EFFECT OF UNBILLED AUTHORIZED CONSUMPTION ON FINANCIAL PERFORMANCE OF ELDORET WATER AND SANITATION COMPANY

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Abstract

In Kenya, there is a great improvement in the water sector compared to years before and after independence. Despite this, water companies have not yet achieved operational efficiency something attributed to non-revenue water. This study thus sought to find out the effects of unbilled authorized consumption on financial performance. This research was be guided by the theory of water balance. This research adopted a descriptive survey research design in targeting 50 respondents. Questionnaires and documents analysis were used in collecting data. To determine the validity of the instruments, the researcher first reviewed each item in the instrument before consulting panel of experts in water management sector. Reliability of the questionnaires was tested using pre-testing through pilot survey method at Kapsabet Nandi Water Supply. Quantitative data from the questionnaires was analyzed using descriptive in form of frequencies, percentages, mean, standard deviations and inferential statistics (Pearson's product moment correlation analysis and multiple regression analysis) was used to test hypothesis. From the study's findings, there was a positive and statistically significant relationship between unbilled authorized consumption (β=2.618,p-value<0.05) and financial

performance. The study thus recommended a team to handle non-revenue water cases to be constituted as not only to oversee but also enforce implementation related policies. This study would help the Water Service Provider to develop NRW reduction strategy and also contribute valuable knowledge to the field of non-revenue water. Further studies could be conducted in other Water Service Providers in Kenya in order to enable comparison of the results.

Keywords: Unbilled Authorized Consumption, Revenue Water, Meter Registration, Water Leaks, Financial Performance

INTRODUCTION

Water essential to sustain life and livelihoods is a core sector of the global economy. The water and wastewater utilities of developing countries generate a substantial portion of the sector's estimated annual turnover of US$500 billion (Global Water Intelligence 2009). Enhancing the operational and financial performance of these utilities provided the basis necessary for expanding access and improving quality of service. The need for improved performance is not limited to developing countries. Urban water and wastewater utilities are under increasing pressure to perform. Achieving the Millennium Development Goals (MDGs) for water supply and sanitation has been a major driver in the sector in the past decade. Between 2000 and 2007, median water supply coverage expanded from 81 percent in 2000 to 91 percent in 2008, despite rapidly increasing urban populations (Berg & Danilenko 2011).

These positive figures hide some striking inequalities. While worldwide access to clean drinking water has progressed enough to reach the MDG target, 780 million people remain without access to clean drinking water. Only 61% of the population in Sub-Saharan Africa has access to improved water supply sources. People lack proper services because systems fail, not enough was invested to appropriately build and maintain them and the stress that urbanization places on the existing infrastructure. In the past decade, Africa's population grew at an annual average of 2.5 percent, and the urban and slum population grew at almost double that rate (World Bank, 2010).

The African continent poses the most difficult challenge for achieving the water and sanitation MDG targets. The MDGs for water supply and sanitation services require a doubling of the pace of expansion of coverage in water supply in urban areas and a tripling for sanitation. Recent projections show that following the 'business as usual' trends, Sub-Saharan Africa would only reach the MDG targets for water services by 2040, and those for sanitation by 2076 (United Nations Development Programme (UNDP), 2006).

The Government of Kenya recognizes that for the country to meet its poverty-reduction strategies and achieve the MDGs, water has to be made available, accessible and affordable, especially to the poor. This was based on the fact that all the eight MDGs are directly or indirectly related to access to water. The Kenyan water sector has for a long time been characterized by inefficiencies, lack of investments, poor management and confusing array of legal and institutional frameworks. In addition, the exponential growth of Kenya's urban centres has put increasing pressure on utilities to extend services to new areas. To address these challenges and as part of a global trend, the Government of Kenya introduced far reaching reforms in the water sector to restructure and improve sector performance.

The Water Act 2016 Section 72 (1) (p) confers to WASREB the mandate to make recommendations on how to provide basic water services to marginalized areas. WASREB is developing a regulatory tool that gives guidance on possible management models for small water supply systems as per the Water Act 2016. In the face of implementation of reforms and the existence of the service provision agreements (SPAs) in the sector, the performance of the water companies in terms of coverage , hours of service, quality of water and cost coverage has remained relatively low leading to continued suffering by Kenyans. Services offered by the WSPs are also characterized by high levels of non-revenue water (NRW), poor debt management practices, lack of openness and accountability, inadequate commercial management and tariffs that are insufficient to cover operations and maintenance costs (Citizens report card, 2007).

Kenya's water coverage currently stands at 55 per cent against a 2015 National Water Services Strategy (NWSS) target of 80 per cent. Sewerage coverage currently stands at 16 per cent. Performance assessment and ranking of utilities was key in ensuring that water services are provided in an efficient and sustainable manner. Utilities continue to be assessed and ranked on the basis of nine Key Performance Indicators (KPIs). These are water coverage, drinking water quality, hours of supply, non-revenue water reduction, and metering ratio. The others are staff productivity, revenue collection efficiency, operational & maintenance cost coverage and personnel expenditure as a percentage of operational & maintenance costs (WASREB issue No. 10, 2018)

Non-revenue water (NRW) is the difference between the volume of water put into a water distribution system and the volume that is billed to customers. NRW includes physical losses (pipe leaks) and commercial losses (illegal connections, unmetered public use, meter error, unbilled metered water and water for which payment is not collected) (Farley, 2003: Juan, 2008). NRW comprises three components which are the physical losses, commercial losses and unbilled authorized consumption. Physical losses comprise leakage from all parts of the

distribution system. Commercial losses are caused by customer meter under-registration, data-handling errors, and theft of water in various forms and Unbilled authorized consumption includes water used by the utility for operational purposes, water used for firefighting, and water provided for free to certain consumer groups.

NRW levels are high in many developing countries, and they can be expensive to reduce. Members of the International Water Association (IWA) Water Loss Task Force developed the Economic Level of Leakage (ELL), which outlines the optimal level of physical losses based on engineering inputs. However, the ELL approach is less useful in developing countries than in developed countries, as it ignores commercial losses, the annualized cost of water supply capacity expansion and situations in which production capacity does not meet demand (Juan, 2008), High levels of NRW reflect huge volumes of water being lost through leaks, not being invoiced to customers, or both. It seriously affects the financial viability of water utilities through lost revenues and increased operational costs (Farley, Wyeth, Ghazali, Istandar & Sher, 2008).

In developing countries, roughly 45 million cubic meters of water are lost daily with an economic value of over $3 billion per year. A World Bank study puts the global estimate of physical water losses at 32 billion cubic meters each year half of which occurs in developing countries. Water utilities suffer from the huge financial costs of treating and pumping water only to see it leak back into the ground, and the lost revenues from water that could have otherwise been sold. If the water losses in developing countries could be halved, the saved water would be enough to supply around 90 million people (Halcrow, 2012). NRW is an operational indicator contributing to the sustainability question of utilities and therefore was a significant measure that facilitates evaluation of the efficiency of operations by the utilities. In 2016/17, the NRW improved marginally from 43% to 42% when compared to 2014/15. This should serve as a wakeup call for all sector players. It cannot be business as usual if this trend of losing significant resources is to be contained (WASREB issue No. 10, 2018)

Statement of the Problem

Kenya's population currently stands at 46 million, most of who reside in rural areas. Of these 20 million reside in areas currently served by 91 regulated utilities, with a total of 1.4 million connections. The 86 utilities serve a population of 11.12 million people out of a total of 20.38 million within their service areas. The utilities employ 9,494 staff and have a turnover of more than Ksh 16.6 billion, up from Ksh 16.56 billion in 2013/14. It is projected that by year 2030, the population in these service areas will increase to 45 million. The National Water Services Strategy (NWSS 2007-2015) had 3 main goals which are improvement of access, reduction of water losses (NRW) and improvement of sustainability as seen in terms of cost coverage (WASREB, Issue No. 9, 2016).

Consumer protection is at the center of the Regulator's mandate and utilities have to be continuously nurtured to improve efficiency. Performance assessment and ranking remains a key regulatory tool to spur competition between utilities, by scoring, comparing and publishing their performance over a given period (WASREB issue No. 10, 2018).

In terms of financial performance, NRW negatively affects water service providers. Firstly, it reduces the operating revenue (i.e. the water bills were not issued as a result of unbilled or unmetered consumption). Secondly, increase the cost of production, operations and maintenance (i.e. salaries, electricity, and chemical cost). Thirdly, increase investment provisions and budget allocation for capital expenditures; additional amount have to be spent on investment in facilities. Consequently, non-revenue water has major impact on water utilities surplus or deficits (Abdullah, Abdelrahman, Subhin, 2017). Given the fact that generating surplus was a key aspect of maintaining water service providers' financial performance, the NRW would be a good indicator for management performance; high percentage indicates poor management.

Annual report and financial statements for the financial year ended 30th June 2016 shows that ELDOWAS produced $13,008,290M^3$ water out of which only $6,821,685M^3$ was billed the balance of $6,186,605M^3$ representing 48% of the total volume of water produced was not accounted for. This represented NRW which is 23% over and above allowable loss of 25% as per the WASREB guidelines (ELDOWAS, 2017). NRW for ELDOWAS was at 43% in the very large category of utilities, others in these category were as follows; Nyeri at 18%, Nakuru at 31%, Thika at 31%, Nairobi at 38%, Kakamega at 43%, Kisumu at 41% and Mombasa at 50%. ELDOWAS has a five year strategic plan 2017/18-2021/22, one of the key strategic objectives is the reduction of non-revenue water (NRW) from currently 43% to 20% in five year plan. Due to their high important on service continuity and efficiency of water providers, this research studies the effects non-revenue water on financial performance for ELDOWAS. Failure to conduct the study means failure to understand how NRW affects company's on financial performance and reasons to why they are incapable of providing better services (WASREB Issue No. 10/2018)

Research Question

What is the effect of unbilled authorized consumption on financial performance of Eldoret Water and Sanitation Company?

Research Hypothesis

H0$_1$: There is no relationship between unbilled authorized consumption and financial performance of Eldoret Water and Sanitation Company.

LITERATURE REVIEW

Theoretical Literature Review

This study was modeled on the theory of water balance advanced by International Water Association (IWA) originally published in 2000. The theory has been used widely in the water sector and recommended by WASREB to WSP regulating body in Kenya. The theory was also included in the Standard NRW Manual for Kenya's 77 WSPs. The International Water Association has found that water losses come from many sources. It came up with the water balance technique, where water utilities track their entire distribution systems so as to discover where the losses are occurring.

The theory postulates that system water input was divided into two components namely authorized consumption and Water losses. The theory further breaks down authorized consumption into billed authorized consumption and unbilled authorized consumption. Water losses are divided into apparent (commercial) losses and real losses. The theory further suggests for billed authorized consumption to be revenue water while the total sum of unbilled authorized consumption, apparent losses and real losses to form non-revenue water. This theory was part of the study for effects of NRW on financial performance of Eldoret Water and Sanitation Company.

Unbilled authorized consumption (UAC)

Unbilled authorized consumption are components of authorized consumption which are legitimate but not billed and therefore do not produce revenue. These equal to unbilled metered consumption plus unbilled unmetered consumption. The research by U. S Environmental Protection Agency (2016) showed that UAC was a NRW component but not a water loss component. However, it was not recommended to calculate the water balance without a good understanding and evaluation of the unbilled authorized consumption. UAC may be classified into two categories: Water used for servicing or field operation: any water utility has to use water for its own operational needs. Water provided free of charge: the water utility may provide water free of charge to various consumers or categories of customers: some administrative or religious premises, its own. Wyatt (2010) used the unbilled consumption while researching on the financial model for optimal management in developing countries.

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RESEARCH METHODOLOGY

This research adopted a descriptive survey research design. This was the best method of conducting this type of research in that it aims to find the relationship between variables. Data was collected from 50 staff namely Head of departments, Sections heads, Supervisors and

employees from Technical, Finance and Commercial departments of ELDOWAS. This was shown in Table 1 below.

Table: 1 Target Population

Respondents	Target population
Head of Departments	3
Sections Heads	8
Supervisors	11
Staff (financial, commercial and technical department)	28
Total	**50**

Source: ELDOWAS (July, 2018)

The study adopted a census of the entire population; therefore all the 50 respondents were included in the study. The study used 5-point likertself developed questionnaires as the method data collection instruments. Cronbach's coefficient alpha was applied on the results obtained to establish internal consistency among items in a variable. The reliability level was 0.75 which was acceptable.

Descriptive statistics were used in organizing and describing the basic features from the data in relation to the variables of study. These include the use of frequencies, percentages, mean and standard deviation in analyzing data relating to study variables. In addition, Pearson's product moment correlation was used in establishing the linear association between variables. Lastly, multiple regression analysis approach was employed in testing the study hypotheses. The regression model was as follows;

$$FP = \beta_O + \beta_1 UAC + e$$

Where; FP Financial Performance, UAC Unbilled authorized consumption, e Random error term

The regression model is based on the assumption; that there is a linear relationship between the independent and dependent variables, it requires all variables to be multivariate normal and that linear regression analysis make is homoscedasticity.

RESULTS AND DISCUSSION

Financial Performance

This is the performance of the business in monetary terms. The financial performance in this study was reflected by the surplus or deficit as reported by the financial statements. The researcher analyzed the ELDOWAS audited financial reports ended 30th June 2018 in terms of

revenue generated and its expenses to come up with surplus or deficit. A percent was computed which was used to analysis the financial performance.

Table 2 Financial performance analysis

Financial year	Total Revenue Generated (Kshs.)	Total Expenses (Kshs.)	Surplus/ Deficit (Kshs.)	Percent (%)
2017/18	735,651,031	646,211,900	89,439,131	12.2%
TOTAL	**735,651,031**	**646,211,900**	**89,439,131**	**12.2%**

According to the audited financial reports produced by ELDOWAS for the year ended 30th June 2018, the company realized a surplus of Kshs. 89,439,131 which is equivalent to 12.2% of the total revenue,the NRW was 42% of the total amount of water billed. This leads to an estimated loss of kshs 316,746,789 which negatively impacts profitability and the long term sustainability for the company.

Pearson's product moment correlation analysis

Table 3 Pearson's Correlation analysis

		Unbilled authorized consumption	Financial Performance
Unbilled authorized consumption	Pearson Correlation	1	
	Sig. (2-tailed)		
Financial performance	Pearson Correlation	.839[**]	1
	Sig. (2-tailed)	.030	
**. Correlation is significant at the 0.01 level (2-tailed).			

The finding shows that there is a weaker relationship between unbilled authorized consumption and financial performance (r=0.839, p<0.05). This shows that unbilled authorized consumption relate positively with financial performance and that there was significant relationship. Therefore, it is necessary to have an inventory of UAC to ensure that no consumer receives water without being billed and improve on operation procedures.

Testing of hypotheses

A multi regression model was applied to determine the effects on unbilled authorized consumption, meter registration inaccuracies and water leaks have on the financial performance of ELDOWAS, Kenya.

Table 4 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.192[a]	.037	-.026	.14325

a. Predictors: (Constant), Unbilled authorized consumption, Meter registration inaccuracies and water leaks.

Adjusted R^2 is referred as coefficient of determination and indicates how the financial performance of ELDOWAS varies with changes in independent variables unbilled authorized consumption. From Table 4 the value of R^2 is 0.037. This implies that, there was a variation of 3.7% of financial performance of ELDOWAS that was predictable by unbilled authorized consumption.

Table 5 ANOVA[b]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.036	3	.012	.586	.027[a]
	Residual	.944	46	.021		
	Total	.980	49			

a. Predictors: (Constant), Unbilled authorized consumption.
b. Dependent variable: Financial performance

From Table 5 on ANOVA results, $F_{(3,46)} = 0.586$, $p<0.05$ was obtained. This implied that the regression model was significant in predicting the effects of Unbilled authorized consumption on financial performance of ELDOWAS.

Table 6 Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	1.953	.069		28.213	.000
	Unbilled authorized consumption	2.618	.564	.037	4.642	.031

a. Dependent Variable: Financial performance

Table 6 shows multiple regression analysis findings which was applied to determine relationship between unbilled authorized consumption and financial performance of ELDOWAS. To begin with, hypothesis H_{o1} stated that: There is no relationship between unbilled authorized consumption and financial performance of Eldoret Water and Sanitation Company.From the analysis, there was a positive and statistically significant (β = 2.618, p-value <0.05). $H_{o1}$was rejected and concluded that there was a significant relationship between unbilled authorized consumption and financial performance. Thisagrees to the study by (World Bank 2006) that often individuals focus on real losses without sufficient attention being paid to apparent losses. It agrees with the study by Shilehwa (2013) that the study found out that there was significant positive relationship between unmetered consumption and non-revenue water at 1% level of significance at Webuye water supply scheme. This agrees with Farley (2003), unmetered consumption promoted uneconomical water consumption contributing to increases in volumes of NRW.

CONCLUSION

This study was to establish the effects of NRW on financial performance of Eldoret Water and Sanitation Company and make recommendations for best practices to enhance efficiency and effectiveness in service delivery hence financial sustainability. It was concluded that unbilled authorized consumption and financial performance has statistically significant relationship. Unbilled authorized consumption include illegal connection, meter bypassing, illegal use of hydrants and poor billing collection systems affects financial performance of ELDOWAS.

RECOMMENDATIONS FOR POLICY AND PRACTICE

Based on the objectives and conclusions this study recommends that;

There is need to bill all authorized consumption. It is important that meter registration inaccuracies to be reduced through proper installation of the standard meter designs. This can be achieved through improving customer meter accuracy by ensuring that customer meters are in proper working condition and duly replaced at the end of their useful lives reduces under-metering and recourse to estimated billing.

In order to efficiently reduce NRW each of the factors influencing it should be tackled in the order of priority. This study dug deep into the effects of NRW on financial performance of ELDOWAS. Future studies could be done in order to provide more light into this area of research. This is by using other indicators of financial performance as well as other non-revenue water aspects. Further studies could be conducted in other Water Service Providers in Kenya in order to enable comparison of the results.

LIMITATIONS OF THE STUDY

The study will be limited to Eldoret Water and Sanitation Company thus; interpretation of the results should be restricted to Eldoret Water and Sanitation Company since they might not be a true representation of what is happening in other companies in Kenya. Additionally, this study adopted a descriptive survey design, and the generalization of the findings was limited by the sample size of the participants involved. The quality of data might be a weakness for this study, since it's not possible to tell from this research whether the results are simply due to the nature and quality of data used or whether it is the true picture of the situation. The researcher mitigated this by using data from various sources.

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