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**Factors that Contribute to the failure to Meet the Expected Cost Recovery in the Water Sector – Case of Mulonga Water Supply and Sanitation Co., Limited**

## **ABSTRACT**

As part of its policy for increasing water coverage, as well as proper use and sustainability of the service, a cost recovery system must be implemented.

The policy of NWASCO includes a full cost recovery program to improve water supply in the both urban and rural parts of Zambia. As a result, the goal of this study was to assess policy implementation of cost recovery practices in water supply in MWSC service areas. The study empirically assessed the level of cost recovery practices, examined the impact of cost recovery practices on water infrastructure, and identified the barriers to cost recovery implementation in water supply.

A descriptive survey research method, as well as qualitative and quantitative research approaches, were used in the study's methodology. To collect primary and secondary data, the researcher used questionnaires, interviews, and documentation searches. The researcher used probability sampling techniques in the study's sampling design. The sample size for the study was 12 employees, 2 NWASCO inspectors, and 200 MWSC customers, but only 81 responded.

According to the study's findings, the deployment of full cost recovery for water supply was quite poor. Poor cost recovery was caused by an insufficient tariff structure, as water tariffs are currently set at less than full-cost recovery levels. High NRW due to water leakage and unmetered connections; poor revenue collection; and insufficient residential connections in peri-urban areas due to exorbitant connection fees for the poor. Furthermore, MWSC had the possibility of covering O&M in its tariff. These are the repercussions of insufficient water service coverage and uneven distribution of water infrastructure in peri-urban areas.

Tariff revision on a regular basis was critical and reconciling cost recovery and affordability, aiming for long-term sustainable cost recovery, improving commercial and technical efficiencies of water and sanitation services, and awareness program on the issue of cost recovery in water supply and services.

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### 1 Introduction

#### 1.1 Background

Following the implementation of the privatisation program in early 1990, the Zambian government decided to commercialize the provision of water and sanitation services in the country's urban areas. This resulted in the formation of 11 water and sanitation companies across the country to address the sector's service delivery challenges. The urban population continued to grow, despite the fact that water and sanitation infrastructure could not keep up. The situation was exacerbated by aging infrastructure that could not meet the population's demand for services.

The breakdown and, to some extent, non-functionality of the water and sanitation system was primarily caused by a lack of funds to renew and maintain the water and sanitation networks. To ensure long-term viability, the government promoted the narrative that service users must pay an adequate water tariff. The revenues generated from service provision had to cover the costs and keep the systems running. If the company can cover its operating and maintenance costs, the system will be reliable.

The financial basis of water pricing is based on the idea that the supplier must be able to recover the full cost of supply. Water tariffs are thus expected to indicate the societal financial impact of water use (Dharmaratna, 2011). The cost recovery or revenue recovery principles have been accepted globally in state-run enterprises pursuing business principles in water pricing.

## 1.2 Research aims and objectives

In Zambia, the cost recovery business model was implemented to propel all of the country's water utilities companies (CUs) toward long-term sustainability goals for water utilities. Despite continued increases in water and sanitation tariffs, the CUs has consistently underperformed since its inception. The following are the key objective of the study:

- i) Examine the current cost recovery frameworks and processes in MWSC service areas.
- ii) Examine the impact of the current cost recovery model on water and sanitation infrastructure.
- iii) Identify cost recovery improvements to support financial sustainability
- iv) Make appropriate recommendations in improving existing cost recovery model

## 1.3 Research Question

What factors Contributes to the failure to meet the expected cost recovery at Mulonga Water Supply and Sanitation Co., Limited (MWSC). And the subquestions includes:

- i) What is the effect of service coverage on cost recovery
- ii) To what extent does the non-revenue water (NRW) affect cost recovery
- iii) What is the effect of regulation on cost recovery

## 2 Literature Review

The key dimension of sustainability in water and sanitation operational processes usually requires a financially viable environment to support water system operations, maintenance, and expansion (DFID, 1998). As a result of unreliable water systems, commercial utility companies continue to provide services to their customers that fall far short of the service level guarantees. One way to improve system reliability is for users to bear the costs of operation and maintenance (Cost Recovery) (DFID, 1998).

When determining tariffs for water and sanitation services, it is critical to consider O&M costs as well as customers' ability and willingness to pay for the services provided. As a result, customer engagement is a critical process because utilities set the tariff for a given period. The engagement would provide insights into the tariff's business model and objectives. "Tariff should also be set in such a way that they are progressively adjusted to meet long term sustainability" (Brikke and Rojas, 2002).

Economic theory suggests that 'correct' pricing of goods such as water has the potential to yield significant economic efficiency benefits, according to Molinos et al. (2013). The pricing of goods and services informs consumers of the scarcity of the resource and, to a large extent, encourages prudent use of the scarce resource. According to Hoque and Wichelns (2013), water prices aid in communicating resource scarcity and encouraging consumers to adopt more efficient practices consistent with the task of improving urban water resources in an efficient manner. Pricing is an important factor that can be used to effectively manage water and sanitation resources and infrastructure.

In the water and sanitation sector, cost recovery occurs when service revenue exceeds or equals the utility's operational costs. As a result, the utility is able to meet its financial obligations and service level guarantees. The primary goal of a full cost recovery model

is to ensure that water and sanitation infrastructure is effectively financed for long-term sustainability. Since the central government covers capital costs in developing countries, the focus is on operational cost recovery. According to Banerjee, Foster, et al. (2010), cost recovery is a stated goal for the majority of water and sanitation utilities in Africa.

Tariffs that are properly designed aid in achieving revenue sufficiency, equity, and affordability (Hoque & Wichelns 2013). Tariffs represent the amount of money that customers pay to service providers and are intended to achieve a variety of goals, including (Cardone & Fonseca, 2003):

Water that is produced but not sold to consumers is referred to as nonrevenue water (NRW). It is caused by technical losses during transmission and distribution, as well as commercial losses caused by theft, including illegal connections. The prevalence of NRW in Zambia is estimated to be greater than 55%. According to Mutikanga et al. (2011, p. 327), NRW is "the difference between system input volume and billed authorized consumption." According to them, it includes both apparent and real losses, as well as unbilled authorized consumption.

The National Water Policy gave birth to the National Water Supply and Sanitation Act No. 28 of 1997 which was passed by the Government of the Republic of Zambia (GRZ) in 1997. The act established NWASCO as the oversight agency for the regulation of water supply and sanitation in Zambia, both urban and rural, and outlined its responsibilities.

The model of cost recovery through the imposition of reasonable user charges entails more than simply raising tariffs; it also necessitates that service providers address issues of operational efficiency. The key operational factors that influence cost recovery includes service coverage, Billing and Collection, Non-revenue water and the regulatory frame.

### **3 Methodology**

During the research, the researcher used a case study strategy, employing both quantitative and qualitative approaches. Mulonga Water Supply and Sanitation Company Limited (MWSC) was chosen for field work because it is a key player in Zambia's water and sanitation services. Data was gathered through a review of the literature, observation, semi-structured interviews, questionnaires, and a review of documents such as the Sector Report, Annual Reports and Management Accounts, and the Business Strategic Plan.

Semi-structured interviews were conducted with regulator inspectors and MWSC employees, while data from sampled customers was collected using a standard questionnaire prepared by the researcher. The review of the literature was critical in determining the methodology to be used and in providing an understanding of the cost recovery model in Zambia.

Both qualitative and quantitative methods were used in data analysis. MS-Excel was used to perform basic statistical calculations on data collected from primary and secondary sources.

### **4 Findings and Discussion**

The data was analyzed and discussed using the following criteria:

#### 4.1 Tariff

The same tariff structure was applied by MWSC across the three (3) districts of Chingola, Mufulira, and Chililabombwe. And further confirms, that MWSC's tariff structure is an increasing block tariff, with sewerage charges calculated as a percentage of billed water consumption. Tariffs are further classified as domestic or non-domestic customer tariffs for both metered and unmetered customers. Domestic metered customers have four (4) blocks, whereas nondomestic customers have only two (2) blocks. This means that when the consumption level reaches a certain threshold, the price of each additional unit consumed varies.

With domestic metered customers, the first customer block of water consumption (0 – 6m<sup>3</sup>) is at K 4.72/m<sup>3</sup>, the second customer block of water consumption (6 – 30m<sup>3</sup>) is K 5.24/m<sup>3</sup>, the third customer block of water consumption (30 – 60m<sup>3</sup>) is K 6.43/m<sup>3</sup>, and the fourth customer block of water consumption(> 60m<sup>3</sup>) is at K 7.63/m<sup>3</sup>. Nondomestic is further subdivided into two (2) categories: institutional (non-profit) and commercial. Institutional metered customers, the first customer block of water consumption (0 – 50m<sup>3</sup>) is at K 6.60/m<sup>3</sup>, the second customer block of water consumption (> 50m<sup>3</sup>) is at K 8.06/m<sup>3</sup>. Commercial metered customers, the first customer block of water consumption (0 – 50m<sup>3</sup>) is at K 9.44m<sup>3</sup>, the second customer block of water consumption (> 50m<sup>3</sup>) is at K 13.28/m<sup>3</sup>. The kiosks and public taps are charged at K 5/m<sup>3</sup>. The finance and commercial team informed us that kiosks and public taps received a 40% discount on billed volumes.

According to MWSC's financials, MWSC were unable to meet its costs beginning in 2020 because the company did not respond to changes in the cost structure in 2020 (recorded losses in 2020 and 2021). Billed revenues fell from K 176 million in 2019 to K 164 million in 2021. Direct costs increased by 51% to K 68 million in 2020 and 7% to K 73 million in 2021, while other operating costs increased by 11% to K 127 million, with a slight decrease of 3% to K 123 million in other operating expenses. Because of changes in the cost structure and a decrease in billed revenue, MWSC's operating profit fell from K 13 million in 2019 to a loss of K 32 million in 2021.

#### 4.2 Service Coverage

The review of management accounts and the NWASCO's annual reports for 2010, 2020, and 2021 confirmed that the average service coverage for water and sewerage was high, at 97% and 83%, respectively. The proportion of the population with household connections in the service area is 61,808, representing 70% of the total household in the three (3) districts, with the remaining 30% served by Kiosks and Public Taps. MWSC anticipates an average of 64,345 connections and 99% water service coverage in 2021.

Had the company increased its customer connections to 64,345, and NRW at 48% NRW, the management accountant estimated that a total production of 34 million m<sup>3</sup> was required to meet the 18 million m<sup>3</sup> sold initially budgeted for. This would have resulted in billed revenue increase from K 164 million achieved in 2021 to K 172 million, Direct Costs increase from K 73 million to K 75 million, and total service delivery costs increased from K 209 million to K 211 million. Increasing service coverage from 97% to 99% would provide the company with two advantages:

- i) The cost of providing services would be reduced since the fixed overhead is apportioned to a larger customer base and recovery of some NRW and translate them into sales.

- ii) The total billed revenue would rise primary because of the increase in customer connections.

Expanding coverage through individual connections generates far more billed revenues than expanding coverage through kiosks/public taps. Individual connections would yield K 6,395,184.00 incremental revenue against K 160,200.00 if the business opted for kiosks and public taps. This would generate more revenue to that would cover cost of service delivery and investment.

### 4.3 Billing and Collection

According to the management accounts, the company has 60,345 connections, with approximately 58,163 active customers. The average annual billed volume was 17.4 million m<sup>3</sup>, with an average effective tariff of K 9.46/m<sup>3</sup> resulting in total revenue amounting to K 165 million. MWSC charges user fees based on the type of customer connection. Domestic, Non-domestic (Commercial, Industrial, and Institutional), Kiosk, and Large Consumer (mine operators) service connections are available from MWSC. The monthly water bill of consumers is a function of the amount of water they use. The volumetric charges is based on a rising block tariff, with the unit charge specified over a range of water consumption.

The billing process is manual; meter readings are taken monthly, and bills are distributed electronically each month after the readings are processed. Cash and electronic payments are accepted from customers.

The effective tariff for mine operators and non-domestic customers is higher, at K 11.60/m<sup>3</sup> and K 12.66/m<sup>3</sup>, respectively, than for domestic and kiosk customers, whose average revenue per m<sup>3</sup> sold was K 7.86/m<sup>3</sup> and K 5/m<sup>3</sup>, respectively. The average cost of delivery service is K 9/m<sup>3</sup> sold (based on the 2019 cost structure), which covers a domestic deficit of K 0.6/m<sup>3</sup> (K 7.86/m<sup>3</sup> – K 9.00/m<sup>3</sup>) and a kiosk deficit of K 3.50/m<sup>3</sup> (K 5.0/m<sup>3</sup> – K 9.00/m<sup>3</sup>). This confirms that the non-domestic and mine operators were charged a higher tariff in order to provide subsidies to domestic customers, including those who used Kiosks and Public Taps.

The researcher observed a drop in revenue from K 172 million in 2019 to K 165 million primarily due to a drop in mine operator revenue that resulted in a loss of over K 8 million cross subsidy. Further, a 92% increase in energy costs increased operating costs for the business.

MWSC's tariff structure factors includes cross subsidies, the Mine Operators and Commercial Customers subsidies the Domestic and Kiosk Customers. For the subsidies to be effective, the Mine Operators and Commercial customer are required to meet certain predetermined volumes of sales volumes in order for MWSC to cover its costs. The increase in costs needed the revenue to increase by the same quantum of at least K 37 million for the tariff to remain cost reflect.

Despite relatively high collection efficiency in 2020 and 2021 (89% and 83%, respectively), Some customers were in default, and K 17 million was set aside as bad debt due to the collection efficiency of 83% in 2021. MWSC, on the other hand, would have only recognised K 16 million as bad debt if collection efficiency had been 90%, saving K 1 million. O & M Cost Coverage fell from 101 % to 87 % and 82% in 2021. This

was primarily due to a decrease in billed revenues, which resulted in less actual money collected in comparison to the overall increase in service costs.

#### **4.4 NRW**

AFDB (2010) states that, NRW arises from technical losses occurring during transmission and distribution, water provided free through stand posts or under exemptions (often for the poor) refers to water that is produced but not sold to consumers. The NWASCO sector report set the NRW target for all CUs in Zambia at 25%, but the MWSC's average NRW was 46%. The data on system input, billed volume, and billed value was provided for three (3) years, from 2019 to 2021. According to the NRW report, physical losses were estimated to be 22%, while commercial losses were estimated to be 24%. However, the estimates could not be supported by sufficient data to be considered reliable.

According to the respondent, the main sources of NRW were leakages, illegal connections, meter reading accuracy, and unmetered customers. The respondents confirmed that the company had an NRW Strategy, but it was not yet fully operational and was lacking in practical application on the ground.

In summary, it is clear that both physical and commercial water losses have harmed the water utility's performance and ability to achieve cost recovery. Despite an NRW of 48%, only 52% of production was billed as of the end of 2021. The CU was spending the equivalent of 48% more on water that was not contributing to the organization's income, which had an impact on production costs. These exorbitant water production costs had an unjustifiable negative impact on the CU's ability to fully cover its expenses. Accounting for 1.1 million m<sup>3</sup> would reduce NRW from 48% to 45 % and add K 10.6 million (K 9.65/m<sup>3</sup> sold revenue x 1.1 million m<sup>3</sup>).

#### **4.5 Regulatory and Monitoring**

The tariff guide of 2020 confirms that the MWASCO has adopted the Cost-Plus Approach in setting the WSS tariffs. "The cost plus method of tariff setting is a pricing method where the customer pays the costs of service provision plus a fixed percentage to the provider. The set tariff should gradually result in full costs recovery (i.e. O&M, depreciation, provisions, capital costs and interest repayment for both water and sanitation service provision." (NWASCO Tariff Guide, 2020 p. 6). Cost recovery in the urban water supply sector is accomplished through service charges, and tariffs govern the amount of revenue received by service providers from customers.

The study discovered that water and sanitation services are less expensive than other utility services. Water tariff increases have been far less than commodity price increases. For example, the average inflation rate over the last three (3) years has been in the double digits, ranging from 16% to 25%, with energy costs, the largest input cost of water production, increasing by more than 92%. Except for the 32% and 29% increases on commercial and institutional customers, which accounted for less than 13% of billed revenue, no increases were implemented during the same period.

MWSC uses historical accounting costs to determine the price, which was a source of resource allocation distortion. Furthermore, because the capital cost of infrastructure was subsidized by the central government, MWSC did not include the capital cost in the tariff structure, giving the impression that water is inexpensive and readily available, and



that user demand for water is unaffected by cost. The company is currently unable to meet demand for water, which has resulted in water rationing rather than changing the tariff to provide a supply side solution. The regulator failed to revise MWSC's tariffs in 2020 due to the upcoming General Elections, which were scheduled for mid-2021 following the expiration of the tariff that was in effect from 2017 to 2019.

NWASCO provide a regulatory oversight on the performance of CUs. However, the regulator's lack of consistency in performance monitoring and meaningful incentives for the service provider has resulted in laxity on the part of the service provider. Based on MWSC's performance in 2021, the company's efficiency levels have dropped, and the regulator has taken no action to address the drop in service delivery by the company. As a result, this confirms that the awards given to the best performing CU are insufficient to motivate performance. Furthermore, the MWSC Board of Directors has not signed a performance contract with NWASCO that would hold management accountable for the CU's performance.

## 5 Conclusion and Recommendation

According to the study findings, the existing level of cost recovery practice in the three (3) towns was rather poor in terms of efficiency and cost recovery targets. The main disadvantages of cost recovery mechanisms were that the town's current tariff structure had not been revised in three (3) years. However, equity was obtained because the company had a separate tariff structure for industrial and commercial usage in effort to accomplish cross subsidization between domestic and non - domestic (industrial and commercial usage) and consumer spending.

At its current operating efficiency, the company would need a tariff revision to recover its costs. However, by improving billing efficiencies, reducing NRW, and expanding coverage, the company could meet its costs under the current tariff structure.

In light of the findings, the following recommendations were made: -

- i) NWASCO should revise the tariff rate on a regular basis;
- ii) NWASCO should improve incentive regulation by diminishing the incentive to artificially boost costs associated with the traditional rate regulation.
- iii) MWSC should distinguish between commercial and technical water losses in order to operate efficiently.

Finally, the study suggests that MWSC and NWASCO focus their efforts on improving the cost-effective processes for tariff subsidies in order to offset a larger share of costs, raising operating cost recovery ratios to levels adequate to support much-needed capital maintenance and entice private capital without raising tariffs beyond affordability. On the other hand, the central government and its cooperating partners must acknowledge that long-term assistance for local water service delivery is necessary, appropriate.

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