existence of a statistically significant influence of financing practices on sustainability of WASCO. Beta coefficients results show $\beta=13.761$ for tariff financing followed by $\beta=9.070$ for debt financing and $\beta=-3.501$ in the case of government financing. The study recommends prioritization of tariffs and debt financing options since they have a strong and positive influence on sustainability of these firms.

Keywords: Sustainability, Tariff, Government Financing, Debt

1. Introduction

1.1 Background of the Study

Sustainable development is economic growth that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED, 1987). There is interchangeable use of the terms; Business sustainability, CSR, TBL or focusing on environmental, social and governance (ESG) to define sustainability (Morioka & Carvalho 2016; Silvestre et al, 2015). Firm sustainability is a greater concept, rigorous performance measure that has gained more acceptance and attention in the recent past (Rezaee & Homayoun, 2014). Africa has the least water distribution at about 9%, America has 45% which is the highest share freshwater resources at the global level followed by Asia (28%) and Europe (15.5%) in that order (Mugagga, 2016). This imbalanced distribution of

fresh water has greatly generated the water problem at the global village (UNGA, 2015). Majority of African countries are classified as least developed with high population growth resulting to a strained demand for water resources (Mugagga & Nabaasa, 2016). Kenya has 91 water and sanitation companies regulated by WASREB. Annual performance evaluation of these companies shows low access and high non - revenue water losses standing at Kshs.11.2b (Wasreb 2023).

1.2 Problem Statement

Improving sustainability of water and sanitation services is one of the country's commitments. Approximately 53% of the population have no access to safe water while 77% have no access to improved sanitation thus making watsan access a national problem. Government spending on water development has significantly reduced from approximately

Kshs46b in 2021 to Kshs.45b in 2022. The achievement of sustainability in the watsan, financing of up to 5 times the present level is needed. WASCOs continue registering high water loss annually resting at Kshs.11.2b in 2022. Empirical evidence and management science shows that financial management practices influence sustainability performance of firms.

1.3 General Objective

The general objective of the study was to assess the influence of financing practices on sustainability of water and sanitation companies in Kenya

2. Literature Review

2.1 Pecking Order Theory

The study was guided by the pecking order theory postulated by Myers and Majluf (1984). The theory hypothesizes that organizations prefer internal funding over external funding due to the associated transaction costs and disclosure requirement. It is further argued that when firms require external funding, they do so in form of debt instead of equity which many times generated as last a resort. Firms tend to utilize internal financing in form of accumulated retained earnings when it is both financially adequate and feasible, a situation called adverse selection.

2.2 Empirical Literature

Financing practices also referred to as capital structure practices involves overseeing the make - up of various elements of the long - term financing of a firm (Arnold, 2014). The capital structure is the mix of various funding sources for the business and includes a mix of internal and external in form of debt and equity. Gul & Cho (2019) defines financing practices as the systematic way a firm is funded by a mix of debt and equity. Sustainable tariffs for water and wastewater services was analyzed by Marques and Miranda (2020) with a finding for sustainable tariffs in the midst of global warming pressure and other conflicting interests by the stakeholders. Mercadier and Brenner (2020) assessed tariff sustainability in context of price stability. The study applied the three Ts model of tariff, taxes and transfers to evaluate tariff setting practices over the study period. They observed that regulators preferences as regards service costs allocation among stakeholders is reflected in the approved tariff. The study concluded that tariff revenue inadequately covers the operating expenses thus affects firm sustainability.

Yu et al (2020) examined the effects of government funding on the financial performance. Government funding was classified into two, beforehand or afterward depending on the time of disbursement and the conditions thereof. They observed that government funding beforehand (GSB) is regularly used to promote new public entities into achieving sustainability. GSB is used as a market signal to potential financiers assuring of government support. Government subsidies afterwards, (GSA) is used as a reward to achieving set targets. The study found large firms enjoy GSB due to their performance level. They concluded that government

funding influences the performance of entities positively up to an optimal level beyond which, a negative influence is registered. Zhu and Liao (2018) examined the impact of government subsidies on firm profitability. The study found that government funding and firm size have a negative impact on firm profitability. Rent seeking activities, overcapacity and asymmetric information between the government and the firms were found to contribute to the negative impact. Further the study opined that government funding is regularly used to achieve social impact as opposed to profitability or sustainability (Zhu & Liao, 2018).

Several empirical studies found a positive influence of financing practices and firm performance. Musah (2018), Ramadan and Ramadan (2015) and Fwabwa (2017) concluded that financing practices significantly influence financial performance. There are a few empirical findings of a negative effect of financing practices on firm performance. Nassar (2016) and Mumtaz et al (2013) found that capital structure negatively influence financial performance. Guy (2019) found commercial financial sector seeks to create profit and avoided public water sector investments. Machete et al, (2021) assessed the cost recovery approaches reliant on regular tariffs, government allocations in form of taxes, and donor grants & debt instruments in form of transfers. They found that the three Ts (tariffs, taxes and transfers) are inadequate to facilitate growth in the water sector. Pories et al (2019) recommends a comprehensive financing strategy which utilizes government taxes (national and county), private finance and tariffs as essential for a healthy, sustainable water and sanitation services. Given the inconclusive and mixed results on the effect of financing practices and sustainability, the topic continues attracting attention by scholars

H02: *Financing practices do not have a statistically significant influence on sustainability of water and sanitation companies in Kenya*

2.3 Conceptual Framework

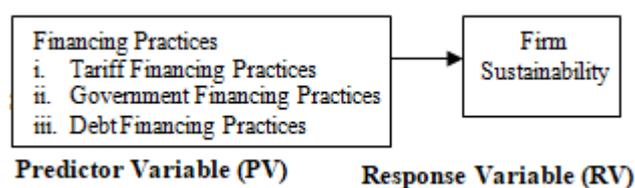


Figure 1: Conceptual Framework for Financing Practices and Firm Sustainability

2.4 Research Gaps

The business models of the studies covered in the literature review differ significantly with the current study as majority focused on profit making institutions. The WATSAN sector is majorly public oriented and owned thus presents unique characteristics including; lack of dividend payments, strict tariff setting which restricts free market pricing, strict regulation through the Water Act 2016, Public Financial Management Act (PFMA 2019) and the various regulations by WASREB which includes regular tariff setting and approval. The variable selection and operationalization of the sustainability measures presents a conceptual gap in this study. In addition, the few studies focusing on sustainability

(Washika, 2019) measured sustainability using the Kaplan and Norton (1952) BSC model without the environmental and social measures. This study used the modified five perspectives SBSC in evaluating sustainability and used the web - based primary data collection method both of which presented a methodological gap.

3. Research Methodology

3.1 Philosophy, Design and Instrumentation

The study adopted a positivist philosophy which believes that reality is observable, stable and described from an objective view point (Saunders et al, 2019). The study adopted a cross - sectional design which allows collecting quantifiable or quantitative data regarding multiple variables in order to identify patterns of associations (Bell et al, 2022). The study purposively sampled 46 from a population of 91 water and sanitation companies in Kenya. Primary data was collected using a structured questionnaire served online while a secondary data collection sheet was applied in the case of secondary data.

3.2 Stability of Instrumentation

Cronbach’s Alpha coefficient was used to assess the instrument for internal consistency. The results generated a coefficient of 0.701 which was adequate. The reliability result was adequate as it was above the minimum threshold of 0.7 (Saunders et al, 2019). Kaiser - Meyer - Olkin measure of sampling adequacy and Bartlett’s test of Sphericity was used to establish construct validity. A coefficient of 0.875 was generated with a significance of 0.000 which was adequate. The Kaiser - Meyer Olkin (KMO) statistics was greater than the minimum KMO coefficient threshold of 0.7 (Saunders et al, 2019).

3.3 Data Analysis and Results Presentation

Data analysis involved; descriptive analysis, factor analysis, diagnostic testing and inferential analysis. The eleven statements measuring financing practices were assessed for their mean and standard deviations in the preliminary evaluation. Confirmatory factor analysis condensed the eleven measures into 3 components measuring financing practices through varimax rotations. Data analysis involved diagnostic tests and inferential analysis. A multivariate regression model was used to test the hypothesis. The model used to assess influence of the components of financing practice on sustainability of water and sanitation companies in Kenya was in the form:

$$\text{Sustainability} = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon;$$

where β_0, β_{2i} = regression coefficients, X_{ij} = Financing Practices and ϵ = Stochastic error term

4. Findings and Discussions

4.1 Response Rate

A total of 184 questionnaires were distributed electronically to the 46 water and sanitation companies selected for the study. One hundred and fifty four (154) responses were received occasioning a response rate of 84%. This response rate was adequate and implies that the findings of this study could be generalized in the population (Kombo & Tromp, 2016).

4.2 Test of Regression Assumptions

4.2.1 Normality Test Results

Normality for the response variable was established using the Q - Q plots. Box and whisker plot was used to assess for outliers.

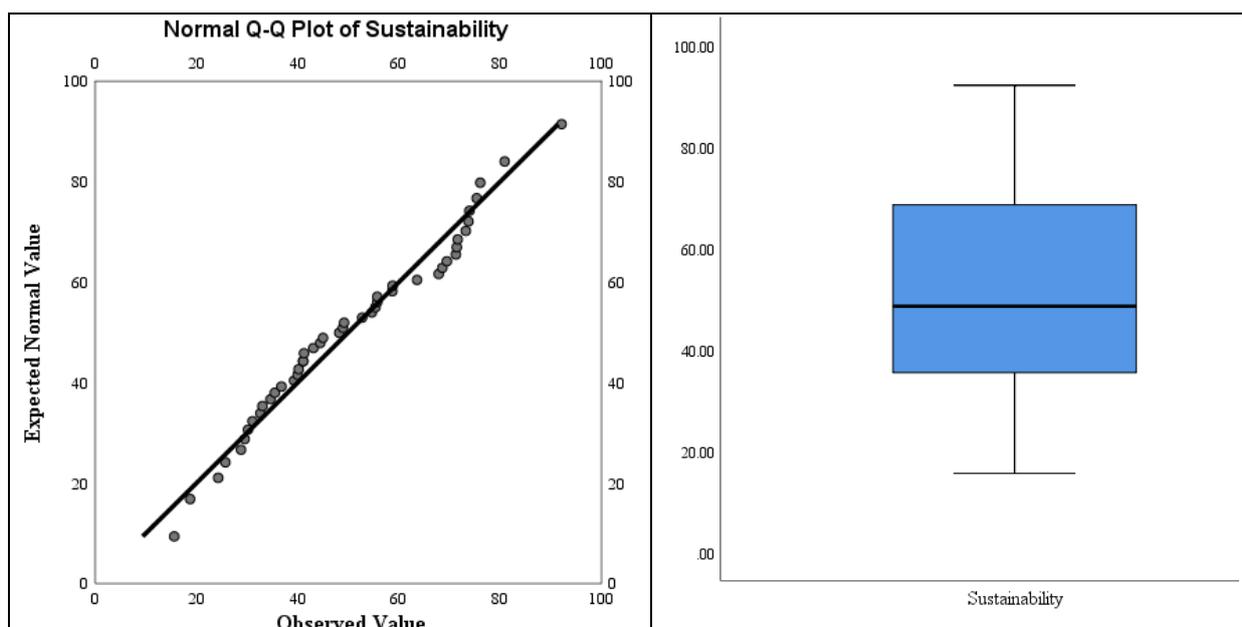


Figure 2: Q - Q Plot and Box Plot for the Response Variable

The results for the Q - Q plot pointed to a normally distributed data set as all the data points were evenly

distributed along the unitary line. The box and whisker plot did not show any outliers. The results implied the response

variable was appropriate for regression analysis.

4.2.2 Test Results for Autocorrelation

Autocorrelation was assessed using the Durbin - Watson d - statistic. The results show a d - statistic of 1.674 which was within the acceptable range of one point five and two point five (Hair et al, 2014). This finding means that the data was suitable for regression analysis (Saunders et al, 2019).

4.2.3 Test Results for Multicollinearity

Multicollinearity was assessed using tolerance and variance inflation factor (VIF). The results are presented in Table 1.

Table 1: Results for Multicollinearity

Model	Collinearity Statistics	
	Tolerance	VIF
Tariff Funding Practices	.969	1.032
Government Funding Practices	.951	1.051
Debt Funding Practices	.937	1.068
a. Dependent Variable: Sustainability		

Table 2: Regression Results for Financing Practices and Sustainability

Financing Practices Components Model	R	R ²	Sums of Squares	F (3, 42)	Beta (β)	t	Sig
Model Fitness	0.881	0.776					
ANOVA							
Regression			12027.360	48.515			0.000
Residual			3470.718				
Total			15498.078				
Coefficients							
Constant					- 19.406	- 2.023	0.050
Tariff Financing Practices					13.761	8.982	0.000
Government Financing Practices					- 3.501	- 2.035	0.048
Debt Financing Practices					9.070	5.513	0.000

Table 2 show R coefficient of 0.881 and an R² of 0.776. The results imply that financing practices accounts for 77.6% change in sustainability. ANOVA results show F statistic of 48.515 with the associated p - value of 0.000 which was significant as the p - value was less than the minimum threshold of 0.05 (Hair et al, 2014). Based on these results, the null hypothesis was rejected. Results for tariff financing practices (β=13.761) are significant as the p - value of 0.000 is lower than 0.05 minimum threshold (Saunders et al, 2019). The results imply that a unit change in Tariff financing lead to 13.761 change in sustainability. This finding concurs with Poris et al (2019) who recommended a comprehensive financing strategy that incorporates tariffs as essential for a healthy and sustainable water and sanitation services. The findings differs with Machete et al (2021) that tariff financing is not adequate for growth and sustainability of water and sanitation services.

Results for government funding practices show a β= - 3.501 and p - value of 0.048. The results are significant as the p - value is lower than the 0.05 minimum threshold (Saunders et al, 2019). The results imply that a unit change in Government financing practices lead to - 3.501 change in sustainability. These results are similar to Zhu & Liao (2018) that government financing negatively influence firm performance and profitability. Rent seeking activities, over capacity and information asymmetry were the main drivers for the negative influence (Zhu & Liao, 2018). Government financing is regularly directed towards social goals and not

The results show the components measuring financing practices variables were not multicollinear as the tolerance was above 0.1 and the VIF coefficients were below 10 (Saunders et al, 2019). The results imply that the data sets measuring financing practices was appropriate for regression analysis (Hair et al, 2014).

4.2.4 Test Results for Linearity

Linearity of the stimulant and response variables was established using Pearson’s correlation coefficient, r. An r coefficient of 0.671 and a p - value of 0.000 was generated implying linearity existed. The finding means that the variables were appropriate for regression analysis.

4.3 Regression Results

A multiple linear regression analysis was carried out on the components measuring financing practices. The results are presented in Table 2.

financial performance (Yu et al, 2020). The results for Debt financing practices (β=9.070) are significant as the p - value is below the minimum threshold of 0.05 (Saunders et al, 2019). This imply that a unit change in debt financing practices would lead to 9.070 change in sustainability. These results concur with Parvin et al (2020) that debt financing significantly influence organizational performance. The findings differs with Ramadan and Ramadan (2015) that good performing companies were less reliant on debt finance.

The model was fitted as: $Y = 13.761X_1 - 3.501X_2 + 9.070X_3 - 19.406$, where Y = Sustainability, X₁= Tariff Financing Practices, X₂= Government Financing Practices, X₃= Debt Financing Practices.

5. Conclusions and Recommendations

5.1 Conclusions

The study found tariff financing practices, debt financing practices and government financing practices significantly influence the sustainability of water and sanitation companies in Kenya. Results for tariff and debt financing practices indicated a positive and significant effect while Government financing practices negatively influenced sustainability of water and sanitation companies in Kenya.

5.2 Recommendations

The study recommends the enhancement and deepening of tariff and debt financing practices. The study further recommends a reduction of efforts geared to attracting government financing as this appear to negatively influence firm sustainability.

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