

**MSc Programme in Urban Management and Development**

**Rotterdam, The Netherlands**

**September 2014**

**Thesis**

**Title: MODES OF FINANCE IN THE WATER SERVICES PROVISION AND THE  
INFLUENCE ON ITS EFFICIENCY IN MOMBASA COUNTY, KENYA**

**Name: Henry Ndegwa Njuguna**

**Supervisor: Dr. Alberto Gianoli**

**Specialization: Managing and Financing Urban Infrastructure**

**UMD 10**

# **MASTER'S PROGRAMME IN URBAN MANAGEMENT AND DEVELOPMENT**

**(October 2013 – September 2014)**

## **MODES OF FINANCE IN THE WATER SERVICES PROVISION AND THE INFLUENCE ON ITS EFFICIENCY IN MOMBASA COUNTY, KENYA**

**Henry Ndegwa Njuguna**  
**Kenya**

**Supervisor: Dr Alberto Gianoli**

**Rotterdam, September 2014**

## Summary

The research is based on financing mechanisms and the efficiency of water service provision within Mombasa County. The specific emphasis is on Mombasa Water Supply and Sanitation Company. The objective of this research is to establish how loans, grants, subsidies and tariffs utilization affect management and organizational arrangements in the water utility and how this decision consequently affect the efficiency of water utility. The literature reviews global trends in financing water through multilateral loans and other forms of debt, grants, subsidies' typologies and tariff formulation structures, mainly focusing on the general information regarding these mechanisms as applied internationally and locally in Kenya. Part of the research addresses the relationship between effect and impact as well as various forms of decentralization of public services with specific focus on unbundling of public goods with review of theory behind unbundling as well as focus in the water sector. On efficiency which is the other variable the research covers Governance, Commercial, Financial, Technical, Customer service and Human resource efficiencies. Each of these indicators is reviewed independently based on certain aspects developed by the International Water Association as the best matrix for evaluating utility efficiency at different functional levels.

The findings of the report are contained in chapter four and includes among other aspects, visual images including graphs and discussion regarding, projects funded by loans and grants, each with detailed analysis of funding amounts and target projects as well as goals, the progress made to date and analysis on the trends of the impact of the funding. Tariffs and subsidies are also analysed as applied in Mombasa County and their effects on the utilities performance as well as their trends over the last six years. There is also detailed analysis on statistical records on Mowassco's financial statements including Net profits, Non-Revenue Water, Billing and Collection efficiency, trends of electromagnetic meters and their impact on revenue as well as consumption records for each of the six business units.

The research concludes that while loans have been utilized in rehabilitating networks, grants on capacity building and tariffs on mainly cost recovery and subsidies on supply to low income areas, each of the methods has had its positive and negative impacts. Loans has mostly improved and stabilized water supply volumes, grants have improved policy and equipping within the company but failed in ensuring impact is felt on the ground while tariffs have contributed to continuity of service to the residents but also overburdened residents. Subsidies in return have failed as the policy used to manage them is poorly implemented and has been hijacked by water kiosk cartels making it hard for the utility to perform its mandate leading to over pricing and in appropriate location of service centres.

The conclusion consists of the overall average utility efficiency calculation done based on mean obtained by getting the average of the ranking (1-5), of questionnaire response questions per indicator as rated by utility senior and junior managers as well as consultants with previous assignments in the water utility and converting this to a percentage to get mean efficiency (%) for each indicator. The overall average utility efficiency was then found by getting the average of the sum of all efficiencies of the six indicators. The average score for the utility was found to be 57% while the average Non-Revenue Water which is a global utility efficiency indicator for the past one year was found to be 50%, hence some close assessment on efficiency. The chapter then concludes by giving an assessment on the influence on efficiency of the utility as a result of the financing mechanisms.

## **Keywords**

**Important words:** Financing mechanisms, Effects, Utilization, Service Provision Efficiency,

## Acknowledgements

I wish to acknowledge and thank the inspiration, guidance and merciful grace of God, the support of my wife Joyce Pesian and beautiful daughter Setian ‘Seey’ Ndegwa, My dad, sisters and brothers, friends and lecturers and staff of IHS. My mentor Maryijk Huysman, my Supervisors Dr Alberto Gianoli and Dr Alexander Jachnow their valuable guidance made this possible. I also wish to pass my gratitude to Mrs. Alome Achayo former Managing Director of Mombasa Water Supply and Sanitation Company and my colleagues at Mowassco for supporting me professionally and for my study and also wish to specially thank Dr. Adriaan Mels (VEI Regional Manager Sub Sahara Africa), Ad Govers (VEI Mombasa WOP Resident Project Manager), Edwin Van Den Brink (PWN Asset Manager) and my colleagues and friends all of Vitens Evides International and Jaco Mabeius of the Netherlands Embassy in Kenya. This would not have been possible were it not for your firm belief in the strength of education in bringing change to the world and my own determination to be a better person.

## Abbreviations

IHS	Institute for Housing and Urban Development
MOWASSCO	Mombasa Water Supply and Sanitation Company
WSP	Water Service Provider
CWSB	Coast Water Services Board
NRW	Non-Revenue Water
IDA	International Development Association
OM	Operation and Maintenance
UARL	Unavoidable Annual Real Losses
UML	Unavoidable Metering Losses
UCL	Unavoidable Customer Losses
DAC	Development Aid Committee
TS	Technical Support
UFW	Un-accounted For Water
MLD	Metering and Leak Detection
IWA	International Water Association
OECD	Organization for Economic Cooperation and Development
DFID	Department for International Development
IBRD	International Bank for Reconstruction and Development
EBRD	European Bank for Reconstruction and Development
IMF	International Monetary Fund
MTPs	Medium Term Plans
MDB	Multilateral Development Banks
NGO	Non-Governmental Organization
ADB	Asia Development Bank
A/DB	African Development Bank
LIC	Low Income Country
UMIC	Upper Middle Income Country
MDGs	Millennium Development Goals
LDC	Least Developed Country
OLIC	Other Least Developed Country
UMIC	Upper Middle Income Country
WASREB	Water Services Regulatory Board
ODA	Official Development Assistance
KfW	Kreditanstalt für Wiederaufbau
JICA	Japan International Cooperation Agency
USD	United States Dollars
Kshs	Kenya Shillings
SWOT	Strengths Weakness Opportunities Threats
BOD	Board of Directors

# Table of Contents

<b>Summary.....</b>	<b>iii</b>
<b>Keywords .....</b>	<b>iv</b>
<b>Acknowledgements .....</b>	<b>v</b>
<b>Abbreviations .....</b>	<b>vi</b>
<b>List of Tables .....</b>	<b>ix</b>
<b>List of Figures.....</b>	<b>x</b>
<b>Chapter 1: INTRODUCTION .....</b>	<b>12</b>
1.1 Water Supply and Finance in Mombasa County .....	12
1.1.1 Background .....	12
1.1.1.1 Mombasa Water Supply and Sanitation Company .....	12
1.1.1.2 Coast Water Services board.....	12
1.1.2 Problem statement.....	12
1.1.3 Research objectives .....	13
1.1.4 Significance of the study .....	14
1.1.4 Scope and limitations .....	15
1.1.5 Description of the project area .....	15
1.1.6 Research question(s) .....	16
1.1.6.1 Main Research Question.....	16
1.1.6.2 Sub Questions .....	16
1.1.7 Research method .....	16
1.1.8 These structure .....	16
<b>Chapter 2: LITERATURE REVIEW .....</b>	<b>17</b>
2.1 Public Service and Role of private sector theory.....	17
2.1.1 Theory of market failure .....	17
2.1.2 The conditions of market efficiency .....	18
2.2 Water service provision efficiency .....	20
2.2.1 Efficiency .....	20
2.2.2 Major challenges .....	21
2.2.2.1 Coverage.....	21
2.2.2.2 Population increase and urbanization .....	21
2.2.2.3 High Non-Revenue Water .....	21
2.2.2.4 Water is often not potable.....	24
2.2.2.5 Asset management is poor or lacking.....	24
2.2.2.6 Other external factors .....	24
2.3 Bridging the Gap .....	25
2.3.1 Improving efficiency .....	25
2.3.2 Global water utility efficiency standards.....	25
2.4 Financing in the water industry .....	28
2.4.1 Finance Model.....	28
2.4.2 International Water Sector Funding .....	28
2.4.3 Water sector finance.....	31
2.4.3.1 Introduction .....	31
2.4.3.2 Financing avenues .....	31
2.4.3.3 Debt.....	32
2.4.3.3.1 Loans .....	32
2.4.3.3.1.1 Traditional bank loans .....	32
2.4.3.3.1.2 Syndicated loans .....	33
2.4.3.3.1.3 Multilateral loans.....	33
2.4.3.4 Cost recovery/Tariffs.....	35
2.4.3.4.1 Tariff structure .....	36
2.4.3.4.2 Types of tariffs.....	36
2.4.3.5 Subsidies.....	37

2.4.3.5.1 Consumption and Connection based subsidies .....	37
2.4.3.5.2 Targeted and Untargeted Services.....	37
2.4.3.5.3 Explicit targeted subsidies .....	38
2.4.3.5.4 Importance of Target Subsidies .....	38
2.4.3.5.5 Challenges of target subsidies .....	38
2.4.3.6 Grants .....	40
2.4.3.6.1 Types of grants.....	40
2.4.3.6.1.1 General purpose grants (Unconditional) .....	40
2.4.3.6.1.2 Specific-Purpose Transfers (Conditional).....	41
2.5 Conceptual framework – Linking finance and efficiency .....	41
<b>CHAPTER 3: RESEARCH DESIGN AND METHODS .....</b>	<b>44</b>
3.1 Research questions .....	44
3.1.1 Main Question.....	44
3.1.2 Sub Questions .....	44
3.1.3 Introduction to financing impacts and effects .....	44
3.1.4 Definition of Impact and Effect .....	44
3.1.5 Effect Investigation .....	45
3.3 Research Design .....	46
3.4 Research Strategies.....	47
3.4.2 Case study .....	47
3.5 Research Operationalization; Variables and Indicators .....	47
3.5.1 Defining efficiency variables .....	48
3.5.1.1 Definition of terms and concepts related to efficiency;.....	48
3.5.2 Defining utilization variables.....	48
3.5.2.1 Definition of terms and concepts related to utilization .....	49
3.6.0 Data Collection Methods .....	53
3.6.1 Research Approach .....	53
3.6.1.1 Questionnaires .....	53
3.6.1.2 Semi structured interviews .....	54
3.6.1.4 Sampling for Primary data.....	54
3.6.1.4 Sample Size and Selection .....	55
3.6.1.5 Validity.....	55
3.6.1.6 Reliability .....	56
3.6.1.6 Data Analysis Methods .....	56
<b>CHAPTER 4: RESEARCH FINDINGS .....</b>	<b>57</b>
4.1 Introduction .....	57
4.1.1 Water utility organogram .....	58
4.2 Water finance in the county.....	59
4.2.1 Technical Support (TS) Project (Bilateral Loan Funded by AFD).....	59
4.2.2 Project objectives .....	59
4.2.2.1 Capacity Building.....	59
4.2.2.2 Improvement Action Plan.....	61
4.2.3 Technical Support (TS) - Project Outcomes .....	62
4.3 Water Operators Partnership Project – WOP (Grant funded).....	65
4.3.2. Initial progress and redefinition of strategy.....	68
4.3.3 Outcomes of WOP project to date - Analysis .....	69
4.4 Additional Projects .....	73
Background information.....	73
4.4.1 Background information on WASSIP projects – multi lateral loans.....	77
4.4.2 Outcomes of Loan Funded infrastructure Projects .....	79
4.5 MOWASSCO Tariff as a Source of Finance (2007-2014).....	82
4.5.1 Tariffs – Background information.....	82
4.6 Subsidies – background information .....	87
4.6.1 Kiosks volume of sales.....	88
4.6.2 The water kiosk policy .....	89
4.7 Are the finances utilized in line with the water needs of the residents of Mombasa County? ...	92
4.7.1 Loans .....	92



4.7.1.1 Are loans utilized in line with the needs of residents of Mombasa County? .....	94
4.7.2 Grants .....	94
4.7.2.1 Are Grants utilized in line with the needs of residents of Mombasa County?.....	96
4.7.3 Subsidies .....	97
4.7.3.1 Are Subsidies utilized in line with the needs of residents of Mombasa County? .....	99
4.7.4 Tariffs.....	99
4.7.4.1 Are Tariffs utilized in line with the needs of residents of Mombasa County? .....	101
4.8 What are the strengths and weaknesses of different funding approaches for water services provision with respect to Mombasa County? .....	102
4.8.1 Strength and weakness of Loans .....	102
4.8.2 Strength and weakness of Grants .....	104
4.8.3 Strength and weakness of Subsidies.....	107
4.8.4 Strength and weakness of Tariffs .....	108
Strength of Tariffs as a source of finance.....	108
4.9 To what extent has utilization of financial mechanisms affected services provision and its efficiency? .....	110
4.9.1 Influence of loans on efficiency .....	110
4.9.2 Influence of Grants on efficiency .....	111
4.9.3 Influence of Subsidies on efficiency .....	112
4.9.4 Influence of Tariffs on Efficiency .....	113
4.9.5 Overall Influence of efficiency by the combined funding methods .....	114
4.9.5.1 Governance Efficiency .....	114
4.9.5.2 Human resource efficiency .....	116
4.9.5.3 Customer efficiency .....	117
4.9.5.4 Financial efficiency .....	119
4.9.5.4 Commercial efficiency .....	120
4.9.5.5 Technical efficiency .....	121
<b>CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS.....</b>	<b>123</b>
<b>Bibliography .....</b>	<b>127</b>
<b>Annex 1 Interview guide.....</b>	<b>131</b>
<b>Annex 2 Utility efficiency survey (source; IWA) .....</b>	<b>134</b>
<b>Annex 3; Financial utilization survey .....</b>	<b>140</b>
<b>Annex 4 MOWASSCO net profit June 2007 – June 2014.....</b>	<b>144</b>
 <b>List of Tables</b>	
Table 1Unbudling of water services .....	19
Table 2 Unbundling of water services in Kenya .....	20
Table 3 IWA Efficiency assessment indicators.....	27
Table 4 Multilateral Development Banks and their focus .....	34
Table 5 Typology of subsidies .....	39
Table 6 Operationalization of variables table.....	50
Table 7 Logical Framework for VEI WOP project (Source ; Mowassco Records, 2013) .....	65
Table 8 Average consumption per BU per day in m3 .....	75
Table 9 Production capacity for water sources supplying Mombasa (Tahal Group & Bhundia Associates, 2013).....	75
Table 10 Details and summary of other multilateral loan funded project .....	77
Table 11Mowassco's water consumption Tariff review since 2010 (MOWASSCO, 2012) .....	83
Table 12 Mowassco sewer discharging tariffs since 2010 (MOWASSCO, 2012).....	83
Table 13 Customer consumption category within Mowassco.....	84
Table 14 Utilization of loans to meet needs of residents .....	92

Table 15 Utilization of grants to meet needs of Mombasa .....	95
Table 16 Utilization of subsidies to meet needs of Mombasa .....	97
Table 17 Utilization of Tariffs to meet needs of Mombasa .....	99
Table 18 Governance efficiency survey results.....	115
Table 19 Summary of Customer efficiency survey .....	118
Table 20 Summary of Financial efficiency survey .....	119
Table 21 Summary on commercial efficiency survey.....	120
Table 22 Summary of technical efficiency survey .....	121
Table 23 Overall Utility Efficiency calculation.....	123

## List of Figures

Figure 1 Mombasa's Location.....	15
Figure 2 The IWA water balance model .....	22
Figure 3 Utility water losses .....	23
Figure 4 The 'vicious' and 'virtuous' NRW cycles .....	23
Figure 5 Utility's efficiency assessment model.....	26
Figure 6 Water financing model .....	28
Figure 7 Global water finance trends .....	29
Figure 8 Top allocation to water by country analysis .....	29
Figure 9 Commitment allocations to finance water .....	29
Figure 10 Commitment by sector within water finance.....	30
Figure 11 Finance mechanism covered by research.....	32
Figure 12 Water utility management environment .....	42
Figure 13 Conceptual framework.....	43
Figure 14 Water utility project effects investigation process .....	46
Figure 15 Research design.....	47
Figure 16 Mombasa's location, (TS photographs file, 2012) .....	57
Figure 17 Water utility organogram (Source; Mowassco records).....	58
Figure 18 Mowassco water network (Source; Mowassco Records) .....	58
Figure 19 Proposed company organization structure under AFD funding (Source; Mowassco Records) .....	62
Figure 20 The manager's NRW Handbook .....	68
Figure 21 West Mainland Pilot Area (Source; Mowassco Records, 2014) .....	69
Figure 22 Site visit to LIA by Mowassco and County officials.....	70
Figure 23 Onsite training by VEI experts and Mowassco artisans .....	71
Figure 24 Comparison of billing between Mechanical and EMM meters for 17 Major clients .....	71
Figure 25 Stabilization effect after adjustment of EMM meters by supplier to suit Mombasa's conditions.....	72
Figure 26 Stores funded by VEI grant being inspected by the Dutch envoy to Kenya .....	73
Figure 27 Mowassco Water sources and transmission routes (Source; Mowassco Recoords, 2012) .....	74
Figure 28 Non Revenue Water trend January 2007 – June 2014.....	76
Figure 29 Water Production and Consumption trend 2007 - 2014.....	79
Figure 30 Mzima pipeline repair kit,                      Figure 31 Hoisting of pumps in Tiwi wells ,.....	80

Figure 32 Average consumption m3/year in BU -2007-2014 .....	80
Figure 33 Annual Net Profits 2007-2013.....	85
Figure 34 Monthly average Net Profit January to December (2007 - 2013) .....	86
Figure 35 Average annual billing per BU in Kshs - January 2007 - June 2014 .....	86
Figure 36 % Collection Efficiency in Comparison to Water Losses 2007-2014.....	87
Figure 37 Mowassco customer numbers distribution by percentage.....	88
Figure 38 Billing trends for water kiosks 2008 - 2009.....	88
Figure 39 Average daily consumption by customer categories 2005 - 2010(Seureca, 2013) .....	89
Figure 40 A water kiosks flouting the policy guidelines, 2014.....	90
Figure 41 Overall utility efficiency .....	123

# Chapter 1: INTRODUCTION

## 1.1 Water Supply and Finance in Mombasa County

### 1.1.1 Background

#### 1.1.1.1 Mombasa Water Supply and Sanitation Company

This research is about the utilization of capital and operational financing options applied in Mombasa County in funding water supply services and their influence on service provision efficiency. The financing options in the county are mainly multilateral loans, grants, tariffs and subsidies. The main partners in funding the water services provision are the World Bank, French Development Agency and the Netherlands Embassy Kenya and VEI. Tariffs are mainly funded through internal revenue as well as subsidies.

The financing options applied may have a significant impact on the water sector based on their utilization and therefore in the end influence the efficiency. The logical rationale is based on the fact that efficiency of a utility can be measured according to accepted service industry benchmarks. The utilization of finance is also measured on parameters consistent with the use of the funds as well as formulated according to project goals and results. In short, the way funds are utilized in the water sector in Mombasa is intended to bring a net positive change, which most likely has a direct or indirect influence to the way in which services are delivered efficiently.

Mombasa City is the second largest city in Kenya with a population of approximately 1.2 million people (Government of Kenya, 2009). The city's daily water demand is estimated to be approximately 182,000 m<sup>3</sup>/day (Tahal Group & Bhundia Associates, 2013) and the current production capacity is estimated to be 43,000 m<sup>3</sup>/day (Tahal Group & Bhundia Associates, 2013). The available supply can therefore meet only about 24% of demand.

The Company's mandates are:

- i. To provide water and sewerage services within the jurisdiction of Mombasa county
- ii. To maintain the assets leased to the Company by Coast Water Services Board (CWSB).

The Bulk Water Supply Unit of Coast Water Services Board in charge of production, supplies Mombasa Water and Sanitation Company with water.

#### 1.1.1.2 Coast Water Services board

The Coast Water Services Board is the Kenya's government's supervisory body for water services providers, these include Mowassco, Malindi, Taveta, Kwale and Kilifi water service providers. Mombasa is the largest water service provider in the region. The board owns all water assets and licenses water utilities in the former coast province (administrative boundaries were revised to include 47 counties hived off from 8 provinces under the new constitution ratified in 4<sup>th</sup> August 2010). The CWSB also implements large scale infrastructure water projects on behalf of the government.

### 1.1.2 Problem statement

Financial interventions to address socio economic challenges need to be analysed, *'the theory that holds that any aid is beneficial to any country no matter the circumstances demands further inspection'* (Abuzeid, n.d). Furthermore, *'the question of foreign aid's effect on economic growth is highly controversial and excites polarised opinions'* (Arndt and Jones, 2009). Mombasa County in Kenya, has been a huge recipient of foreign aid and has also invested significantly from government funding avenues in different sectors of its economy including the water sector, the effect of these is evident but there are divergent opinions. To what extent has the funds been utilized to meet the efficient provision of services in the water sector? *'The question in focus is not as simple as it may appear.*

*Methodological difficulties mean that it is hard to provide a definitive and comprehensive conclusion. Even so, there is very little to suggest that foreign aid has a consistent harmful effect across countries over time''* (Arndt and Jones, 2009).

The questions from the above statement can be assumed to apply not just to foreign aid, but also funding mechanisms applied in the water sector to finance capital and operational projects. This is through focussing on internal funding mechanisms by the utility or government. This research focuses on the water sector and specifically Mombasa County which is among Kenya's 47 administrative devolved governments. Water Supply and Sanitation Services are undertaken by Mombasa Water Supply and Sanitation Company. The city has a population of about 1.2 million people (Government of Kenya, 2009); numerous attempts in form of financial investments have been made by the government and donor agencies in improving access to water and sanitation for the residents of Mombasa County with levels of limited success.

This financial aid has been in the form of loans, grants, tariffs and subsidies. The company through internal cost recovery measures has funded its operations and minor capital works. It is however unclear to what extent the financial investments have improved the efficiency of service delivery in terms of globally accepted measures and indicators for water utility efficiency.

There is need to assess the impacts and effects of investments and there are currently studies undertaken to investigate this, *'mobilizing capital for 'investments intended to create positive social impact beyond financial return (Brandenburg and Jackson 2012; Freireich and Fulton 2009). Two key components of this definition are, first, the intent of the investor to achieve such impacts, and, second, tangible evidence of the impacts themselves''* (Jackson, 2013). How much has the continued investment improved water supply services? Are the financial options mix used in the water sector best suited in addressing the challenges? Answers to these questions and many more regarding financial investments, and tangible effects in improvement of water services need to be studied.

The aim of the research is to investigate to what extent different funding mechanisms utilized to fund water services have been effective in addressing water supply services challenges in Mombasa County with an emphasis on influence on service provision efficiency. The assessment of effects is often complicated because it *'is complex, nuanced, dynamic and, in fact, often uncertain. Evaluating these processes and their chains of results requires a detailed understanding of systems of causal factors and effects whose character is shaped by forces acting at all levels – global, national and local – and across the social, economic, political, cultural and environmental spheres''* (Jackson, 2013).

Funding mechanisms above means financial sources uniquely fashioned to attain certain expected outcomes in water supply services. The effects assessment and especially in terms of service provision efficiency, is also important because it is the accepted standard for successful water supply services as form of benchmarking between utilities globally, therefore it makes *'investors accountable for their intentions and claims''* (Jackson, 2013), and in turn raises the consumers' willingness to pay for sustainable services.

There is limited research on impacts channelled investment Hebb, (2013). This research will focus on effects of investment in the water sector through the assessment of funding mechanisms used, their utilization and to what extent they improve water supply service provision and its efficiency.

### **1.1.3 Research objectives**

The main objective of the research is to investigate the extent to which different financial options used to fund water supply services have managed to achieve efficiency in service provision. The analysis will cover the interaction between the funding methods, utilization of

funds and their effects related to efficient water supply services. The efficiency will be determined through internationally recognized benchmarks for water utility efficiency developed by International Water Association. The research will help in the understanding of how finance can be used to improve sustainability of water utilities and the efficiency of their services.

The research will also seek to establish key issues that affect the efficiency of service provision in Mombasa as a result of funding mechanism used. The research will draw conclusions based on interactions between finance and the organization which is the water service provider in Mombasa (water utility). These ideas are hinged on the ideology that organizations are not just the employees and the work processes especially in public service provision “*organization, then is a group of people with a common purpose who work together to achieve shared goals. The collection of work groups that has been consciously designed by management to maximize efficiency and achieve organizational goals is referred to as the formal organization*” (Brilhante, O., 2014). Most public institutions are regarded as formal organizations though their mode of operation involves interactions with informal organizations and environment.

The financial investments environment is rather a complex system involving multiple players with diverse roles and interests. Sometimes these interests may vary, the investment environment may “*execute private debt deals, providing loans, guarantees and other debt instruments, as well as equity and quasi-equity, to funds, enterprises and projects that aim to provide the poor and marginalized with employment, income and affordable products and services, including housing, food, health care, education, energy and environmental protection*” (Jackson, 2013). The water sector in Mombasa is not peculiar to the above statement, there are investments from subsidies, loans, tariffs and grants, each intended to improve water and sanitation services levels and the lifestyles of the city residents. The extent to which this investment is utilized and brings a desired effect to the targeted population based on the goals initially set, is crucial in understanding what the opportunities, constraints, external and internal factors determine how a service provision utility performs. It also helps in studying how investments affect the service delivery via the service provider. In addition, it is significantly important to mention that the water sector receives massive investment internationally (OECD., 2013) and it is extremely important that professionals and academicians continuously research on the mix of investment channels and evaluate their strengths and weaknesses and their respective effects and efficiency at the tail end of service delivery.

#### **1.1.4 Significance of the study**

This study is important as it gives a deeper perspective on the relevancy of questioning funding mechanisms for water projects and the eventual outcomes for the same due to options selected. Usually, significant investments in the water sector are usually undertaken based on urgency and need due to the basic fact that water is both a human right enshrined in the Kenyan constitution and the fact that it supports life. There has been growing demand to understand financing mechanisms effectiveness. “*The increasing prominence in international development policy arena has also been attracting corresponding (though much more gradual) interest in academic research circles. Research studies addressing all or most of these issues that have been published include, among others, Sanford (2002), Odedokun (2003, 2004) and Clements et al (2004)*”. (Odedokun, 2004).

Though not easy, there is need to investigate the funding mechanisms selected to optimize the solutions to the problem of adequate and quality access to water. In addition it can also help in optimization of debt repayment capability transferred to future generations. “*Getting the ‘value’ for water rights and user accepted methods to evaluate quality of water, user cost and external effects is then currently challenging economists*”(Parena, 2011). This study

contributes to the available knowledge on effectiveness of aid or other forms of investment in the water sector with optimization of long term sustainable results as the key factor, rather than arbitrary funding, often, under the assumption that lack of finance is the major handicap of access to quality and adequate water services. The key component of the investigations was how the water service provision efficiency has been influenced by the financial investments, both in terms of technical and management processes hence effectively meeting or not meeting water services levels.

The research adds to the academic and professional knowledge on assessment of capital and operational investment for urban water utilities based and on the efficiency of their effects. Currently most information available is only from sector organizations.

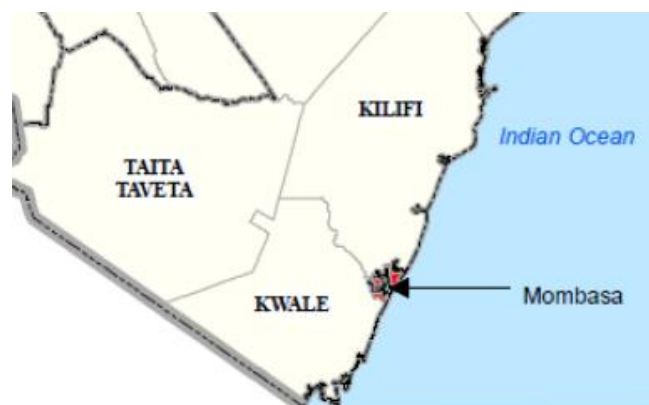
#### **1.1.4 Scope and limitations**

The scope and limitations of the study can be summarized as below:

- i. The amount of data readily available although relatively adequate limited the scope of desired detail the research would cover.
- ii. The field research period was too short to gather all the preferred information required for a more detailed research, this affected the quality of the research. The information on funding covers different sectors and ministries and needed extended periods for gathering information.
- iii. There was also the likelihood of suspicion when researching on funding of projects due to the sensitivity of those involved in case corruption was evident in any of the water projects.
- iv. Lastly there has been insignificant research on funding of water projects and related topics especially in Kenya. Establishing the connection between cause and effect with respect to development projects funding utilization and effects and their efficiency is a seldom researched on topic, hence more challenging.

#### **1.1.5 Description of the project area**

Mombasa is the second largest city in Kenya, it has a population of 1.2 million people and is situated on the coastal strip of the Indian Ocean in the Kenyan coast (4.05° S, 39.7° E), the area is a county within Kenya's 47 County and experiences a tropical climate. Its humidity is about 85 % and average temperature is about 28 °C.



**Figure 1 Mombasa's Location**

### **1.1.6 Research question(s)**

#### **1.1.6.1 Main Research Question**

What is the effect of utilization of different financial mechanism on the efficient provision of water supply services in Mombasa County?

#### **1.1.6.2 Sub Questions**

- i. Are the finances utilized in line with the water needs of the residents of Mombasa County?
- ii. What are the strengths and weaknesses of different funding approaches for water services provision with respect to Mombasa County?
- iii. To what extent has utilization of financial mechanisms affected services provision and its efficiency?

### **1.1.7 Research method**

The research applies both explanatory and descriptive methods to acquire and develop its arguments. Data acquisition is through questionnaires, semi structured interviews and secondary data review. The targets for questionnaires and interviews include management personnel responsible for the water utility and consultants with previous working experience with the water utility.

### **1.1.8 Thesis structure**

**Chapter one:** The chapter contains the introduction giving a brief summary of the water sector finance situation and service provision background in Mombasa County; it also contains the problem statement details and theoretical background as well as significance, limitations and scope of the research.

**Chapter two:** The second chapter contains the literature review underpinning the research basis, this includes the description of efficiency in water services, finance of water services and also the conceptual framework for the research and the link between finance and service provision efficiency.

**Chapter three:** The chapter outlines the operationalization, research strategy, data collection methods and analysis as well as outlines instruments to be used for collecting data and procedure for preparation. It also includes supporting arguments for selected methods and reliability and validity checks.

**Chapter four:** The chapter contains background information on the financial mechanisms used, the efficiency of the utility based on aspects of water utility efficiency developed and recommended by International Water Association. It also contains the authors analysis based on literature reviewed and secondary data review, the survey results and interpretation and answers to the research questions

**Chapter five:** This contains the conclusion of the utility efficiency based on interpretations on calculations and analysis of survey data as well as other sources of information reviewed in the chapter four



## Chapter 2: LITERATURE REVIEW

This section reviews the main themes of the research mainly focussing on the theory behind the delivery of public goods and private goods. The section also reviews the different financing mechanisms as well as the efficiency of water service provision and factors that influence both key variables for the research.

### 2.1 Public Service and Role of private sector theory

*“Consensus is displacing the long-held view that infrastructure services are best produced and delivered by monopolies”* (World Bank, 1994). The statement implies that partly due to market failures, there is growing support around integration of alternative means for offering such services apart from traditional systems, normally offered by statutory bodies and were closely regulated and controlled by the state. This is according to the World Development Report (World Bank, 1994). Mostly the assertion of failure of markets is the most common reason for governments to intervene and offer services to the public.

#### 2.1.1 Theory of market failure

According to Cowen (1988, p.35) market failure can be defined in terms of allocation theory which idealizes it as when there is *“failure of price market institutions to sustain desirable activities or to stop undesirable activities, whereby desirability is evaluated relative to the solution values of some explicit or implied maximum welfare problem”* (Cowen, 1988). To understand market failure it is important to clearly outline terms commonly used in relation to market failure, some of these are;

- i. **Externalities;** These refers to the impact or effect of one party's actions on another. They may be positive or negative in this case meaning they leave the affected party in a better position or in a worse position respectively.(Cowen, 1988). The idea of externality can further be expanded to pecuniarity or non pecuniarity, marginal or inframarginal, pareto relevant or pareto irrelevant.
- ii. **Transaction costs;** this can be defined as any actions, rules, hindrances that inhibit chances of trade between two parties (Cowen, 1988), examples could include restriction on imports from certain quarters or taxation of certain goods beyond normal standards to promote local production in addition to reduce imports from external sources. In cases where transaction costs are also considered externalities, this can be a source of market failure, an investor who wishes to invest in a certain industry but is unable to do so because of transactional costs can lead to him or her abandoning the prospective project.
- iii. **Public goods;** the concept of public goods involves two critical aspects,
  - a. **Non excludability,** which refers to the impossibility of preventing non-paying individuals from enjoying the benefits of goods or services, (Cowen, 1988). Mostly it is used to characterize an externality. Normally markets under-produce goods and services with positive externalities and over-produce goods and services with negative externalities. This is because of transactional costs. The reason is simply because investments are driven by hunger for profits and in case there are transactional costs then the demand rises and therefore excludability rises and in turn the chances of profitability.
  - b. **Non rivalrous,** refers to the situation whereby an individual's ability to consume a good is not affected by another individuals consumption of the same good. An example could be a park; anyone can use it as long as it is not congested.

Water supply to urban systems is considered a private good because consumers who don't pay up or stick to laid down guidelines by the water utility can be excluded by disconnection, in addition consumption by one part of an urban setting diminishes if another part of the urban setting increases its consumption, it therefore, is not a public good but rather a private good and is subject to market failure. The main reasons for market failure necessitating government intervention are pricing inefficiencies (Cowen, 1988) which require regulation of overall takeover of services to safeguard public interest. The reason for pricing inefficiencies is when there is a monopoly in an industry leading to one producer controlling all production of goods or services, mostly as a result of technological leverage.

In some cases other party's with potential may opt not to produce goods and services simply because they can minimize costs in case they are produced by other parties, despite the fact that they enjoy the usage of the goods, this is called the free rider hypothesis, and this may lead to a monopoly by a single entity. However this is questioned by some economists in case of cooperative behaviour like in case of *'altruism, ethical beliefs, convections, ignorance or even subtle forms of self-interest',* (Cowen, 1988).

The Central theorem of modern welfare economics under gross assumptions on technology tastes, and producer's intentions stipulates that, *'the equilibrium conditions which characterize a system of competitive markets will exactly correspond to the requirements of paretian efficiency'* (Cowen, 1988). Paretian efficiency is said to occur when a certain benefit to one party does not leave another party worse off than they were before the benefit to the first party, this means the effect on the second party is either no change or improvement from current state and not deterioration. This can be achieved if competitively imputed incomes are redistributed in a competitive market solution to achieve pareto efficiency assumed by a certain social welfare calculation. This is never the case in the real world as imperfection and resistance to change, trader preference, unpredictability of expectations, and the whims of collective claim (Cowen, 1988) makes it unrealistic.

### **2.1.2 The conditions of market efficiency**

Duality theorem asserts a relationship between pareto efficiency and market performance this can be explained based on the notion that *'constants; langragean multipliers, shadow prices, wages, rents, interest rates correspond between pareto efficiency and market performance and this then means that devolved decentralized decisions in response to this 'prices' by atomistic profit satisfaction-maximizes sustain just that constellation of inputs, outputs and commodity-distribution, that the maximum of the specified social welfare calls for'* (Cowen, 1988). In other words all economic costs are sensitive to social welfare considerations. However duality failure happens by failure of existence of necessary constants or by signal or incentive due to deliberate intentions to maximize profits by producers of good and services, (Cowen, 1988). It may also occur due to the unsustainability of self-regulation by market players to sustain input and output costs and profits to conform to certain welfare calculations. This is called failure by structure (Cowen, 1988) or even due to legal and organizational imperfections caused by errors of omission of certain contributions or *'preclude their explicit allocation or capture by market processes'*, (Cowen, 1988). According to Cornes and Sandler (1986, p.7) governments intervene normally allocate resources to goods and services that the private sector fails to assign sufficient resources. This may also be done in situations whereby equity and fairness is paramount. Such cases may include water supply especially in countries whereby there is acute shortage that may lead to social conflicts or health risks for urban centres, in other situations the government intervenes to redistribute wealth to ensure a more equitable society through various taxation regimes, social security and free basic medical cover systems.(Cornes and Sandler, 1986). The theory of public goods can be useful in explaining where the government needs to intervene and at what level of influence, examples include, corrective taxation,

provision levels, usage costs and financing options (Cornes and Sandler, 1986) for projects of public interest.

Strong basis for impure public goods is supported by the club theory whereby despite some public utilities are free for usage they are subject to diminishing returns and can be extinguished therefore need some form of control which implies locking out partly some of the would be users hence not purely public (Cornes and Sandler, 1986). *‘partial divisibility of benefits, club theory can form the foundation for management of these benefits’* (Cornes and Sandler, 1986). Welfare economics, public finance and game theory linkage is provided by club theory which also supports understanding aspects of two part tariffs, peak load pricing, and cost allocation problems. In essence, the financing of public goods and intervention of the government is related to their characteristics since private goods, this could be either fully or partially, all the same it could be the inability of markets to sustain provision for the services according social welfare and economically suitable realms. How then does the government intervene in the water sector? The introduction of public sector regulation and separation of roles (unbundling) by considering socio economic values of different activities has enabled diversification of service delivery, including the reduction of monopolies and increase in competition hence led to the improvement of service quality in some cases (World Bank, 1994). The report by the World Bank proposes that bundling of services restricts sectors to monopoly (p.53), while unbundling brings more transparency because of cross subsidisation between different lines of service delivery, clearly alienates subsidy needs for low income consumers and improves accountability and management of service delivery. Unbundling can be vertical or horizontal (World Bank, 1994), whereby, the former involves separation by nature of service for example production, transmission and distribution of water services while the latter involves separation by geographical base or by service category for example transport companies operating in different provinces and passenger or cargo planes in air transportation respectively. In the water sector unbundling can be in the form of leases whereby a non-public entity rents the assets and discharges the services (Mowassco’s case), concessions whereby the private party agrees on a build and operation agreement for a certain period usually thirty years, management or service contracts, this can be summarized as shown below.

**Table 1 Unbundling of water services**

FORM OF SERVICE IN WATER SUPPLY	APPLICATIONS	INCENTIVES
Service	Meter reading, billing and collection, and maintenance of Private connections	Permits competition among multiple providers, each with short and specific contracts
Management	Operation and maintenance of the water supply system or major subsystem	Contract renewed every one to three years, and remuneration based on physical parameters, such as volume of water produced and improvement in collection rates
Lease	Extended operational contract	Contract bidding, with contract duration of about ten years; provider assumes operational risk
Concession	All features of the lease contract, plus financing of some fixed assets	Contract bidding, with contract period up to thirty years; provider assumes operational and investment risk

Adopted from World Development Report 1994, (Source Triche 1993)

The water sector in Mombasa County and generally Kenya has been unbundled vertically as shown in the next table below.

**Table 2 Unbundling of water services in Kenya**

INSTITUTION		ROLES AND RESPONSIBILITIES
1.	Ministry of Environment, Water and Natural Resources	Development of legislation, policy and strategy formulation, sector coordination and guidance, and monitoring and evaluation.
2.	Water Services Regulatory Board (WSRB)	Regulation and monitoring of service provision. (Water Services Boards and Providers). Issuance of licenses to Water Services Boards. Setting standards for provision of water services. Developing guidelines (water tariffs etc).
3.	Water Services Boards (WSBs)	Efficient and economical provision of water services. Developing water facilities. Applying regulations on water services and tariffs. Procuring and leasing water and sewerage facilities. Contracting Water Service Providers (WSPs).
4.	Water Service Providers (WSPs)	Provision of water and sanitation services (Mowassco).
5.	Water Services Trust Fund (WSTF)	Financing provision of water and sanitation to disadvantaged groups (pro-poor).
6.	The Water Appeals Board (WAB)	Arbitration of water related disputes and conflicts between institutions and organizations.
7.	National Water Conservation and Pipeline Corporation (NWPCPC)	Construction of mega-dams and drilling of boreholes in large numbers in Arid regions.
8.	Kenya Water Institute (KEWI)	Training and Research.
9.	National Irrigation Board (NIB)	Development of Irrigation Infrastructure.

## 2.2 Water service provision efficiency

### 2.2.1 Efficiency

The term efficiency refers to the ratio of output to input (Brilhante, O., 2014). The higher the efficiency of a system the more socially, environmentally and economically sound it is to operate it and vice versa. Inefficiency is undesirable and leads to failure. Efficiency is represented by the following equation.  $\text{Efficiency} = \text{Output}/\text{Input}$ , and is usually expressed as a percentage rate (%).

In non-quantitative terms especially in the case of water utilities efficiency can be defined as the ability of a water utility to supply adequate drinking water to meet the existing demand, the water to be of a quality meeting minimum world health organization standards for physical, chemical and biological parameters for drinking water. In addition, the utility's ability to maintain its physical and non-physical assets in a sustainable state, while meeting internationally desired service levels in water services provision for urban water utilities are also indicators of its efficiency. *‘The inefficiency of water utilities is often identified as one of the major factors in explaining the slow progress and the many setbacks in improving access to water and water distribution (e.g., see Schuebeler, 1995; World Bank, 1999)’* (Estache and Kouassi, 2002). Therefore, it is an acceptable measure of successful water services strategies. Service levels refer to a set of generally acceptable norms in best practices in water supply service provision. Examples could be percentage (%) of population with access to water services regardless of seasonal variations, in this case the higher the better or hours of supply per day and in this case the more the better.

### 2.2.2 Major challenges

Among the major challenges to modern water utilities are;

#### 2.2.2.1 Coverage

Inadequate coverage with only certain areas covered by water supply utility's network. *'Africa faces increasingly critical resource constraints in its effort to extend water services of acceptable quality to the vast majority of its people. (e.g., see Pouliquen, 2000; Sandelin, 1994; Snell, 1998; World Bank, 1999)'*, (Estache and Kouassi, 2002). This is common in developing countries where the most vulnerable groups in the society are seldom reliably supplied. In most cases, this is due to their low ability to pay for water services coupled with minimal political influence due to lack of mechanisms or resources to mobilize effectively for water related investments in their localities. Governments also face difficulties in providing water infrastructure in low income areas due to land tenure issues as well as poor planning and political intricacies. Most network coverage expansion requires significant capital investments which may not always be available for some countries. *'Despite strong calls for action at international level, the Joint Monitoring Program, led by WHO and UNICEF, found that 2.6 billion people still do not use improved sanitation (out of which 1.1 billion still defecate in the open), while 884 million people do not use improved sources of drinking water (JMP, 2010)'* (Tremolet, 2011).

#### 2.2.2.2 Population increase and urbanization

Due to increased urban population, there are dynamic challenges related to water services provision; exponentially rising demand for water from urbanization, industrial development and agriculture despite the minimal water resources capacity in some areas.

Other challenges are related to over abstraction of ground water as urban residents seek to boost their water reserves, the need to provide water in poorly planned urban settings, population surge in urban centres leading to higher demands which in turn results in water supply provided by the utility to be intermittent. Demand and supply dynamics of cities force them to ration their water supply through scheduled programs; this occurs whereby certain areas are supplied on certain hours or days and others on other days and hours. This causes irregularity and lack of clarity on the reliability of the water supply system including hours of supply, pressure levels or amounts expected. It also leads to pipe network bursts as sometimes peak flows are diverted to sections not designed to handle sudden surge in volumes of water and related system expansion challenges due to lack of integrated planning strategies linking with other municipal services like roads, inland canals, telecommunication and power supply lines and many more.

#### 2.2.2.3 High Non-Revenue Water

NRW is defined as the difference between the Volume of potable Water Produced and the Volume of Water Billed over a given period of time by a water utility (Seureca, 2013).

NRW = Volume Water Produced – Volume Water Billed Expressed as a percentage:

$\% \text{ NRW} = ((P_{\text{roduced}} - B_{\text{illed}}) / P_{\text{roduced}}) * 100$ , the following figure illustrates the different components of Revenue and NRW according to recommendations by International Water Association IWA.

**Figure 2 The IWA water balance model**

**A Water Balance**

Network Input	Authorised Consumption	Authorised Billed Consumption	Billed Measured Consumption		Exported	Revenue Water
			Billed Unmeasured Consumption		Household	
		Authorised Unbilled Consumption	Unbilled Measured Consumption		Non Household	Non Revenue Water
			Unbilled Unmeasured Consumption		Household	
			Operational Use		Non Household	
			Illegal Use		Household	
	Water Losses	Apparent Losses (Commercial Losses)	Meter Under Registration		Small	
			Metering Losses		Large	
			Leaks on Primary Network		Household	
			Leaks and Overflows on Operators Storage Facilities		Non Household	
		Real Losses (Physical Losses)	Background Losses		Household	
			Burst Losses	Visible Leaks	Non Household	
				Visible and Reported Leaks	Services	
				Unreported Leaks (Invisible Leaks)	Mains	
					Services	
					Mains	

Source: TS Report on Metering Program for Mombasa Water (Seureca, 2013)

As seen from above, NRW is comprised of three main components namely:

- Real Losses (also referred to as Physical Losses); these are losses resulting from leakages and pipe bursts in the network as a result of hydraulic weaknesses in the system or vandalism of water assets by scrap metal illegal market.
- Apparent Losses (also referred to as Commercial Losses); in any water utility there are losses associated with the network meters as well as accounting errors in billing or collection. These losses may be due to wear and tear of water meters leading to inaccuracies or lack of correction factor application when billing or under registration or over registration (over billing). Commercial losses might also be as a result of water theft through meter manipulation or network illegal connections.
- Authorised Unbilled Consumption (including operational use), in some cases water utilities do not bill government institutions like hospitals, military installations or mosques and churches. In other cases the utilities use water for cleaning the system reservoirs or flushing pipes or even firefighting. Most utilities in third world countries seldom meter this water and therefore it amounts to Non-revenue water as the utility incurs a cost to produce it but does not receive any payment for the same.

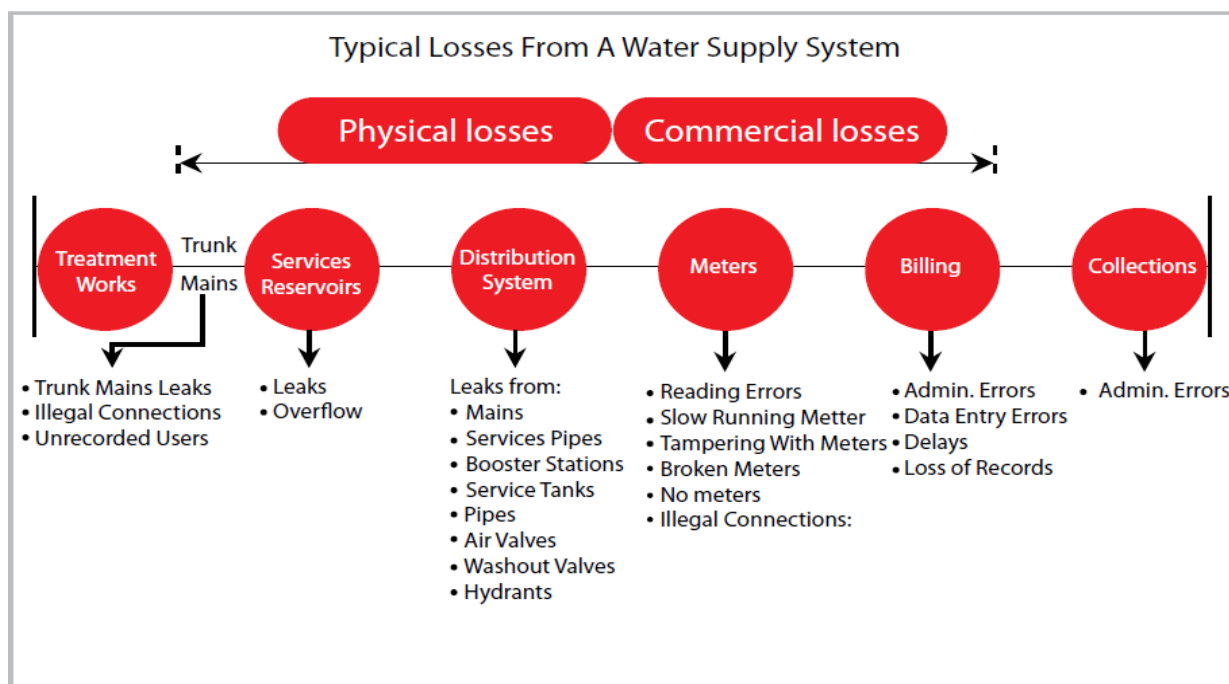
Thus:  $NRW = \text{Real Losses} + \text{Commercial Losses} + \text{Authorised Unbilled Consumption}$

Commercial Losses = Customer Losses (including illegal connections) + Metering Losses (including meter under-registration (MUR)) the relationship between NRW and UFW is as follows:

- $UFW = \text{Real Losses} + \text{Commercial Losses}$ , and
- $NRW = UFW + \text{Authorised Unbilled Consumption}$ , or, in other terms:
- $UFW = NRW - \text{Authorised Unbilled Consumption}$  (Seureca, 2013)

For each water supply system, there are unavoidable water losses which occur as there is no water supply system that is completely free of losses, even the best water network systems like in the Netherlands and Tokyo in Japan have non-revenue water volumes of about 5%, and the unavoidable losses are therefore classified as follows: Unavoidable Annual Real Losses (UARL), Unavoidable Customer Losses (UCL); and Unavoidable Metering Losses (UML).

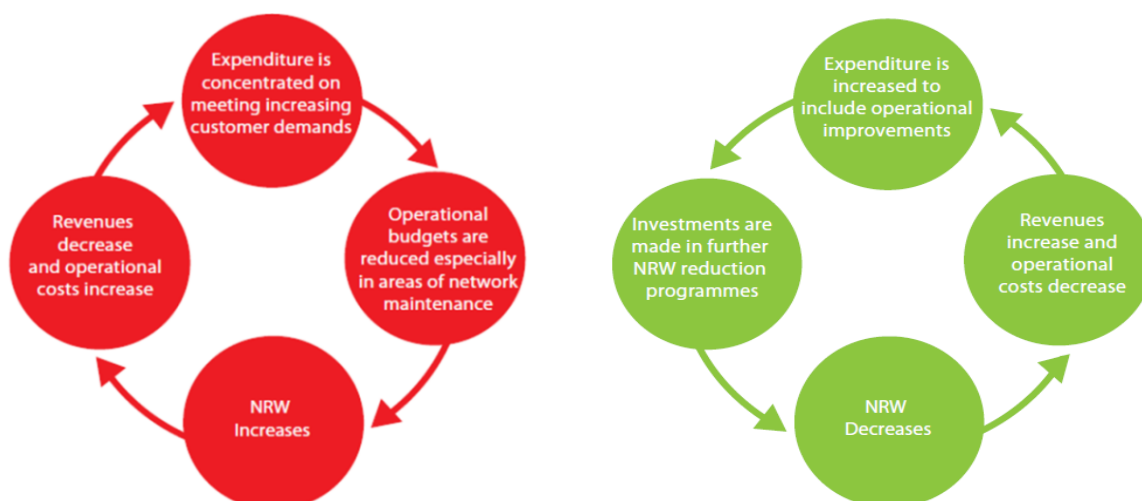
**Figure 3 Utility water losses**



Source: The utility manager's non-revenue water handbook (Malcolm and et al., 2008)

The impact of high losses in a water utility is great and is mainly caused by either a combination of two or more of the following reasons which could be; lack of clarity on magnitude of challenges (magnitude, sources, costs), Incapacitation (insufficient trained staff), poor funding and budgeting control practice (pipes; meters), management non commitment and external political influence (Insufficiency of support and weak internal Operational policies), (Malcolm and et al., 2008). The impacts are diverse and can be summed up in the following two diagrams;

**Figure 4 The 'vicious' and 'virtuous' NRW cycles**



The 'vicious' NRW cycle

The 'virtuous' NRW cycle

Source: The utility manager's non-revenue water handbook (Malcolm and et al., 2008)

The decrease revenue as a result of losses (increase in NRW) causes the water utility to divert funds to meeting emergencies and cuts back on operation and maintenance, furthermore this leads to system dilapidation and in essence, decrease in service provision efficiency, the

result is further reduction in revenues and financial sustainability of the utility. The usual result is complete collapse of all technical systems, job cuts, industrial action by employees and public backlash. In the end the government is forced to intervene as what can be termed as market failure by structure or even failure according to the central theorem of modern welfare. This is called the ‘vicious’ non-revenue water cycle.

The preferable ‘virtuous’ cycle involves a continued improvement of the system through losses reduction, network rehabilitation and expansion, increase of customer base, reduction of environmental costs due to efficiency in supply distribution with minimal water loss and increase in revenue. There could be diversification of business options for the utility including venturing into research and development or innovation.

#### **2.2.2.4 Water is often not potable**

The current rate of urbanization, environmental degradation associated with growth of cities and increase of non-permeable land surface has led to lower flood duration times and less fresh surface water retention capacities. In addition agricultural farming expansion, deforestation, industrial waste disposal and general global impacts of climate change have increased the depletion of water quality. Many natural water systems that have fresh water have been polluted due to lack of planning and legislation on waste management and sound farming practices, in other cases is lack of enforcement of such legislation due to laxity or political interference. The result of this is acute shortage of potable water and hence more strain to the scarce water resources available for human use.

#### **2.2.2.5 Asset management is poor or lacking**

Assets to a water utility can be classified as infrastructure systems or networks that are tools used by the utility to discharge its mandate; Assets may be physical or nonphysical. Among the physical assets of a water utility include; Production of the service (e.g., bulk water, waste water), transmission (through pipes, canals or cables to service areas), distribution (through the piped and cables network to the customer), buildings, vehicles, office stationary and any other physical office and administrative or technical property of the water utility. The non-physical components of assets include the following; human capital and expertise, operational manuals, design manuals, health and safety manuals and strategic and asset development/management plans among others (Brilhante, O., 2014). Poor management of both types of assets leads to water resources destruction and losses, therefore to avoid this, requires integrated approaches to achieve the benefits, (Biswas, 2008).

#### **2.2.2.6 Other external factors**

Natural resources demand may also be a problem where there are human and wildlife related conflicts. It may complicate water supply service provision or in some cases the demand for water interferes with natural ecosystems, a good example is the Ethiopian Gibe III project that has raised concern for the ecosystems within Lake Turkana in Kenya. Political correctness (Tremolet, 2011) and interference in appointment of water utility management staff can be another big polluter of utility’s autonomy in service delivery as well as in implementation of management decisions with managers more concerned in satisfying political ‘godfathers’ rather than utility growth agenda. In addition, socio-economic conditions like cultural tendencies of locals are also supplementary to utility growth, work culture and organizational ethic; countries with poor social and economic policies tend to have utilities that also struggle to deliver services.



## 2.3 Bridging the Gap

### 2.3.1 Improving efficiency

Water utilities may face many challenges some of which have been identified above, however there are numerous solutions to the problems depending on their nature. The choices taken by any water utility management team could spur the company to growth or to further deterioration. However there is a ideology that helps solve the challenges through a multi-pronged approach in management covering both physical and non-physical assets.

*“There is an absence of comprehensive analyses of urban water management systems in the developing world. Concrete strategies for utilities to translate good principles into practice are often missing in discussions on water governance. Few positive models of urban water management have been identified and valuable lessons and experiences often are not shared”* (Chiplunkar and et al., 2012). It should be noted that water utility management is a holistic asset management cycle involving physical infrastructure as well as non-physical infrastructure like operation plans and strategic plans and budgets as well as finance. According to Chiplunkar (2012, p.2) the United Nations estimates that 13% of the world’s population still relied on unimproved water sources for its drinking needs, and 39% still did not have access to improved sanitation facilities in 2008 (United Nations, 2011). The international Water Association which is a body for research and benchmarking comprised of water engineers, scientists, engineers , experts and managers in the water sector, proposes certain specific areas that can be used to reduce the inefficiency of water utilities. These key areas are critical in assessing how efficiently of a utility is able to meet its goals. According to the IWA water utility efficiency matrix (IWA, 2013) the main areas of focus in a water utility efficiency assessment are:

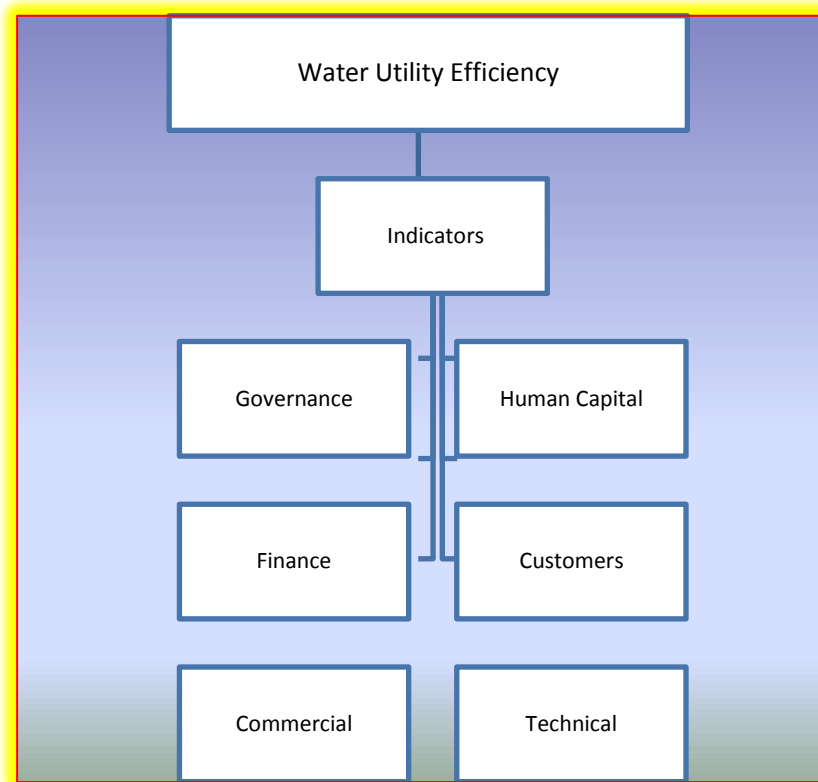
- i. Corporate Governance
- ii. Human Resources (HR)
- iii. Customers
- iv. Financial
- v. Commercial
- vi. Technical

Any water utility that strives to meet service standards in these key sections have in the past and in many places globally shown immense success in efficient service delivery. Examples are in the Netherlands (Maques and Witte, 2007) where focus in water management after privatization, set a list of bench marks that utilities were expected to meet and report. Other examples in Asia are in Manila, Phnom Penh, Kuala Lumpur (Chiplunkar and et al., 2012). In Europe positive results were recorded in the United Kingdom also.

### 2.3.2 Global water utility efficiency standards

The expected water service efficiency standards used in this research are indicators accepted internationally and cover the relationship between internal management processes of the water utility and external effects of service delivery. It is common practice to use benchmarks to assess efficiency *“Farell (1957), drawing upon the work of Debreu (1951) and Koopmans (1951), introduced a measure of productive efficiency that avoids the problems associated with traditional average productivity measures (ratios). He proposed that efficiency relative to a best-performance frontier determined by a representative peer group”* (Estache and Kouassi, 2002). This is because *“Complications arise from the fact that water production is a function of many variables, many of which are exogenous to the water sector - for example household income, chemical products prices, and intra household decisions etc.”* (Estache and Kouassi, 2002).

**Figure 5 Utility's efficiency assessment model**



According to International Water Association, (IWA, 2013) the efficiency framework of a water utility can be based on an assessment of the six (p.27) broad sections mentioned previously in this thesis. The ideology is based on the assumption that improvement potential of the utility is driven by the efficiency according to the IWA framework. The IWA is a professional body with a network of hundreds if not thousands of professionals in the water sector globally and contributes to the global knowledge on water issues through research, sharing and dissemination of written materials, benchmarking, webinars and seminars and workshop . The key values of the organization are sustainability, equity, diversity and innovation (<http://www.iwahq.org/21/about-iwa.html>) ‘ ‘ *A firm is regarded as technically efficient if it is operating on the best-practice production frontier in the industry*’ (Estache and Kouassi, 2002). As a result the International Water Association Efficiency Assessment Matrix recommended by IWA has been selected for the assessment of efficiency in this thesis.

**Table 3 IWA Efficiency assessment indicators**

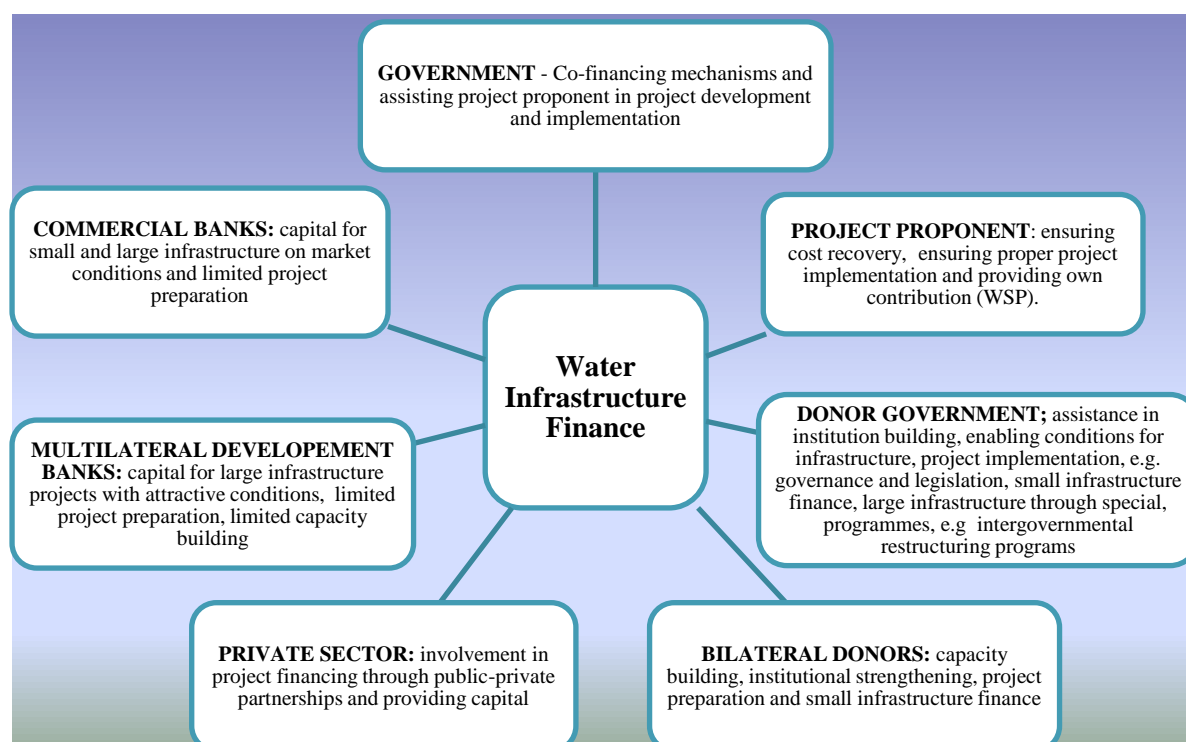
INTERNATIONAL WATER ASSOCIATION UTILITY EFFICIENCY EVALUATION MATRIX (IWA, 2013)		
NO.	INDICATOR	INDICATOR IMPORTANT PARAMETER
1	Corporate Governance	<ul style="list-style-type: none"> <li>i. A clear mission statement and vision ‘shared vision of what is the company about to customers, employees, suppliers and environment.</li> <li>ii. Strategy – Understanding of SWOT for the utility</li> <li>iii. Recruitment of Board of Directors and staff</li> <li>iv. Code of ethics and accountability</li> <li>v. Procedures and quality assurance in all processes</li> <li>vi. Organization and transparency in procurement process</li> <li>vii. Public relations and transparency</li> <li>viii. Professional bodies membership and benchmarking participation</li> <li>ix. Accountability and responsibility to the environment</li> </ul>
2	Human Resources	<ul style="list-style-type: none"> <li>i. Internal communications for easy access on information on challenges, strengths, strategies, feedback and transparency.</li> <li>ii. Staffing levels and skill portfolio conformity</li> <li>iii. Remuneration levels</li> <li>iv. Staff training and capacity building programs</li> </ul>
3	Customers	<ul style="list-style-type: none"> <li>i. Coverage based on human population and not seasonal variations.</li> <li>ii. Delivery of service</li> <li>iii. Water quality</li> <li>iv. Communication channels with customers</li> <li>v. Customer services</li> <li>vi. Complaints management</li> </ul>
4	Financial	<ul style="list-style-type: none"> <li>i. Existence of financial operational projections</li> <li>ii. Existence of capital planning and projections</li> <li>iii. Accounting principles and procedures</li> <li>iv. Financial reporting and monitoring</li> <li>v. External auditing and annual financial reporting</li> <li>vi. Credit worthiness</li> <li>vii. Tariff setting policies and mechanisms</li> <li>viii. Revenue sufficiency</li> </ul>
5	Commercial	<ul style="list-style-type: none"> <li>i. Customer information</li> <li>ii. Meter reading and billing</li> <li>iii. Collection efficiency; domestic and industrial clients</li> <li>iv. Collection efficiency; public authority and bonded clients</li> <li>v. Customer metering</li> </ul>
6	Technical	<ul style="list-style-type: none"> <li>i. Water safety plan</li> <li>ii. Strategic asset management</li> <li>iii. NRW Management</li> <li>iv. Operational efficiency</li> <li>v. Maintenance</li> <li>vi. Water resource management</li> <li>vii. Drinking water quality monitoring</li> </ul>

## 2.4 Financing in the water industry

### 2.4.1 Finance Model

The structure of project finance in most developing countries' water sector is based on the following model as summarised as below, (figure 6), this is not 'a one size fits all' but the financing arrangements may change to different formats depending on specific cases. The model shown below has been adopted as it is the most consistent in infrastructure projects covered by the thesis and within Sub-Sahara Africa. The main reason for the preference for this criterion is the considerable amount of fiscal, operational and administrative structures employed in financing projects from conception to commissioning.

**Figure 6 Water financing model**



Adopted from (DAC), Foreign sources of financing, Chapter Six

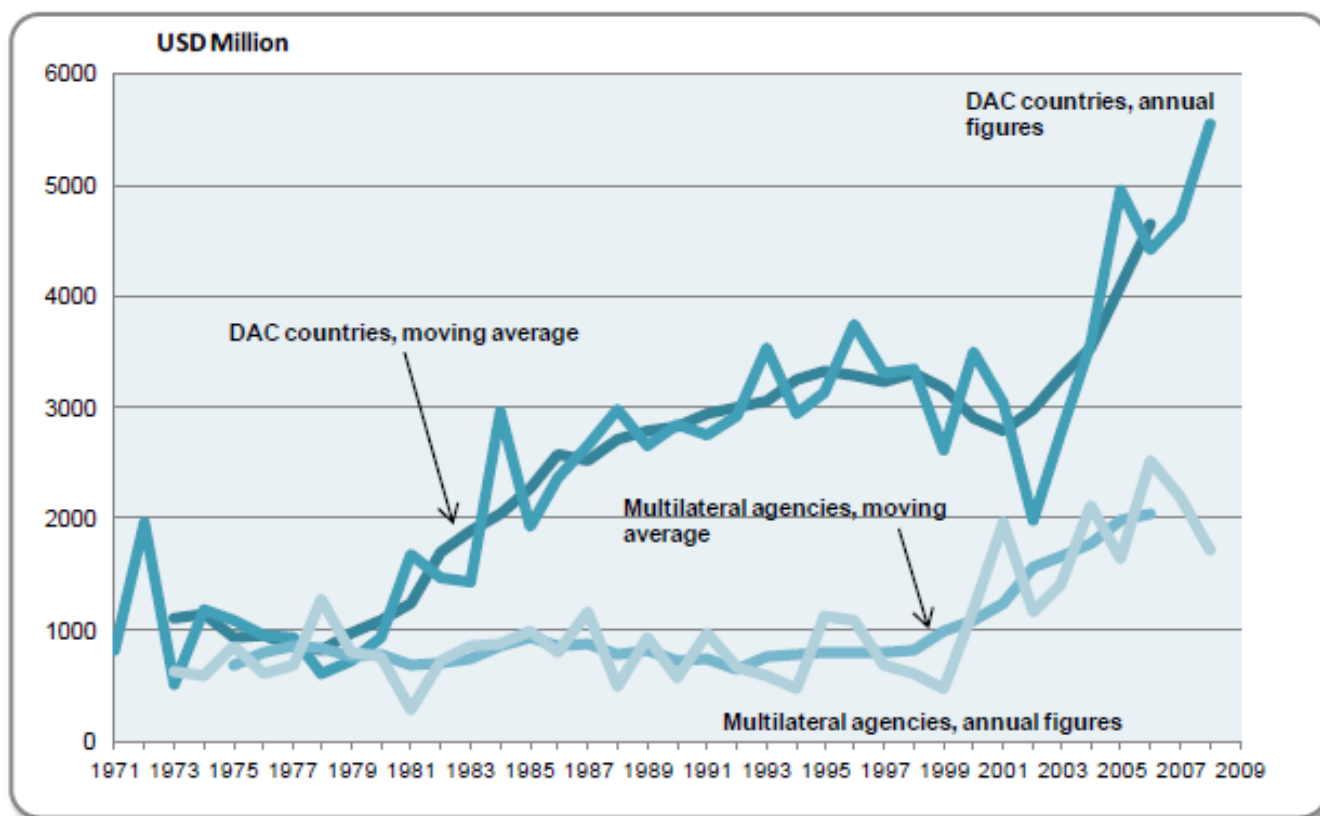
There are factors that determine which form of financing arrangements is applied to finance a water project or program, these is mainly dependent on (Weber and Alfen, 2008); size of the project, amount and sustainability of cash flows, preferences of project sponsors e.g. government or private investors, risk factors of the project and macro-economic conditions and credit worthiness.

### 2.4.2 International Water Sector Funding

According to Nelson (2013, p.1) '*multilateral development banks (MDBs) include the World Bank and four smaller regional development banks: the African Development Bank (AfDB), the Asian Development Bank (AsDB), the European Bank for Reconstruction and Development (EBRD), and the Inter- American Development Bank (IDB)*' all of them constitute international financial institutions funding water services development. Internationally, according to OECD data water infrastructure finance has been rising in the past decades; in the 1990s financing of water and sanitation declined sharply but after 2001 there was a significant rise in allocations to water sector. It is estimated that by 2008 the total allocation to water and sanitation totalled 7.8 billion USD (OECD., 2013). The prominent donors in this period 2007-2008) were Japan (on average USD 1.9 billion per year), Germany (USD 771 million), and the United States (USD 644 million). The allocation by DAC members to water programs rose steadily since 2007, '*in 2007-08, aid to water and*

sanitation represented 7% of DAC members' bilateral sector-allocable aid'' (OECD., 2013) out of this ''Sub-Saharan Africa received 29% of total aid to the sector, and South and Central Asia 18%. Poorest countries classified as "low income" received 43% of total aid to the sector, two-thirds of which was in the form of grants'' (OECD., 2013) '' For DAC countries, the share has increased by one percentage point over the period 2003-08, from 6% in 2003-04 to 7% in 2007-08 (Table 1)''(OECD., 2013).

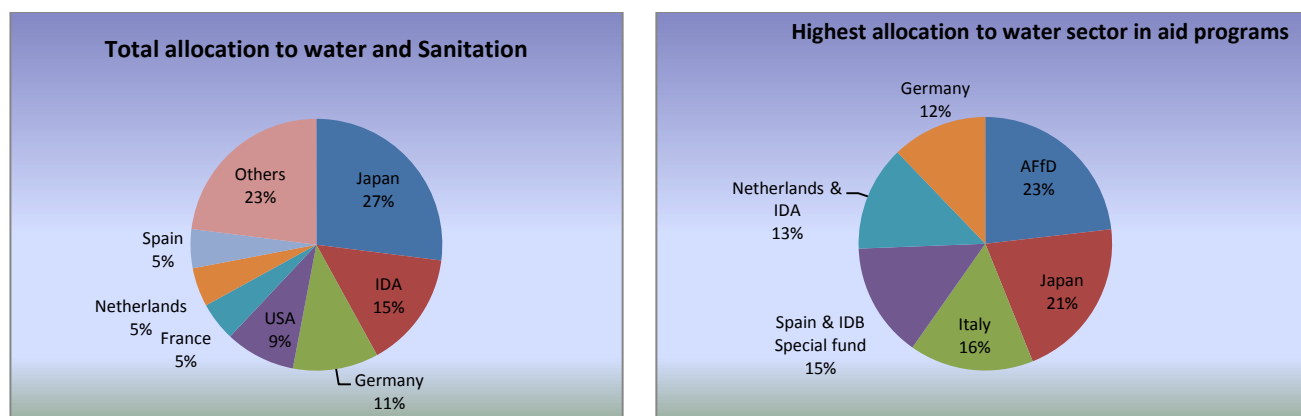
**Figure 7 Global water finance trends**



Source: OECD

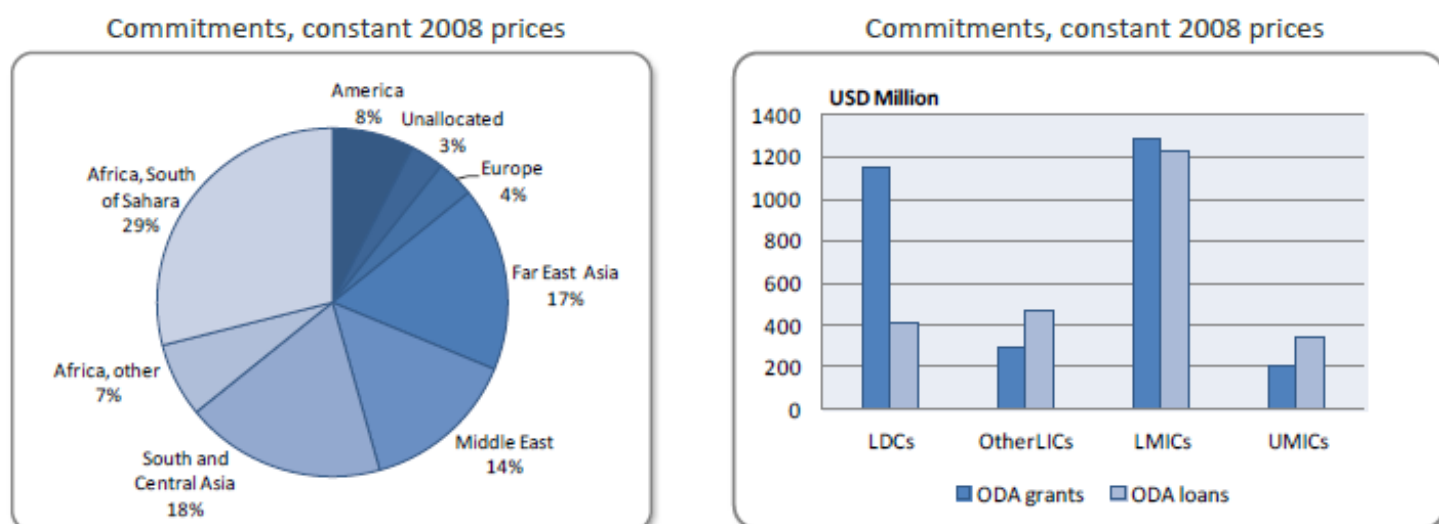
Main Donors to the water sector listed descending (2007-2008) are as shown below while the countries that extend in terms of highest allocation of aid to water and sanitation sector are(OECD., 2013) also shown, of the aid received the geographical distribution can be summarised as shown below;

**Figure 8 Top allocation to water by country analysis**



Source: OECD

**Figure 9 Commitment allocations to finance water**

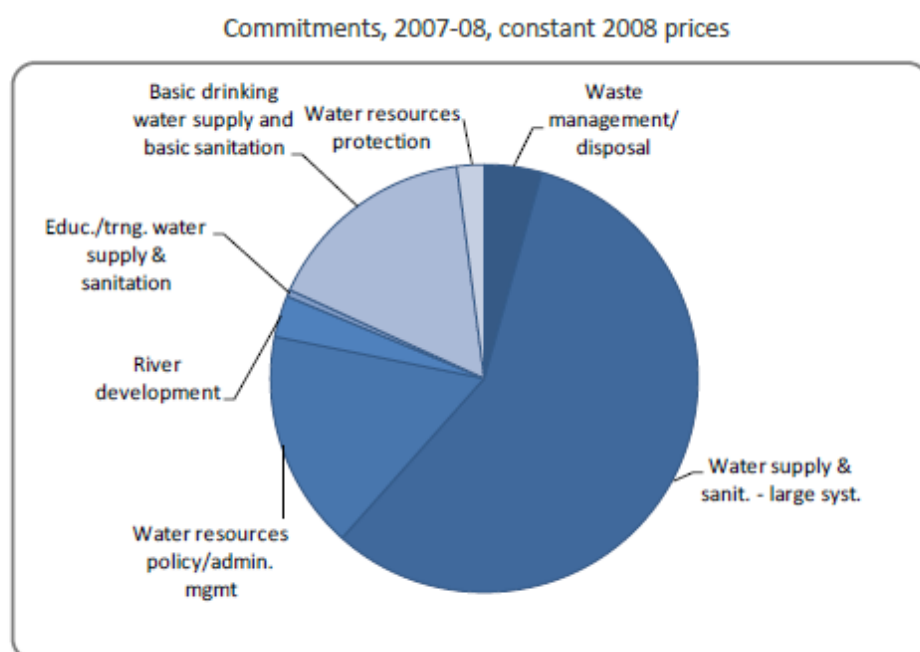


Source: OECD

Where, LDC means Least developed countries, LIC means Low income countries, OLIC means other low income countries and UMIC means Upper middle income countries.

The financing of water sector is not entirely for infrastructure development as in most cases the lack of operational maintenance is a main cause of dilapidation or deterioration of assets leading to degradation of services in urban water utilities. As a result there are projects where a mixture of infrastructure and capacity building programs are initiated to enable utilities build their ability to manage water systems. According to OECD the total allocation in the water sector based on sub sector allocation can be summarized as below for the period (2003 - 2008);

**Figure 10 Commitment by sector within water finance**



Source: OECD

The information provided from above is based on OECD data and does not cover individual government's allocation to water and sanitation nor does it cover humanitarian aid in water and sanitation through other avenues. OECD has the biggest investment in water and sanitation in Sub Sahara Africa and has therefore been given special focus.

## **2.4.3 Water sector finance**

### **2.4.3.1 Introduction**

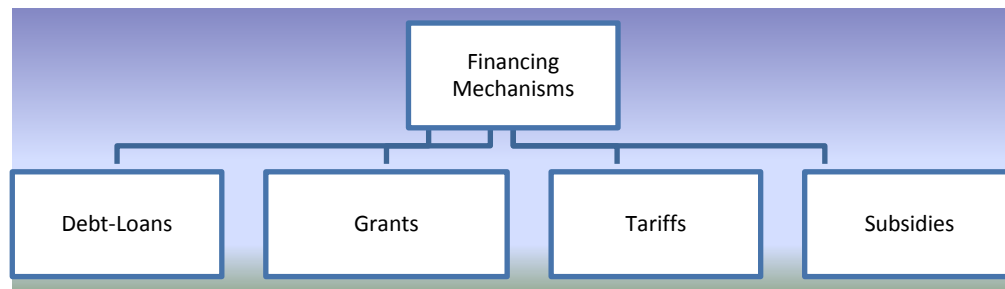
The definition of ‘finance’ (Longman, 2004) refers to the management of money, monetary support for an enterprise or the resources of a state, company or person. The dictionary meaning of the term ‘mechanism’ (Longman, 2004) refers to a system of mutually adapted parts working together in or as a machine or the mode of operation of a process. In these research therefore ‘financing mechanisms’ is defined as the mode of operation and processes employed in the water sector to acquire and invest monetary support for projects and programs geared towards the improvement of water supply services. The assessment of utilization of financing in the water sector is not just evaluating the funding needs and the sources for the monetary support it goes beyond that as shown in this thesis *“The issue is equally to have appropriate institutional arrangements and develop related capacity, and to target expenditure in such a way that the resources reach the intended beneficiaries without undue leakages”* (Mehta, 2013). There is also the need of prudent utilization, *“and it is critically important to use the resources effectively, efficiently, and in a transparent manner”*, (Mehta, 2013). Furthermore investment in the water sector is generally trans-boundary and requires investments in both natural environment, protection of resources, infrastructure assets (abstraction, transmission, treatment and distribution) , manpower and assets for operations and maintenance of water resources. There is also the regulatory or legal framework and policy involved in managing water resources, therefore it is a multi-dynamic, multi-interest, and multi-agenda function (Biswas, 2008).

Most water services in urban settings are provided by public utilities (Tremolet, 2011). According to World Health Organization, improvement in water and sanitation could reduce the global costs for health by 10 % which amounts to USD 84 billion per year in terms of benefits.(Tremolet, 2011).Understanding water financing mechanism and their effectiveness and efficiency is therefore an important step in solving water challenges.

### **2.4.3.2 Financing avenues**

There are a couple of options available for funding water projects, according to OECD these include; through improved efficiency in operations and diversifying into cheaper forms of technology or service delivery, including lowering standards where possible, the other option is through the 3Ts, Tariff, Taxes and Transfers while the other source could be through the mobilization of credit facilities through loans, equity and bonds obtained from market or public sources. The widely recommended policy is through (Tremolet, 2011) the Sustainable Cost Recovery principle whereby the 3Ts are applied to secure financial cash flows in the future and this is used to attract funding from loans and equity. Initially Full Cost Recovery Principles were applied in water service provision but due to the increasing capital needs and issues related to access and affordability of water especially on socially responsible service provision, it is no longer tenable to rely on taxation and tariffs as the source of revenue for funding water supply provision. Political intrigues also affect the pricing of water hence a need to diversify into other alternative funding sources is necessary. The major sources of financing water covered by this research are as indicated below;

**Figure 11 Finance mechanism covered by research**



### **2.4.3.3 Debt**

Debt is the most extensive source of finance for infrastructure projects including the water sector. According to Weber *et al* (2008, p.202) it accounts to 70% - 90% of funding for such kind of projects. Debt may be in the form of bank loans, syndicated loans or infrastructure bonds. Much of the global water sector funding has been covered in the previous section and this section shall only briefly deal with the technicalities of debts and some of the key actors in debt financing of water projects.

#### **2.4.3.3.1 Loans**

Loans are the most prevalent and traditional form of financing water projects especially those requiring significant capital outlays. They can be divided into syndicated loans of usually up to 50 million Weber *et al*, (2008, p.203) USD or club deals. The loans are preferred since they are flexible to special characteristics of a project, for example, loans can be phased out depending on construction progress and needs. The interest rate of a loan is determined using the basis of a reference interest rate and a project specific margin based on current market trends and industry criterions. They also consider the risk profile of the water project. The rate of interest can be variable, fixed or specified for a certain period, (Weber and Alfen, 2008).

##### **2.4.3.3.1.1 Traditional bank loans**

Loans are time bound; this implies that financial institutions have set their preferred time limits for repayment of the loan based on industry standards. The traditional loan has a timeframe of 7-12 years (Weber and Alfen, 2008); while Public Private Partnerships have longer debt time spans some extending to up to 20-30 years. In such cases, multinational development banks fund the projects due to the complexity of the projects in terms of cost. The implementation and contractual obligations for management, as well as requirements for governmental guarantees can be provided for by the stakeholders in the project.

In most cases the banks insist on a repayment completion of a few years before the end of the project term. This provides arrangements for normalising or restructuring the project and its funding in case the project encounters any unforeseen difficulties.(Weber and Alfen, 2008) According to Webber and Alfen (2008) Bank loans are normally less risky to lenders as they put strict requirements for mitigating risks of defaults, this include;

- Attaching current and imminent claims of the special purpose vehicle (SPV) based on material project agreements,
- Pledging shares of company sponsors, sufficient capital funding project to ensure its success, maintaining contingency ac
- Counts for the project, through financial agreements and guarantees and through rights of subrogation to the financing bank.
- In some cases transactions are cascaded into senior and sub ordinate loans in which case the sub ordinate loan has a higher risk factor and chances of default, hence might have a higher interest rate.



#### **2.4.3.3.1.2 Syndicated loans**

In this kind of project finance, a group of banks fund a project and then place the loan in the market thereby diversifying credit risk, Webber and Alfen (2008, p.204). These financing mechanisms are usually employed in cases where the amounts involved are significantly high hence requiring risk broadening as well as multiple funding sources. In most cases the group of banks form a conglomerate of banks and usually under a lead bank being the overseer usually referred to as the lead arranger. The financial structure for the bank is usually included in the project documents and agreements and also is tailored into the project specific needs. (Weber and Alfen, 2008) This includes the disbursement programs and implementation schedules customized to project progress.

In most cases the lead arranger usually has a higher profit margin compared to the rest of the bank after the project is complete, normally referred to as the final take, it acts as a commitment incentive to the lead arranger of the syndicated loan and its constituent member. Normally the lead arranger is required to underwrite the loan alone until the other syndicate loan banks underwrite their individual commitments to the project (Weber and Alfen, 2008). This normally prompts the lead arranger to seek syndicate partners in form of financial institutions with industry reputation that can place the loan in the market at prestigious, broader form after the process of under writing is complete. Normally it is advisable to engage local financial institutions in case of contracts involving financing projects in foreign countries as these initiates and maintains political goodwill. It is important that banks include the following critical documents in the contract; covenants, representations, warranties and events of default. This should be in addition to ‘’ control and influence when structuring the credit agreement.

#### **2.4.3.3.1.3 Multilateral loans**

Development in the water sector post the world war period has heavily relied on state funded finance through development partnerships and loans especially in less developed countries. This includes state owned banks like Kreditanstalt fur Wiederaufbau (KfW), Japanese International Cooperation Agency (JICA), Overseas Private Investment Corporation (USA), European Investment Bank (EIM), and the China Exim Bank. It also involves international finance organizations and multilateral organizations like the World Bank, International Bank for Reconstruction and Development IBRD, International Finance Corporation IFC, International Development Agency IDA, Inter-American Development Bank, Africa Development Bank and the Asian Development Bank.

**Table 4 Multilateral Development Banks and their focus**

MULTI-LATERAL AGENCY	TYPE OF FINANCING	TYPE OF BORROWER	YEAR FOUNDED	YEAR 2012/1013 COMMITMENTS (BILLION USD)
<b>World Bank Group</b> International Bank for Reconstruction and Development (IBRD)	Non-concessional loans and loan Guarantees	Primarily middle-income governments, also some creditworthy low-income Countries	1944	15.25
International Development Association (IDA)	Concessional loans and grants	Low-income governments	1960	16.30
International Finance Corporation (IFC)	Non-concessional loans, equity investments, and loan guarantees	Private sector firms in developing countries (middle- and low-income countries)	1956	18.30
<b>African Development Bank (AfDB)</b>	Non-concessional loans, equity investments, and loan guarantees	Middle-income governments, some creditworthy low income governments, and private sector firms in the region	1964	3.2
African Development Fund (AfDF)	Concessional loans and grants	Low-income governments in the region	1972	2.9
<b>Asian Development Bank (AsDB)</b>	Non-concessional loans, equity investments, and loan guarantees	Middle-income governments, some creditworthy low income governments, and private sector firms in the region	1966	10.1
Asian Development Fund (AsDF)	Concessional loans and grants	Low-income governments in the region	1973	3.0
<b>European Bank for Reconstruction and Development (EBRD)</b>	Non-concessional loans equity investments, and loan guarantees	Primarily private sector firms in developing countries in the region, also developing country governments in the region	1991	11.8
<b>Inter-American Development Bank (IDB)</b>	Non-concessional loans and loan guarantees	Middle-income governments, some creditworthy low income governments, and private sector firms in the region	1959	10.80
Fund for Special Operations (FSO)	Concessional loans	Low-income governments in the region	1959	0.32

Source: (Nelson, 2013)

#### **2.4.3.4 Cost recovery/Tariffs**

Tariffs refer to periodic charges levied by water utilities in many countries to sustain provision of water services provision especially in the urban centres. Many countries in Africa introduced tariffs after the 1960s, in Ghana the tariffs were introduced in 1965, (Boakye, 2003) and in Kenya it was after the 2002 water act that the regulator WASREB was mandated to formulate and regulate water tariffs (WASREB, 2002).

Water tariffs are crucial for water service supply and sustainability as they not only free state resources to other alternative uses, but also ensure accountability and quality services that utilities offer to meet their costs. However tariffs are required to be sensitive to the different financial capability of the population in affording cost of water. It is generally accepted that tariffs should be socially responsible and economically viable, meaning that they not only recover costs but also meet the needs of low income earners. The sole aim of tariffs is mainly to achieve sustainable cost recovery for OM and for capital expenditures; this however is not easy due to many factors some which have been mentioned previously. Nevertheless tariffs can be used to meet basic OM and minor Capital projects. (OECD, 2009). *‘Increasing revenue from tariffs requires a comprehensive approach, which includes reforming tariff levels and structures and increasing bill collection rates, but also increasing levels of service and putting in place social protection measures’* (OECD, 2009).

The basic principles of tariff formulation are (WASREB, 2002);

- i. Financial sustainability: The eventual aim of cost recovery is to ensure that water service providers meet their operational costs with a goal of obtaining full cost recovery where feasible. This ensures that infrastructure is well maintained as costs of maintenance are usually cheaper and extend lifespan compared to high cost of capital investment, meaning there are economies of scale in maintaining water networks.
- ii. Water as a human right; Water supports life and these rights *‘entitles everyone to access to sufficient, safe, acceptable, physically accessible and affordable water and sanitation* (WASREB, 2002). Therefore, tariffs should never be used to deprive any part of a population off these rights.
- iii. Tariffs are also considered as gauges of efficiency as they are looked to important aspects of utility service delivery some of this include coverage levels (the higher the coverage the higher the billing), water quality thresholds and NRW reduction.
- iv. Tariffs are gauges of the environmental economic value of water *‘by reflecting the economic value of raw water and costs of abstraction, treatment and distribution, tariffs can encourage conservation’* (WASREB, 2002).
- v. Interactive: The tariff structure should be easily understood by the general public. This makes it easier for the public to manage their consumption and budgets and avoid inconveniences.

#### **Tariff preparation/adjustments**

Tariffs are normally prepared or adjusted through a consultative process involving stakeholders such as the public, the regulator and the service provider. The service provider submits a tariff adjustment proposal to the regulator who within prescribed time scales responds by approving the tariffs, recommending amendments or rejecting the tariff and indicating with clarity the reasons for rejection.

#### **Considerations for tariff setting**

Among the issues considered in tariff preparation are (WASREB, 2002):

- i. Calculations of OM expenditure of the water utility which mainly helps in evaluating the minimum costs for delivering reasonable services by maintaining its operational utility capacity and the expectations of the public(WASREB, 2002).
- ii. The utility administrative costs which normally give an indication of the costs that it has to incur to properly manage assets and make minimal capital asset investments; this protects the public against high tariffs(WASREB, 2002).
- iii. Debt repayment, mostly all utilities are expected that upon complete OM cost recovery they should present data on adopted debts while incurred debts are considered as investment plans for WSP. This is normally submitted to a regulator through an amortization plan (WASREB, 2002).
- iv. For tariffs meeting 100% OM costs and still repaying loans they are required to submit data regarding investments and depreciation rates so that they can be captured in tariff calculations (WASREB, 2002).
- v. The water service provider must also provide information regarding their total water production compared to usage as well as levels of NRW (WASREB, 2002).

#### **2.4.3.4.1 Tariff structure**

Tariff structure, WASREB (2002), refers to the way arrangement of the tariff in terms of what is the recoverable amount per category of customers or per category of consumed volumes. The utility normally considers the following critical issues;

- i. *‘An average tariff and a tariff Structure that determines how expenditures making up the total O&M costs will be recovered, for example,*
- ii. *Through variable charges, per m3 of water service provided*
- iii. *Through “block” structures, with variable charges that change once customer’s usage exceeds a certain volume*
- iv. *Through a fixed charge for a water service connection and some given quantity of water service, or*
- v. *Through some combination of fixed and variable charges*
- vi. *Customer Classes that reflect the different costs imposed on the system by customers’ different usage patterns, different utilization rates, different equipment requirements, or different administrative requirement*
- vii. *A Tariff Structure that shows (in Kshs) how much each customer class will pay for each unit of water consumed, for each connection type, and for each month of service’’ (WASREB, 2002) p.12.*

#### **2.4.3.4.2 Types of tariffs**

- i. Two part tariffs, whereby a mix of fixed costs related to asset investments are reflected in addition to consumption related tariffs (WASREB, 2002).
- ii. Increasing block tariffs, these is common whereby the lower consumption volumes are charge at a price reflecting the lowest charge for the lowest consumption threshold and higher price for the next consumption band. This ensures that the rich are able to provide more revenue to service the poor as they fund the bulk of the utilities’ service provision costs (WASREB, 2002).
- iii. Sanitation tariffs, this are tariffs charged to connection and are mainly assumed to be a rate times the percentage volume (normally 85%) of total water consumed and metered. This is normal in cases where centralized sewers service consumers with water connections (WASREB, 2002).
- iv. Tariffs for water kiosks and stand pipes are normally intended to service low income areas *‘ where the water price per cubic metre should not be higher than the social block of the tariff. This price should already include the margin of the kiosk operator if possible but should not be significantly higher than the social tariff for household*

*connections plus the standing charge divided by the cubic metres of the first block''* (WASREB, 2002).

- v. Industrial and commercial block tariffs which target full cost recovery since these institutions do not need minimum basic consumption (humanitarian) for water unless it is an incentive for water conservation(WASREB, 2002).

According to critics of tariff structures, increasing block tariffs have been criticized as not being responsive to needs for water consumption by the poor, the argument is that due to their structure, households with higher density consume more and hence pay more per unit even if they are poor, or in case of shared meter between households as is the case in many developing countries and mostly poor, densely populated areas, the poor households end up paying more per unit of water consumed. It is important to understand that tariffs should be structured in such a way that they are economically sustainable and socially responsible.(Whittington, 2003)

#### **2.4.3.5 Subsidies**

Subsidies refer to situations where water utilities offer their services at a below than financially efficient rate in order to ensure access of water to the low income part of the population. Some critics and scholars on the matter argue that services are always generally subsidized, this however depends on the personal opinion since efficiency can mean a lot of things to different people, also tariffs are normally less the efficient monetary price, so the structures as a whole are subsidized, however there are two categories of subsidies;

- i. Consumption based and connection based subsidies
- ii. Targeted and un targeted subsidies

##### **2.4.3.5.1 Consumption and Connection based subsidies**

The consumption based subsidy is aimed at reducing the cost of consumption and is applicable to households with metered connections in most cases they are usually meant to lower costs to the poor people. *“Consumption subsidies may operate through the tariff structure (as a reduction in the price faced by all or some households), may appear as a percentage discount applied to customer bills, or may take the form of a cash transfer to reimburse households for utility expenditures”* (Komives and Foster, 2005, p.9-10).Alternatively, connection subsidies are usually available to households that have not been accessed by connection services from water service provider and are meant to entice new connections; this could be waiver of all fees for new connections. Komives and Foster (2005).

##### **2.4.3.5.2 Targeted and Untargeted Services**

This occurs when there is a general application of price cuts to the general population of utility products and usually not targeted at any specific group. Usually water utilities apply both targeted and untargeted subsidies. Generally, a specific group may further access the targeted subsidies like water kiosk owners or low income settlements having community water points Komives and Foster (2005). Within the category of targeted subsidies there exists implicit and explicit targeting, where by explicit targeting *“represents a conscious attempt to reduce the cost of service or the cost of connection for customers with a particular characteristic (for example, poor households, households in informal settlements, or households that use little electricity)”* (Komives and Foster, 2005) and *“by contrast, implicit targeting is the unintentional result of common pricing practices of utilities”*(Komives and Foster, 2005), implicit subsidy is usually applied by charging a fixed price to all customers regardless of consumption patterns and habits, this usually results in customers that cost less to supply subsidising customers that cost more to supply. Another method of implicit targeting is when water bills are combined with sewer bills even in cases where there is no

100% sewer coverage, this means that those without sewers subsidize the ones with sewers hence it is unfortunate as in most cases the poor are never connected to the centralized sewer system. Due to challenges in determining what exactly consumers use when charges are general it is not easy to acquire data or develop information on implicit targeting (Komives and Foster, 2005).

#### **2.4.3.5.3 Explicit targeted subsidies**

The meaning of explicit targeting is best covered as explained by Komives and Foster (2005, p.10) *“Explicit targeting involves an intentional policy to charge some consumers more and other consumers less for the same service”*. One of the approaches to explicit targeted subsidies is through administrative selection where by a regulator decides that a certain class or category of people will receive services at a certain rate compared to the rest. Self-targeting can also be another means for explicit subsidy whereby an incentive is given to a consumer based on achieving some desired level of bench mark set by the service provider, an example could be a subsidy based on water conservation by the consumer. A key characteristic of water service consumption is that most houses through increasing block tariffs have their prerogative to determine what level of subsidy they receive, whether intentionally or otherwise.

#### **2.4.3.5.4 Importance of Target Subsidies**

The target subsidy lowers the cost of providing the subsidy through cross subsidization, this is because alternatively the cost of individually providing the subsidy to individual houses is usually higher to a utility than when cross subsidised Komives and Foster (2005, p.12). Secondly, targeting ensures that the impact of subsidy is relevantly felt by those who need it most and in most cases it's the poor consumers of water and lastly targeted subsidies cause less consumption distortions unlike poorly targeted or untargeted subsidies. This is because there is an incentive to safeguard consumption needs regardless of financial status of any group.

#### **2.4.3.5.5 Challenges of target subsidies**

Target subsidies may have challenges, for example it is often argued Komives and Foster (2005, p.12, that target subsidies provide solutions that are incomplete and only solve problems of a certain group instead of a holistic approach to solve water pricing challenges. In some cases the poor may also not accept the subsidy due to lack of consultations in developing them or in some cases due to the stigma associated with being needy or finally, there are administrative costs for enforcing the target subsidies.

**Table 5 Typology of subsidies**

		TARGETED SUBSIDIES			
			EXPLICIT TARGETING		
	<i>Untargeted subsidies</i>	<i>Implicit targeting</i>	Self-selection (Quantity targeting)	Service level targeting	Administrative selection targeting
<b>Consumption subsidy</b>	<i>Across-the-board price subsidies</i> ⇒ all consumers <i>Charging for variable but not fixed costs</i> ⇒ all consumers	<i>Low collection rate with no disconnection policy</i> ⇒ all consumers who do not pay their bill <i>Illegal connections</i> ⇒ those with illegal connections <i>Flat fees for unmetered connections</i> ⇒ high-volume consumers with unmetered connections <i>Combined water and sewer tariffs</i> ⇒ households with water and sewer connections <i>Single volumetric charge</i> (when costs vary by customer or time of use) ⇒ high-cost customers	<i>Increasing block tariffs</i> ⇒ low-volume consumers with meters <i>Volume-differentiated tariffs</i> ⇒ households with metered private connections who consume less than x units per month	<i>Free water at public water taps</i> ⇒ households using public taps <i>Low rates for low-voltage electricity service</i> ⇒ households with connections to low-voltage electricity services	<i>Geographically differentiated tariff</i> ⇒ customers who live in certain areas <i>"Social tariffs"</i> ⇒ customers classified as poor <i>Merit discounts and discounts for pensioners</i> ⇒ qualifying customers <i>Burden limit cash transfers</i> ⇒ households whose utility bills and housing expenditure exceed a defined burden limit
<b>Connection subsidy</b>	<i>No connection fee</i> ⇒ all new customers <i>Subsidized interest rate for financing connections</i> ⇒ all new customers	<i>Flat connection fee</i> ⇒ new customers who are more costly than average to connect		<i>Reduced connection fee for households providing labour or materials</i> ⇒ households that choose to provide labour <i>Reduced connection fee for lower service level</i> ⇒ households that chose this service level	<i>"Social connections"</i> ⇒ households classified as poor

Source: (Komives and Foster, 2005)

### 2.4.3.6 Grants

According to Brech and Potrafke (2013, p.5), *“overall gross ODA (Official Development Assistance) encompasses grants and concessionary loans. Grant aid is distinguished by the fact that it carries no repayment obligation, i.e. it is a pure transfer payment”*. Sometimes grant may be ‘tied’ (Brech and Potrafke, 2013), which means that it comes with conditions from the country source, these conditions may be related to procurement of goods from source country or institutional restructuring in the recipient country. Previous research indicates that grants are not only prone to spearheading development agenda but are also inhibited by partisan world geopolitics and interests. *“partisan effect would be strongest for grants (which are more akin to domestic social welfare transfer payments), and for less developed country recipients (where poverty and inequality are of greatest concern). Left wing governments tended to give more aid to autocratic as compared to democratic recipient countries”* (Brech and Potrafke, 2013).

Generally grants have been instrumental in transforming water supply and sanitation services in Africa. This is normally through the Not for profit organizations or through government institutions or even through community based organizations recognized by local and national governments and operating in rural areas and remote arid parts of Sub Sahara Africa or in low income areas in urban centres. Some of the key sectors in grant allocation especially in urban water utilities has been in capacity building, increase to access, sanitation and hygiene promotion, disaster relief, infrastructure expansion and maintenance as well as technical capacity building and knowledge development and sharing. According to studies by IMF metropolitan areas *“have large economic bases and therefore little a priority needs for grant financing, yet they have strong dependence on central transfers”* (Shah, 2002). However, such strong reliance on transfers undermines local autonomy and local accountability (Shah, 2002).

Grants may be geared towards the attainment of certain goals in water supply services provision or act as improvement of lifestyles or attainment of development goals or support of beliefs of right to access of water to all as per international, donor or recipient aspirations but never the less, they may also result in different outcomes compared to initial targets *“ ‘odious debt’, “because the proceeds are stolen by the governments and the citizens are taxed to repay”* , (Schleifer, 2009), this could lead to worsening of situation in case accountability is poor. Grants have multiplier effects, in that successful projects result in positive social economic effects in an urban centre. A good example could be improved access to potable water reducing cases of water borne diseases. However the introduction of grants may also result in a cycle of continued dependency on transfers which may result in less accountability and staff commitment. It is therefore important that grants be tempered with improved cost recovery measures which could reduce grant dependency. With proper financial management and taxing regimes with higher efficiencies there may be no need for grants, (Shah, 2002).

#### 2.4.3.6.1 Types of grants

##### 2.4.3.6.1.1 General purpose grants (Unconditional)

This kind of grants are normally intended to bridge disparities in development and equity, they are usually allocated to areas in need and specifically sectors that cannot easily repay costs owing to the low level of service or poverty levels Shah (2002). In most cases there is some level of control from the donor but normally the implementer is allocated some degree of freedom in selecting the specific uses of the grant as this not only breeds trust between parties implementing the project but also generates as sense of ownership and stewardship by the target group in implementing the project. Most of these grants are normally channelled through the civil society and NGOs.



#### **2.4.3.6.1.2 Specific-Purpose Transfers (Conditional)**

*“Specific-purpose, or conditional, transfers are intended to provide incentives for governments to undertake specific programs or activities. These grants may be regular or mandatory in nature or discretionary or ad hoc”* (Shah, 2002). This type of grants are initiated by donors who have keen interest to not only provide finance but also to instil certain ethos and processes in the way in which finances are utilized based on the prevailing conditions of the recipient country and also on the donor country legal requirements for foreign aid management. They mostly insist on integrity and accountability in public funds management and seek to cultivate the same ethics. Many foreign countries have their own foreign aid policies and therefore apply them when it is of certain economic or political strategic interest.

Grants of significant amount of funds usually take this format to ensure value for money disbursed, and normally target capital expenditures and operational expenditures (Shah, 2002). Conditional grants also have certain expected level of results from the implementing institution and may also require level matching whereby the institution is also required to contribute some value for the total funds requirement. These types of grants are very effective in ensuring that from support the governments through matching requirements initiates’ new development projects.

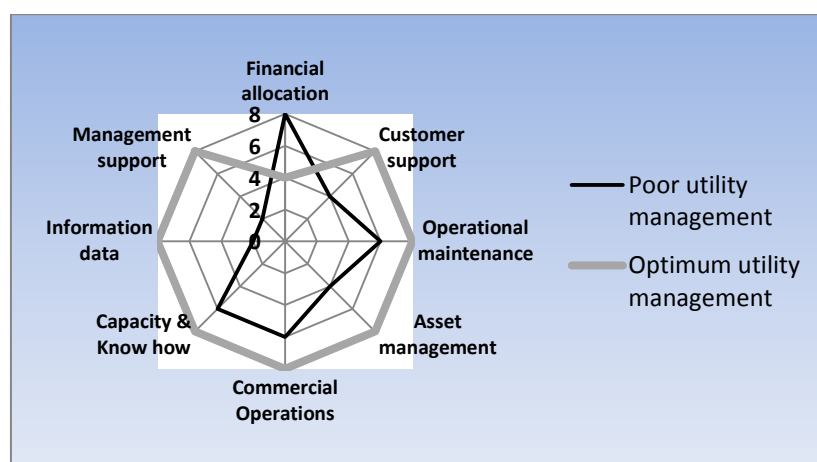
### **2.5 Conceptual framework – Linking finance and efficiency**

Water infrastructure delivery involves multiple players with diverse interests, financial intensity and considerations to ensure long term sustainability. All this require huge financial investments, and the investments Olstein *et al*, (2009, p. XVIII) and (Tremolet, 2011), and are normally done with certain goals in mind, most importantly that once implemented the funds will help improve the lifestyles (Hebb, 2013), of people through safe adequate drinking water, however the practicality of this desire is based on the efficiency of the whole system during implementation and after commissioning of programs and rather not just the financial investment in water systems. *‘here is a deliberate decision to achieve both a financial return and an ancillary social and/or environmental benefit from the investment opportunity’* (Hebb, 2013). The systems through which finances are allocated and utilized determine the effects and efficiency of systems that will be realized eventually. Poor utilization leads to wastage of funds and prudently well managed and implemented financing of projects usually have positive tangible results. Services are delivered through a water utility which is a system of people, culture, physical and nonphysical assets and mainly decisions that they make in their respective role within the utility. However, their decisions are normally affected by their environment at the work place, this is also determined by among other things the financial health status of the utility as it affects all other organizational functions (Stretcher and Johnson, 2011, p.799) and mostly individual lifestyles of its employees, which in turn is as a result on financial investments made in them and the utility, either capital or operational. In other words, the efficiency of the utility in delivering efficient services is dependent on the utility environment (figure 13) and includes the policy, processes, procedures, support functions, physical and nonphysical assets among others, all of which are usually achieved through financial (capital and operational) planning and investments.

Studies have been conducted on investment options and impacts on performance, fiscal interventions have in many cases improved existing conditions compared to previous ones (Arndt and Jones, 2009). This implies that aid is not entirely harmful. In addition, utilities or commercial organizations need to optimize financing options as, *‘trade-off theory provides an exposition of the benefits of prudent debt use and the dangers of excessive debt use’* (Stretcher and Johnson, 2011), and *‘a firm’s financing choices influence firm conduct in product markets in addition to the conduct of competing firms, thereby influencing*

*competitive outcomes*”(Stretcher and Johnson, 2011), this implies that finance mechanisms and their utilization have implication on current and future water utility performance on efficient fronts, decision making and efficiency especially in liberalised urban water services provision like Mombasa. Despite offering public services, water utilities in Kenya are required to be self-sustainable financially (WASREB, 2002). Their nature therefore must be responsive to certain trends of the common market in terms of regulation freedom, though ‘softly’ as their goods are private goods of public interest. In addition finance affects decision, ‘‘ *In addressing whether or not a firm is thinking in terms of good governance and sustainability, one must look at the financial processes the firm has in place for its decision making*’’(Bloxham, 2011). This means that management and organizational sustainability is based on decision making which implies that financing mechanisms utilization are directly or indirectly linked to performance efficiency of any management team and in overall any service provider including public water utilities.

**Figure 12 Water utility management environment**



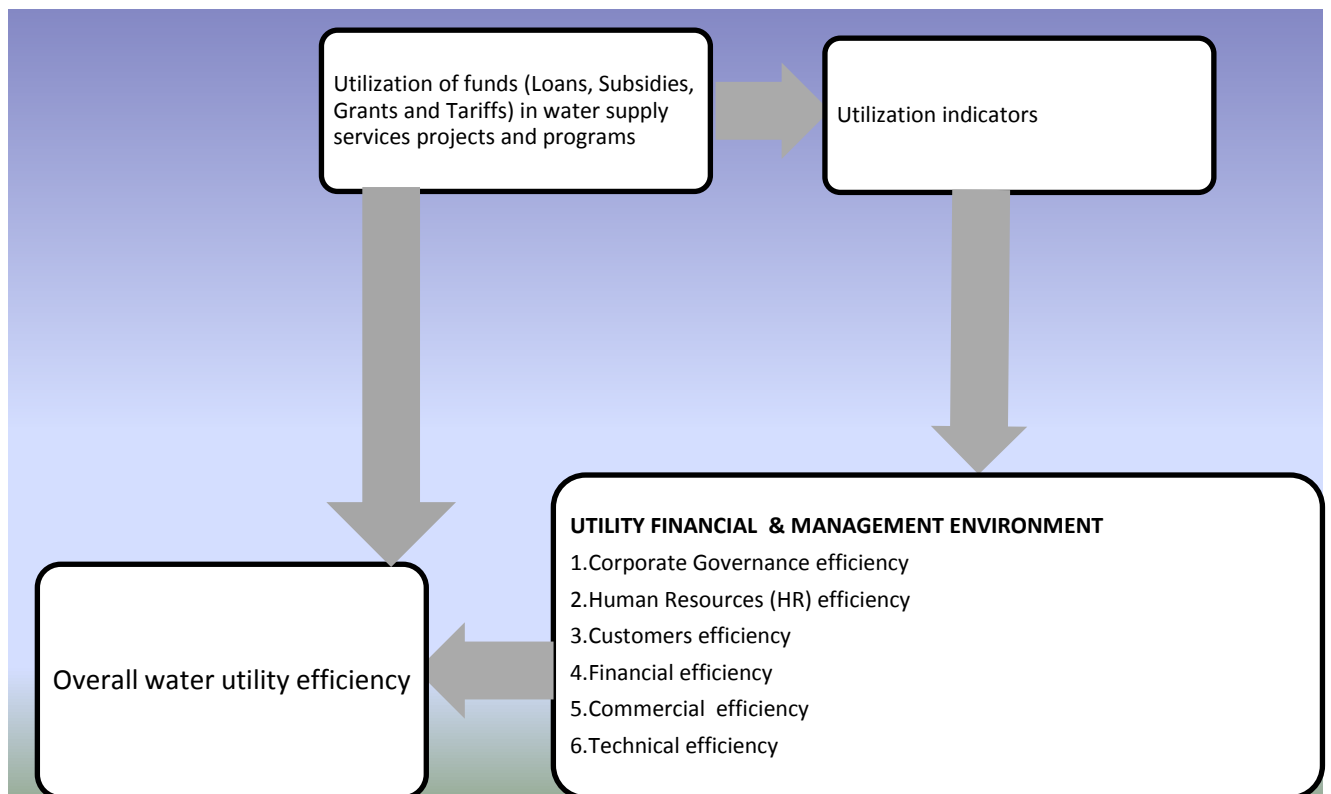
Adopted from The Managers NRW handbook and modified by author

The management of all assets affect how the company remains sustainable a good example is illustrated above where by in ‘*optimum utility management*’ (on a scale of 0-8, with 8 being good and 0 bad), all the core utility functional capacities are optimized at a necessary minimum financial utilization requirements whereas with ‘*poor utility management*’, there is poor performance associated with a need for significantly high financial interventions occasionally to avoid the utility’s collapse of services.

The efficiency of services is also affected by financial plans for the utility, (Tremolet, 2011).Whereby the planning should be initiated by processes aimed at increasing efficiency, reducing losses, and ‘‘*this would be where reforms to improve the effectiveness of service delivery and lowering of capital costs would be most needed*’’ (Tremolet, 2011).

In conclusion, ‘‘*the water and sanitation sector must include a full range of financing approaches, making the most of potential efficiency gains*’’(Tremolet, 2011) and ‘‘*to achieve this, policy makers and water service providers need to engage in a process of strategic financial planning so as to identify what needs to be financed, how much additional resources can be generated from existing sources and how the performance of utilities can be improved to generate such efficiency gains and mobilise external financing*’’(Tremolet, 2011). This means that the way utilization of financial options is done, has a critical role to play in enabling utilities meet their effective goals and also do so efficiently. This is the pivotal rationale for this research.

**Figure 13 Conceptual framework**



## CHAPTER 3: RESEARCH DESIGN AND METHODS

### 3.1 Research questions

#### 3.1.1 Main Question

What is the effect of utilization of different financial mechanism on the efficient provision of water supply services in Mombasa County?

#### 3.1.2 Sub Questions

- i. Are the finances utilized in line with the water needs of the residents of Mombasa County?
- ii. What are the strengths and weaknesses of different funding approaches for water services provision with respect to Mombasa County?
- iii. To what extent has utilization of financial mechanisms affected services provision and its efficiency?

#### 3.1.3 Introduction to financing impacts and effects

The effect utilization of financing mechanisms in water services provision in Mombasa can be investigated and analysed by reviewing various projects and the success of achieving their goals. However, the intention is not just to establish extent of meeting targets; it extends to establishing how efficiently they have been met. To gain an understanding of this it is important to get the implied meaning of ‘effect’ in this case assumed to be a related to ‘impact’. The former being more particular to specific case and the latter being overall result due to the actions that initiated the effect, which also may be long term. The relationship between the two parameters is very close. The relationship between financing mechanisms and efficiency in service provision is mainly derived from the effects of projects undertaken and measures of the extent to which they improved service provision based on industry standards methods of measuring the same.

#### 3.1.4 Definition of Impact and Effect

The dictionary meaning (Longman, 2004) of impact is defined as; the action of one body coming forcibly into contact with another or an effect or influence, especially when strong. On the other hand ‘effect’ is defined as the result or consequence of an action. The theoretical difference between impact and effect is usually very minimal though impacts tend to be long term. There is need to closely look at the two and identify similarities or differences in order to establish the research logic. Any action taken or any force exerted on an existing system has an effect on its current state and may or may not change its current state of being. According to DFID (Stern, 2012) , “*any development program either assistance or intervention leads to development results*”. There is a cause and effect theory. These results may be visible in terms of physical changes, or may be invisible, for example, in terms of cultural shifts or behavioural change. This is mainly the result of institutional changes and capacity building. The changes may be negative or positive leading to improvement or worsening of situations respectively.

The changes may be limited and not be easily identifiable due to the lack of mechanisms of identifying, measuring, or even evaluating them. The presence of an identifiable change after the start, during and end of the intervention to the system can be termed as the effect on the system on its functional capacity. Usually these changes are identified through a process of monitoring and evaluation continuously often through measurement based on certain indicators. *‘Different definitions prioritize different aspects of ‘impact’; imply different concepts of causality (what produces the impact); and how to estimate the impact (evaluation designs)’* (Stern, 2012). Stern (2012, p.5), also alludes to the fact that the most widely shared definition is that by Development Aid Committee which is originated from the context of

international development aid and states that impact can be defined as *‘Positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended’* OECD-DAC Glossary (2002), (Stern, 2012).

According to Stern (2012) the definition has the following outstanding characteristics which can also be associated with effects, that is;

- i. The possibility for any effect or impact, contrary to the expected one/s
- ii. Recognition of either optimistic or pessimistic outcomes;
- iii. That effects ‘produced’ are as a result (somehow caused) by the interference which may have long term or short term impacts;
- iv. Proposes multiple varying outcomes of connections between all kinds of development
- v. Intervention (project, programme or policy) and effect; and
- vi. Focuses on the longer-term results of development initiatives

Effect may also be felt all over a system or only in certain sections of the system depending on their magnitude or the multiplier effect of the outcome caused by the effect on a section of influence in an organization or a system. In general the important aspect of effect that is acceptable is that firstly, effect is as a result of some externally or internally originating intervention on normal functions of a system and secondly, that there is a variable change caused by the intervention (Stern, 2012). The most prolific emphasis in impact evaluation is based on counterfactual analysis whereby an assumption is made that the changes are as a result of the intervention and that there would be no change had there been no intervention hence the cause and effect. In some cases the impacts can be empirical or not but concluded from derived assumptions based on observed trends.

### **3.1.5 Effect Investigation**

The investigation of effects has some aspects of evaluation as it involves investigation or measurements of a shift from a certain position or state to another. The study of activities in between the changes is a form of evaluation which according to Baker (2000) defines (Poulos and etal, 2006) as comprehensive evaluation as one that includes monitoring, process evaluation, economic evaluation, and effect evaluation. She also summarizes the different purposes each type of evaluation. Monitoring is used to assess whether a program is being implemented as was planned. Process evaluation assesses how the program operates and focuses on problems in service delivery. Economic evaluation (cost-benefit or cost-effectiveness) assesses program costs and benefits. The above clarifications are intended to suggest that the investigation of effects involves measurements of shifts from one state to another in a system and in essence have some aspects of assessment.

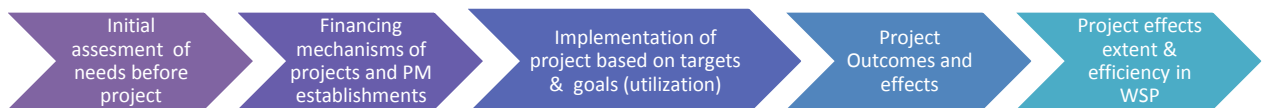
Utility’s capacity to efficiently utilize finances on organizational culture, governance, procurement and financial policies are issues that have an input on the development trajectory of water utilities. Another important issue to note when assessing impacts or effects of projects in water service provision is that they may be directed to specific quota groups for example financing of water projects in low income areas, financing of bulk transmission, expansion or augmentation of existing distribution networks. There are also instances whereby there is a shift in financing arrangements and procedures from direct external involvement, to using existing financing mechanisms of a host government, for example, using procurement laws of host country. This may create a challenge in dealing with accountability. *‘Long implementation chains; partnerships with governments and civil society; and bottom-up or devolved programs are characteristic of today’s ‘complex’ interventions’* (Stern, 2012).

In conclusion effects investigations should be able to;

- i. Investigate and address the intention of the financing mechanisms used based on a set of predetermined goals.
- ii. Should be able to outline outcomes and further demonstrate the effects extent of achieving on particular targets.
- iii. Deal with multi variable aspects of project finance and especially identify and only cover what is possible to assess and avoid what might be difficult to or might have no mechanisms to assess.

This research is focused on effects of financial investments in the water sector and how this has influenced water services delivery efficiently. Some cases of the investigations findings may border on effects or impact while some may be difficult to separate amongst the two as they may be short term but have long term impacts. The research is designed to capture the above mentioned issues and can be shown in the diagram below and explained in subsequent sections.

A schematic of the project effects investigation process is as follows;



**Figure 14 Water utility project effects investigation process**

### 3.3 Research Design

Research design refers to a process of collecting empirical data for research projects. The key requirements for a good research design must meet the following threshold well Bhattacharjee (2012, p.35), *‘the data collection process, the instrument development process and the sampling process’* (Bhattacharjee, 2012). *‘Broadly the sampling process can be classified as either positivist or interpretive methods’*, (Bhattacharjee, 2012).

Positivist designs examples are laboratory experiments and field surveys that mainly focus on explaining a testing a certain theory or hypotheses. Descriptive designs could include action research and ethnography which focus on theory building (Bhattacharjee, 2012).

Positivist methods apply a deductive approach whereby they develop theories and postulates and try to prove them using observed data, while on the other hand interpretive methods apply inductive approach whereby they try to build theories from observed data. *‘examples of positivist designs include laboratory experiments, field experiments, field surveys, secondary data analysis, and case research while examples of interpretive designs include case research, phenomenology, and ethnography’* (Bhattacharjee, 2012), p.36. The research design for this study can be assumed to be positivist as it is reliant on existing data (Figure 15) to show the relationship to the theory that how finance is utilized determines how efficient a water utility is able to deliver its services based on industry standards.

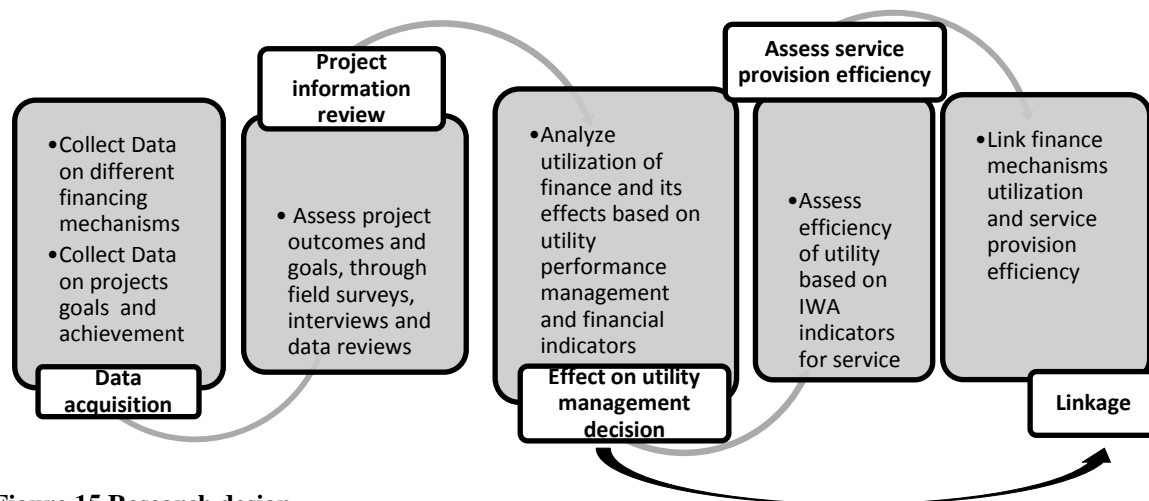


Figure 15 Research design

### 3.4 Research Strategies

#### 3.4.2 Case study

This method is usually applied for in depth studies on certain phenomena over a certain period of time, data is mainly gathered through long time observation, interviews and social experiments or studies. The method helps in understanding long term social political and cultural trends in the society (Bhattacharjee, 2012), the challenge of this method is that the interpretation is opinionated on the researcher's ability and establishing cause and effects relationship might be a challenge. There is also the difficulty of generalizing the findings to other cases. The research questions seeks to answer to what extent has utilization of finance been used to improve service provision efficiency. The research is rather based on 'how' and 'why' finance has affected the efficiency of supply delivery. The author has little control on (Yin, 2003) on manipulating the data on finance options or efficiency, this are sourced and investigated from actual statistics and opinions of management staff and consultants who have worked with Mowassco. Other reason why it is suitable for this research is the ability to deal with full variety of evidence (Yin, 2003) from different sources like the utility managers, reports and company statistics and the consumers of water as well as regulators, this flexibility is crucial for my interpretation of variable relationships. There is also the flexibility of case study to be used in conjunction with other methods especially where there are unclear contextual boundaries as is the case with this research where reviews for existing secondary data, semi structured interviews, and questionnaires among other methods might be used. The variables will use either quantitative or qualitative data and this is possible with case study research

### 3.5 Research Operationalization; Variables and Indicators

This research data collection applied questionnaires to establish utility managers' and experts' perception about the service levels and their expectation, this helped in validating data as the questionnaires were conducted targeting managers and external experts on different subjects and from different organizations, who have worked with Mowassco as consultants, open ended interview questions were also conducted on managers at different levels within the organization coupled with secondary data review of data from the water utility records. The data is then be interpreted to draw the relationships between variables based on the operationalization model. There are six indicators for efficiency of services and four for utilization of finance, the measured parameters are ratings of the extent to which the water utility uses this variables which are related to efficient water supply provision. They are developed by International Water Association (IWA, 2013) as best performance frontiers for

water utilities with a scale of 1-5 with 1 being lowest and 5 highest. The measured parameters have more elaborated texts on rating details to be contained in the annex.

### 3.5.1 Defining efficiency variables

- i. **Corporate governance efficiency;** this *“gives an idea of the current level of efficiency the utility has on the internal performance interaction and the external relationships with the public, environment and professional bodies”* (IWA, 2013, p.1).
- ii. **Human resources efficiency;** demonstrates current level of efficiency the utility regarding internal communications channels, the employee skill mix, the staff remuneration and enrolment and qualification ranks. It allows identifying if the current human resources within the utility are appropriate, (IWA, 2013, p.9).
- iii. **Customer service efficiency;** this variable captures the extent to which the water utility provides adequate services to users and the ease of interaction with customers (IWA, 2013, p.11).
- iv. **Financial efficiency;** this indicator checks whether budgets are consistent with needs, capital investments are need based, projects are completed on time and cost recovery is achieved, (IWA, 2013, p.14).
- v. **Commercial efficiency;** *“this gives an idea of the current level of efficiency the utility has in relation with the payment, by the customers, of the service provided financial aspects”* (IWA, 2013, p.15). This informs whether the utility is financially sustainable.
- vi. **Technical efficiency;** this indicator showcases the utilities efficiency in asset management and planning aspects and whether the resources it has are suitable for the kind of services it is supposed to offer, (IWA, 2013, p.17).

#### 3.5.1.1 Definition of terms and concepts related to efficiency;

- i. **Adequately;** adequate water supply refers to the ability of the supply to meet the demand for water for domestic, industrial and commercial use.
- ii. **Reliably;** reliability in water supply refers to the extent to which water is supplied consistently at required hours for use by industries, commercial institutions and domestic usage as well as other consumers.
- iii. **Good water quality;** good quality refers to the chemical, physical and biological characteristics of drinking water meeting set standards by World Health Organization for drinking water and Kenya Bureau of Standards
- iv. **Accountability;** accountability refers to the quality of services and integrity in managing public water supply services through transparency, diligence and reasonable sensitivity to consumers’ needs *“place water agencies at arm’s length from governments and to make them accountable to the public”* (Chiplunkar, 2008, p.3).
- v. **Professionally;** this is the extent to which the water utility applies international best practice in water supply service (Chiplunkar, 2008, p.3) and (Maques, 2007).
- vi. **Sustainably;** this refers to the extent to which a water utility supplies water with level of environmental concern in management from abstraction, transmission and distribution management (Chiplunkar, 2008, p.ix)

### 3.5.2 Defining utilization variables

The term utilization is derived from the word utilize which means to use something according to Longman dictionary (2004). This means that the below terms can then be defines as;

- i. **Utilization of loans;** this refers to the ways in which loans are used in expansion of water supply through mainly capital investments in infrastructure development and expansion.



- ii. Utilization of grants; this refers to the methods by which grants are used to improve operational efficiency, human and technical capacity building.
- iii. Utilization of subsidies; this refers to ways in which subsidies are used to improve water access to the low income earners at social and economic cost recovery (Komives, 2005).
- iv. Utilization of tariffs; this refers to ways in which tariffs are used to improve operational efficiency and employed in minor capital works. (WASREB, 2005)

### 3.5.2.1 Definition of terms and concepts related to utilization

- i. **Needs sensitivity;** Refers to the extent to which the finances in the water sector are fashioned to meet the demands and needs of the residents and also to what extent the utility feel that indeed this is the case, finances towards operations and capital investments should be optimized (Chiplunkar, 2008, p.203).
- ii. **Responsively;** Refers to the way in which the utility responds to the needs of the consumers promptly *‘‘A robust system of reporting and monitoring is also needed to help set priorities in water policy interventions and to strengthen the responsiveness of institutions and processes’’*, (Chiplunkar, 2008 p.3).
- iii. **Sustainably;** Refers to the extent to which the financial mechanisms are employed with a long term perspective of service improvement and efficient supply meeting current and future needs with minimal environmentally negative impacts *‘‘This requires that utilities strive to be financially self-reliant by operating as independent, business-like institutions with an emphasis on improving their revenue and effectively managing their cash flow’’* (Chiplunkar, 2008 p.3).
- iv. **Adequacy;** This aspects refers to the amount of finance invested into the water supply sector in Mombasa County. It relates to whether financing options are able to meet the financing gap in terms of water supply services operational and capital expenditures (Chiplunkar, 2008, p.203) and (Tremelot, 2011).
- v. **Prudency** – Refers in this case to the extent to which sound management practices and processes have been used to ensure that finances are properly utilized for the purposes they are intended for.
- vi. **Suitability** – In this context refers to the extent to which the financial mechanisms is well fitted to its intended use.
- vii. **Acceptability** – In this case refers to the extent to which a tariff system being applied is pleasing, welcome and adequately satisfies the needs of consumers of water services.
- viii. **Equity** – This refers to the extent to which a subsidy levels charges costs for consumption of water to low income consumers in a manner that is economically sustainable and socially sensitive to their ability to pay. The other meaning is also fairness of any action to various groups with varying level of needs.

**Table 6 Operationalization of variables table**

	Concept Definition	Variables	Measured Parameter, level which best describes situation (Value rating: Scale of 1-5, 5 being highest score and 1 lowest)
1	<b><u>Dependent Research Variable</u></b>  <b>Efficiency:</b> Efficient provision of water supply services;  The extent to which the water utility supplies water;  <ul style="list-style-type: none"> <li>○ Adequately</li> <li>○ Reliably</li> <li>○ good quality</li> <li>○ Accountability</li> <li>○ Professionally</li> <li>○ Sustainably</li> </ul>	Corporate governance efficiency:	Mission statement usage in organization departments
			Strategy existence and implementation within the company departments
			Board of Directors recruitment transparency
			Clarity in definition of Code of conduct and internal accountability for employees and their roles
			Quality control procedures existence auditing, documentation and updating
			Procurement ceilings and documented process usage
			Public relations policy and tools existence and usage
			Professional bodies, membership and participation
			Environmental accountability by monitoring impacts frequency
		Human Resources efficiency	Internal communications-extent of regular communications
			Recruitment and staffing – Numbers and appropriate skill position march
			Remuneration levels high or low compared to industry standards
			Staffing training and education levels
		Customers efficiency	Coverage and access to water by population
			Delivery of service hours per day, pressure and service reliability
			Water quality compliance level
			Information and communication to customers and emergency systems in case of interruptions
			Customer service-bill payment convenience and customer call response systems reliability
			Complaints management-recording, follow ups and solutions offered reliability
		Technical efficiency	Water safety plan existence and implementation status
			Strategic asset management- asset records and updating frequency
			NRW monitoring frequency and reliability
			Network maintenance style

			Water resources management plan existence and usage
			Drinking water quality monitoring
			Operational efficiency monitoring level frequency
		Commercial efficiency	Customer information database levels
			Meter reading and billing procedures, accuracy and recording levels
			Collection efficiency % range and billing period domestic and industrial customers
			Collection efficiency % range and billing period-public authorities and bonded customers
			Customer metering, testing and calibration levels
		Financial efficiency	Existence and usage of financial operating projections
			Existence and level of capital and planning projections
			Existing and level of usage of accounting principles
			Frequency of financial monitoring and reporting
			Annual external auditing and reporting status
			Utility Credit worthiness, rating and access to credit
			Tariff setting policies and application levels
			Revenue sufficiency
2	<p><b><u>Independent Research Variable</u></b></p> <p><b>Utilization:</b> the methods by which financial mechanisms are used to fund water.</p> <p>Utilization of different financial mechanism;</p> <ul style="list-style-type: none"> <li>○ Responsively</li> <li>○ Needs sensitivity</li> <li>○ Prudence</li> <li>○ Adequacy</li> <li>○ Suitability</li> </ul>	Utilization of loans in water supply infrastructure expansion (This affect technical and Commercial efficiency)	Adequacy of available resources (funding/m3) against (investment demand/m3)
		Utilization of grants in operational efficiency and capacity building (This affect financial, commercial, customer communication, human resources, efficiency)	Responsiveness of investment based on needs
			Prudence in management and accountability (project design costs vs completion costs, project completion timeliness, quality control measures)
			Needs sensitivity (WTP), level of demand for service
			Consistency of funding source reliability
			Staff training requirements met
		Utilization of subsidies in operational efficiency	Organization structure reviews and contracted qualified employees hired for management
			Training versus skill mix compatibility
			Improvement in professional operational and skill capacity
			Level of staff engagement in development of company strategic plans
			Equity in affordability
		Utilization of tariffs in operational expenditure	Revenue from subsidised sources/cost of water
			Needs sensitivity and location of water kiosks
			Investment to meet pro poor demand
			Prudence in management and accountability
			Cost recovery effectiveness of the tariff

		and minor capital investments	Equity and fairness of tariff to the rich and poor
			Contribution of tariff to water resources conservation
			Acceptability of the tariff
			Simplicity and transparency of the tariff

## **3.6.0 Data Collection Methods**

### **3.6.1 Research Approach**

Research approach refers to the devices, systematic processes for research, that cover the relationship between general assumed theories, to meticulous methods of data gathering, analysis and inferences development (Cresswell, 2008). The choice of a research approach should normally be sensitive to the design of the research, which refers to the procedure of carrying out the research, the intentions of the researcher, in terms of what outcomes the researcher wishes to convey about the problem, the type of data he or she will need to gather and the targeted recipients of the research findings. In addition the researcher personal experiences may also shape the type of approach that the researcher will use in conducting his or her work (Cresswell, 2008).

The types of research approaches can be categorised as qualitative, quantitative and mixed methods (Cresswell, 2008). According to University of Bradford (2007, p.1) research approach can also be grouped into three broad categories quantitative or qualitative, applied or basic and deductive or inductive research approaches (Neville, 2007, Neville, 2007). The selected data collection methods for this research are questionnaires, semi structured interviews and secondary data review.

#### **3.6.1.1 Questionnaires**

This research is positivist *'examples of positivist designs include laboratory experiments, field experiments, field surveys, secondary data analysis, and case research, ''* (Bhatacherjee, 2012). The research is heavily reliant on structured set of questions used to measure the efficiency of service provision variables from the utility point of view on utility efficiency. In this form questions are asked in a specific order and for precise answers (Westat, 2002) to ensure standardization. The challenge for this choice of data collection is on flexibility as it limits the perspectives and answers of respondents; however this is based on the research analytical design, it is a consistent and internationally accepted standard. The criterion is used for measuring water service provision efficiency. There is a challenge on conducting statistical tests on the questionnaires outcomes as the research targets managers and consultants, yet the size of sample available at the utility is less than 35 managers.

The challenge is also because the fact that the data cannot be easily controlled or manipulated to draw relationships unlike in other methods of data collection, alternatively, in this case answers from respondents could risk the research losing focus, or conclude with multiple inferences not covered in the literature review and therefore outside the scope of this research.

Secondly, by asking different managers in different cadres, institutions in the sector, for example, Vitens Evides International and other consultants (VEOLIA, PWN etc) who have worked previously in the company, comparisons can be drawn and any biased interpretations avoided. This ensures the validity of the research findings because not only is the measurement standardized for different categories of respondents' answers but also is the applicability externally. Furthermore, the methods are developed for utility evaluation by reputable international industry frontier institutions with regards to historical and professional research on water utilities performance and evaluation. It is suited for a survey as the questions to be answered for measuring efficiency are well firmly structured easy to understand but meant to optimize rating of efficiency. Triangulation with semi structured interviews and secondary data review will also be carried out.

### **3.6.1.2 Semi structured interviews**

In this case of interviews, the field researcher has some flexibility in terms of what is being searched for and expected from the interviewee, the interview is conducted using a guide based on a topic but disregarding any sequence of questions asked (Bailey, 2007). On financial utilization the research relies on company records, reports and statistics, questionnaire and semi structured interviews this is important because apart from collecting quantitative data it is important to evaluate the perspective or opinions of the respondent for analysing and understanding the effects of certain financial utilization options and respective indicators being measured that have a relationship with efficiency of water services provision. By collecting this information and assessing the changes in efficiency over the period after financial intervention it is possible to qualify or disqualify financing options targets, achievements and their extent in improving efficiency. This helps in answering the research questions. The method fits into the research strategy as it provides opportunity to explain the utilities perception and opinion of financing options from the perspective of key management staff and for the interpretation of this in terms of its effects on the utilities efficiency based on internationally approved measurement systems.

**Sources:** The sources of information for this research are different senior managers and junior managers from the water service provider (Mowassco) and former consultants working with the company on various projects, former managers and where possible current consultants. The utility has 430 employees spread in five water distribution zones. The research also includes reviews on past statistical records on company performance and projects, company monitoring and evaluation reports, strategic and management reports, financing statements and project progress or completion reports. This encompasses sources from previously recorded and stored information on the utility.

#### **Types of data;**

The data will includes financial records on funding and expenditure on capital and operational projects, customer data, projects and strategic and management reports, utility rating data on financial, customer, technical, commercial, human resource and corporate governance efficiency. The timeframe for analysis of the changes is preferred to be 2007 – 2014. The data will be both quantitative and qualitative.

#### **Data Access and Preparation**

Data was accessed from the water utility records and various departments including human resource, commercial, technical and finance offices where it is stored. The data was intended to collect only relevant information based on time and importance to research, the data was then summarised into numerical values usable for research and where qualitative it was scanned or written down for reference during analysis and for interpretation. The selection of data was based on importance of the data source content and its alignment to the research variables and questions, this was followed by a detailed review to establish relevancy whereby positive data is stored and irrelevant data ignored,

### **3.6.1.4 Sampling for Primary data**

The sampling method selected is non probabilistic in nature as the research topic is intended to explain a relationship that only a certain cadre of personnel can be able to provide relevant information concerning the water utility. The sampling was purposive and targeted senior managers, consultants and junior managers. The company has approximately 430 employees distributed within five water supply zones. These zones have management staff at different levels and the information gathered will also transcend departments, ranks and professional backgrounds hence bolsters internal and external validity.

### 3.1.4 Sample Size and Selection

POSITION	NUMBER	DATA TO BE COLLECTED	DATA COLLECTION METHOD
Ag. Managing Director - Mowassco	1	Qualitative	-
Ag.GM-Finance	1	Qualitative and Quantitative	Semi structured interview and structured questionnaire
GM-Engineering and Strategy	1	Qualitative and Quantitative	structured questionnaire
GM- Business & Customer Service	1	Qualitative and Quantitative	Semi structured interview and structured questionnaire
GM-Human Capital	1	Qualitative and Quantitative	Semi structured interview and structured questionnaire
Assistant Human Capital Manager	1	Qualitative and Quantitative	Semi structured interview and structured questionnaire
Planning & Design Engineer	1	Qualitative and Quantitative	-
Operations Manager - Water	1	Qualitative and Quantitative	Semi structured interview and structured questionnaire
Operations Manager - Commercial	1	Qualitative and Quantitative	Structured questionnaire
Manager Commercial Projects	1	Qualitative and Quantitative	Semi structured interview and structured questionnaire
Manager-Projects	1	Qualitative and Quantitative	-
Internal Auditor	1	Qualitative and Quantitative	Structured questionnaire
Managing accountant	1	Qualitative and Quantitative	Semi structured interview and structured questionnaire
Business Unit Managers	6	Qualitative and Quantitative	Structured questionnaire
Commercial Officers	6	Qualitative and Quantitative	Structured questionnaire
Technical officers	6	Qualitative and Quantitative	Structured questionnaire

### 3.6.1.5 Validity

The research cannot limit the cause and effect dynamics to its central focus; there are other issues beyond its scope that may affect utility efficiency like national and international politics, government policies, macro-economic climate or even climatic conditions that limit water availability. The focus of the research is on issues raised in the literature review, the scope, variables; indicators are all geared towards answering relatively satisfactorily, the research questions.

Validity refers to the extent with which the variables and their relationship is measurable (Cresswell, 2008), the fact that the research variables are analysed based on a specific set of structured questions meant for efficiency determination, and the opinion and perspective of respondents on efficiency are limited. The assessment method is as per international standard on utility performance and introducing other external parameters may not measure the research according to accepted utility norms, hence, establishing relationship could be difficult. The challenge is however overcome by selecting respondents from within the institution in focus (Mowassco) and outside the institution (independent consultants familiar with the utility operations), and secondary data sources, this provides a situation whereby results are not biased to judgement of any certain group and therefore measured from diverse

group and opinions. This ensures that any relationship is unbiased and does indeed exist as demonstrated by the findings. The other option used is the use of secondary data to support quantitative and qualitative data collected from interviews (Westat, 2002), this will validate or invalidate the researcher's measurement of variables or the researcher's interpretations.

#### **3.6.1.6 Reliability**

This refers to the ability of a researcher applying the same research techniques to collect and analyse data and obtain similar results to the one reported in a research (Cresswell, 2008). This research uses archived and reliable data sources within public domain and by ensuring homogeneity in questions asked to respondents, it further uses internationally accepted standards for measuring efficiency of water utilities developed by IWA, the literature review is also hinged on existing industry and theoretical standards regarding water supply provision as well as water sector finance. The trail of the research reveals consistently the research question, the variables and the measurement of indicators to establish findings. Based on this context the research is well covered in terms of reliability.

#### **3.1.6 Data Analysis Methods**

The analysis of data is consistent with previous research analysis procedures and techniques, it involves data collection and organization into a logical order, the data is then indexed, labelled, categorized into some typology, depending on its content and the kind of interpretation best fitted to it, descriptive analysis was then statistically done by SPSS, and Excel spreadsheets where applicable.



## CHAPTER 4: RESEARCH FINDINGS

This section of the report deals with the outcomes of the research mainly focusing on projects handled under different financing mechanisms. It analyses previous trends on various aspects of funds utilization and efficiency of utility in service delivery based on company records, survey results and secondary and statistical data review. The information is further analysed to draw interpretations and support arguments seeking to respond to the main and sub research questions.

### 4.1 Introduction

The findings of this research are based on the review of company information sources like statistics, past records on performance and reports from the company and external consultants. The research also interviewed 7 senior managers and administered questionnaires to 32 different senior and middle level management personnel. The structure of the findings is mainly through review of projects giving background information about funding sources, goals and achievements after completion or as at current stage of implementation, the period of analysis is 2007 to 2014 or as per the data obtained. The research also reviews the company's performance data including trend analysis of water supply, demand and sales, the tariff trends regime over the years and the changes in efficiency of service delivery.

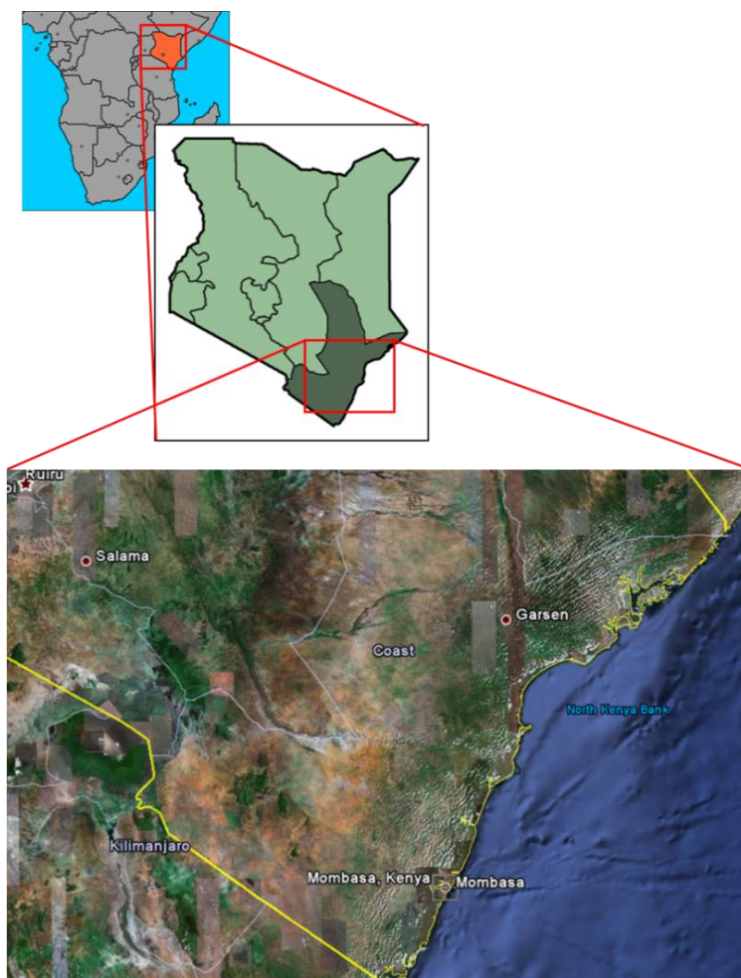


Figure 16 Mombasa's location, (TS photographs file, 2012)

#### 4.1.1 Water utility organogram

Over the years, the current organization structure has been reviewed to resemble the one shown below, this has been done based on various considerations including, costs considerations, political interests and redundancies to be created by the any new structure.

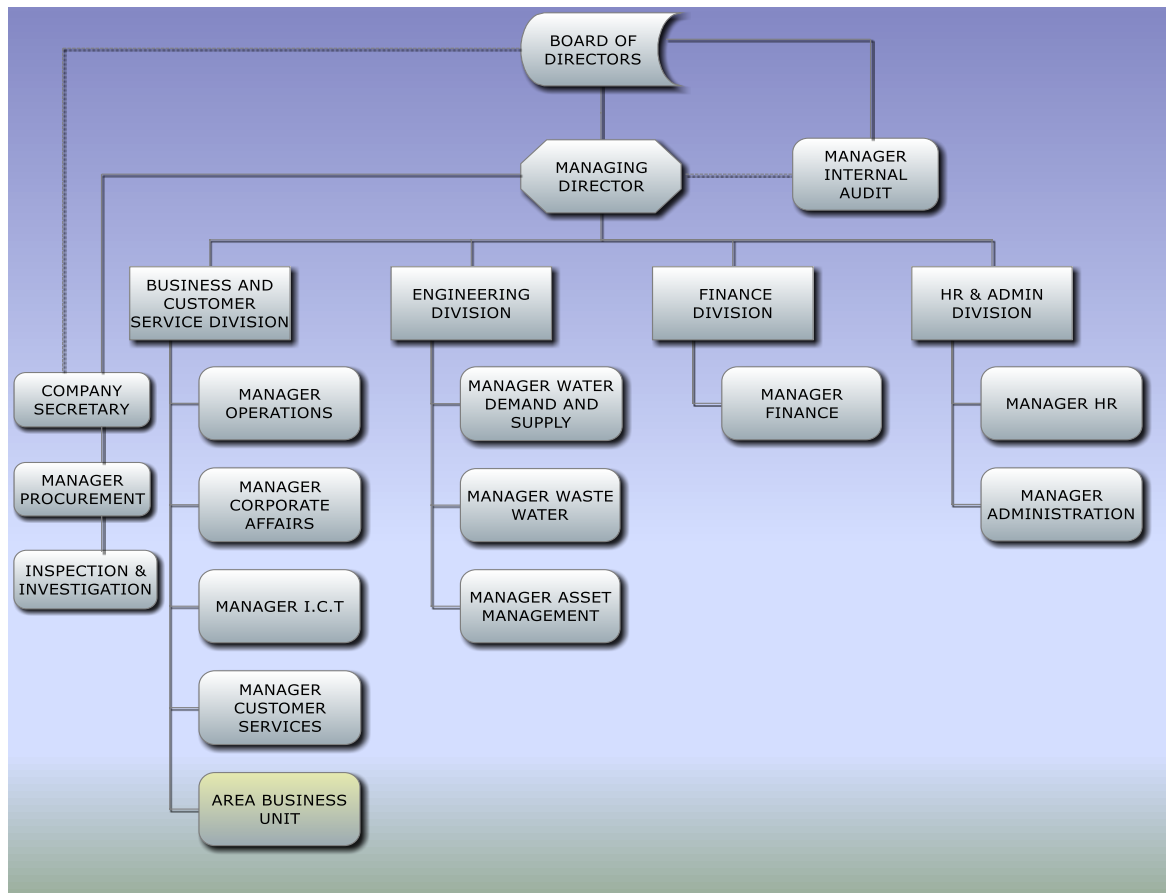


Figure 17 Water utility organogram (Source; Mowassco records)

The water company operates through six administrative units' referred to as Business Units (BUs) each headed by a Business Unit Manager. The current BUs are as shown below.

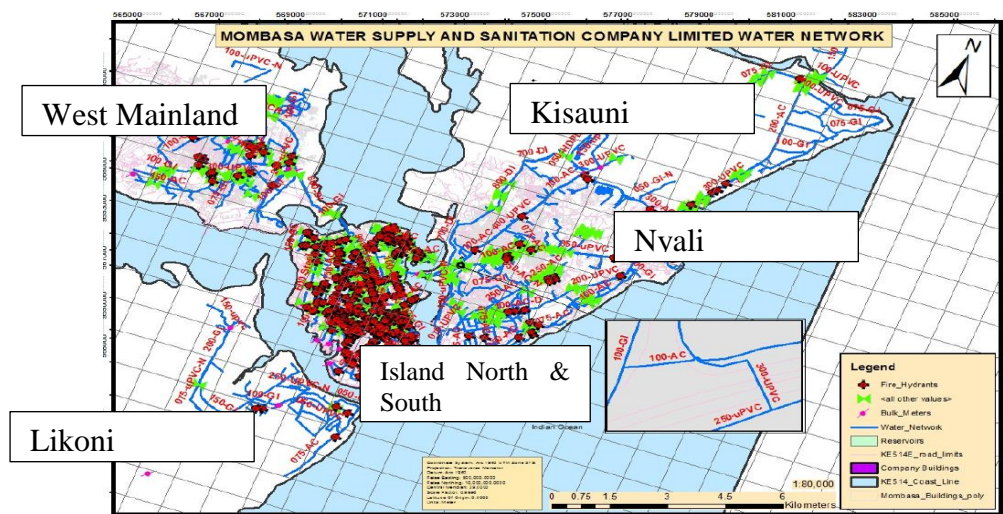


Figure 18 Mowassco water network (Source; Mowassco Records)

The Island is administered as Island South and Island North both of which operate independent of each other when it comes to offering of water supply services, revenue collection and billing of customers. In addition this applies to management of physical and nonphysical assets of the water utility. The rest of the Business Units are Kisauni, Nyali, Likoni and West Mainland.

## **4.2 Water finance in the county**

The water services provision in Mombasa is financed through different mechanisms including loans, tariffs, grants and subsidies. This section reviews each of the above methods with respect to Mombasa County and its relationship with other areas and stakeholders in the water sector where applicable. The main focus of the section is the review of background information on funding, intentions of funding, for example project goals and outcomes, and then a review of trends for the period 2007 – 2014. The trend is based on data collected from the company on both financial and utility efficiency. It is based on the literature review and as outlined in the operationalization and also influenced by availability of data.

### **4.2.1 Technical Support (TS) Project (Bilateral Loan Funded by AFD)**

According to records with the water utility, the project was initially a 2,956,819/= million euro project funded by AFD (L'Agence Française de Développement ) to the Government of Kenya (GoK) and implemented through the Coast Water Services Board (CWSB) which is the supervisor of the water utility. The project was implemented through supervision by Seureca Consulting Engineers East Africa, a branch of Veolia International – Water (France).

According to the Mowassco reports (Seureca, 2010), the components of the project for Mombasa Water included the following.(Seureca, 2010)

#### **Package 1**

The first Package was funded by the French Development Agency (AFD) and included:

- i. **Technical Support (TS)** to Mombasa Water and Sanitation Company (MOWASCO) for capacity building and to CWSB for project implementation.
- ii. **Mombasa works and studies:** further studies for water distribution and sewerage services followed by DD, works TD and TOR-RFP for works supervision, followed by the corresponding works and supervision of the works.

### **4.2.2 Project objectives**

The objective of the service was as follows:

- Support to MOWASCO for water and sewerage services management improvement (Capacity Building, Improvement Action Plan)
- Support to CWSB for project implementation(Seureca, 2010)

#### **4.2.2.1 Capacity Building**

TS assisted Mowassco in developing a GIS with assets and customers inventory. This assignment was defined as to include the following;

- Present to MOWASCO several Geographical Information Systems suitable for hydraulic networks mapping, including consumers' connections, and assisted the utility in the selection. The TS was in charge of delivering two copies or a multi-post one of the selected software with the related hardware
- Identify the existing city maps or aerial pictures and select the most suitable.

- Identify and collect the existing data on equipment (networks maps, reservoir and pumping stations drawing) and on the consumers (lists with connection address, number and type of meter)
- Identify the needs for complementary data
- Define the composition and qualifications of the MOWASCO's team who collected the complementary data, check and update it on the field, prepare the drafting documents, and enter it in the GIS
- Assist MOWASCO in the organization of the GIS Team, including the staff selection.
- Organize and supervise the work Plans of this team.
- Assess existing and propose improvement of overall asset management and depreciation strategy (Seureca, 2010).

### **Metering and leak detection Program**

The TS was to:

- List the existing bulk and consumers meters and their condition,
- Identify supplementary metering needs, prepare Tender Documents for procurement of these meters and monitor the procurement process
- Define the composition and qualifications of the MOWASCO's team who carried out the metering and leaks detection (MLD) Program,
- Help in procuring the necessary leak detection equipment,
- Support MOWASCO in the organization of a MLD Team, including staff selection.
- Establish the MLD Program, including the targets and related indicators to monitor it.
- Organize and supervise the work Plan of this team and train them on the job (Seureca, 2010) .

### **Customers' management improvement**

The TS was to:

- Define the features of this new system,
- Present to MOWASCO several customers' management systems and assist the Utility in the selection.
- Assist MOWASCO in updating the consumers list by inserting the result of the consumers' inventory carried out by the GIS team.
- Establish an improvement billing Program, including the targets and related indicators to monitor it.
- Propose the decentralization of the commercial department, in order to get MOWASCO closer to its customers (Seureca, 2010).

### **Water quality monitoring**

The Tasks of the TS would be:

- Reviewing the existing laboratory facilities
- Proposing new facilities and rehabilitation of the existing (shared by the CWSB and the 6 WSPs) ones, including the definition of the needed staff, room, equipment, chemical, etc.
- Preparing Tender Documents for procurement of laboratory goods and monitor the procurement process (Seureca, 2010).

#### **4.2.2.2 Improvement Action Plan**

##### **Detailed Overall Diagnosis**

The TS was to carry out a detailed audit for each department:

- Management:
- Technical Department (Engineering and Strategy)
- Commercial Department (Business and Customer Service)
- Administration and Finance Department (Human Capital and Administration)
- Staff: organizational chart, number, education, skills, location, Job Descriptions (assigned tasks): budget preparation, accounting, balance, borrowing,
- Available assets: offices, office equipment, workshops, vehicles, tool and
- Outcomes of the department (salaries, department operation costs, financial cost) (Seureca, 2010).

The TS was required to implement a balance between the duties of each department and the available human, financial and operation equipment in order to assess the consistency of the current company organisation according to the tasks it was to carry out.

In addition the TS was to propose improvements to MOWASCO's financial management.

The TS was also required to update the technical performance ratio (global efficiency, average linear leakage, number of breaks and shortage per month) and confirm the identification of the main technical issues.(Seureca, 2010)

##### **IAP preparation**

The TS was to propose useful adjustments to improve the efficiency of the utility. It could include:

- Adjustment in general and/or specific organization charts
- Adjustment in staff number
- Improvement in staff skills
- Improvement in human resources recruitment and management
- Activities to be developed or to be reduced
- Necessary investments (office upgrading, hardware and software, vehicles, technical operation equipment)
- Priority strengthening actions (Seureca, 2010)

##### **Training Program**

The TS was to define, according to its reorganisation proposal, the skills to develop in the company and the new skills to introduce, propose training courses and study tours to match this target, specifying the content, the duration, the possible location and the number and type of the involved staff. (Seureca, 2010)

##### **IAP Implementation**

The TS was to propose and implement specific short term actions in addition to actions to support MOWASCO in reaching the above targeted improvements. It was envisaged that this support would have to focus on the following:

- General management improvement
- Maintenance improvement (Seureca, 2010)

### 4.2.3 Technical Support (TS) - Project Outcomes

The technical support project conducted a Detailed Overall Diagnosis (DOD) and afterwards submitted an Implementation Action Plan (IAP) on all the expected deliverables mentioned above for the project as per the terms of reference of the contract. It is not possible to review each item in details but the results of the project are summarised in consequent sections.

#### Organizational structure review

The technical support (TS) project played a critical role in the revival of Mowassco from the downward spiral in terms of efficiency through a detailed diagnosis and an improvement action plan, furthermore, highlighting serious challenges that the water utility was facing in various departments. The project even developed a proposed new organizational structure which was not implemented owing to its financial costs. The proposed structure was as below. However the current company organizational structure borrows heavily for the proposal under TS (Figure 17).

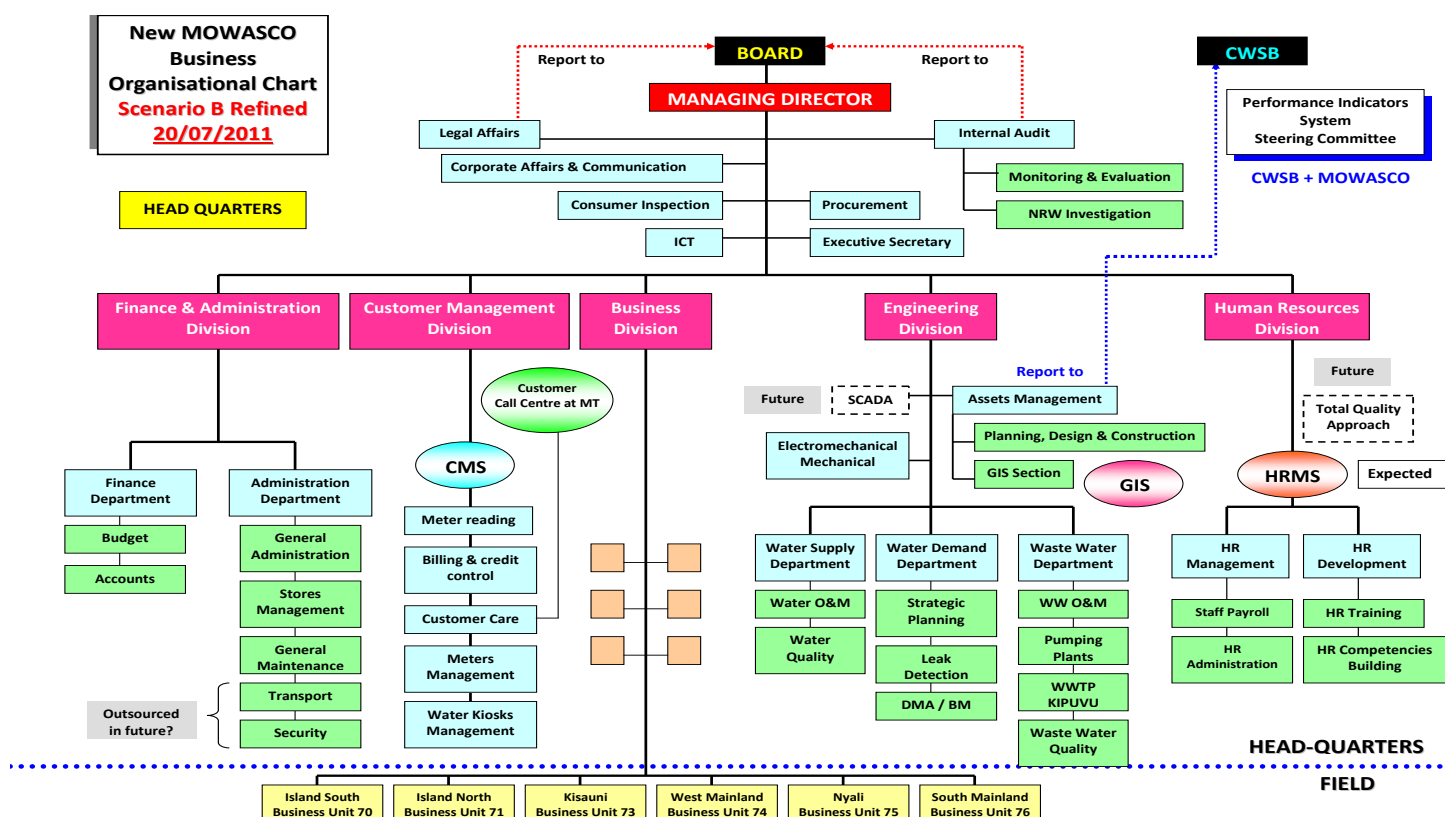


Figure 19 Proposed company organization structure under AFD funding (Source; Mowassco Records)

Though the structure was not adopted fully, the revised organogram (figure 17) borrowed heavily from the structure and also left options for future improvement to conform to the proposal or further developments that would enhance efficiency and conform to interests of the company while appreciating its challenges.

## **General training and cultural change**

The TS developed an organization structure that was partly adopted. In addition to this the company conducted numerous training programs for all cadre staff to improve efficiency. This was under the 'Culture and Team Building' Exercise-Training Programme. The TS as well continuously was involved in the Central Management Committee meetings to assist in strategic management decisions. The lower cadre training of artisans was conducted on skill basis and on priority topics. This included periodic and regular training on leak detection, large customer metering measurement using different on line metering systems, cold and wet tapping, GIS appreciation and user training for senior and junior managers. There was also extensive training for two GIS administrators and one billing administrator as well as Mowassco staff on using and appreciating EDAMS billing software. It is a modern billing system for water utilities that integrates meter management database and billing as well as financial transactions.

## **Geographical Information System**

The TS project was also responsible for digitizing and creating in GIS about 85 % of Mowassco's pipe network of up to 50 mm and above. The project also assisted in developing specifications and procurement for the GIS hardware and Software systems. It also helped in the creation of an operational offline GIS link to IT (Information Technology) network, through a secure location accessible by Business Units remotely. In addition, training of staff on the use of GIS system and collection of customer information including meter details, customer physical address, account details and GPS coordinates. There was also the collection of waste water data, ready for digitizing and uploading into the GIS data base. This is currently underway. There is also continued updating of the database as work on VEI WOP project progresses. The TS formulated documents on the way forward after handing over the project to the utility, this included data to be collected in the future and updated in the system.

## **Customer management program**

Through the TS project Mowassco was able to procure a software for customer management called EDAMS, hard ware for the system and at least 33 Hand held meter reading gadgets, this helped in better meter data acquisition and to ensure that meters are read on site and allegedly fictitious readings commonly submitted by some lazy meter readers were avoided, the gadgets have a GPS logging system whenever data is entered hence indicating position of acquisition. This was a better tool for customer data management and updating method as it is linked within the company and administrated at a single point, it also extends reporting abilities and detection of commercial losses as well as monitoring of customer management and complaints progress. However its utilization is not efficient due to resistance from some meter readers and hence there has been a slow adoption of its potential and therefore limited benefits to the water company. Through the Customer Information Survey (CIS), the company was able to collect digitally, coordinates and customer details which are currently being verified before being uploaded in the water utility GIS system which will later be linked to the EDAMS software so they are integrated to provide optimum geographical and customer database under one platform.

## **Metering and Leak Detection**

The company was previously less informed about its water losses and the perception generally was that billing was low because of unavailability of adequate water; however this perception changed as there was appreciation of the role played by lack of adequate knowledge on NRW management strategy or systems. The technical support project initiated on site meter testing, large customer meter accuracy tests, small customer meter precision

testing. It also helped the utility in highlighting the existence of spaghetti pipes which are small Polyethylene pipes connected to transmission main and supplying individual customers in low income areas and in some cases even in affluent neighbourhoods. These are points of leakages due to poor workmanship and even lack of institutional knowledge on their existence as well as points of contamination for the water network. The company acquired about 19,000 domestic customer meters suited for Mowassco and about 20 electromagnetic meters that are suitable for district metering or major customer meter systems that can help in the establishment of proper district metered systems and improving billing respectively. The customer meters have been installed or are still being installed while the electromagnetic meters await completion of plans for their utilization. In addition the company procured underground pipe locaters and leak detection equipment as well as insertion flow meters for measuring flow rate in bulk transmission pipelines. This capacity building is crucial for any contemporary water utility to address water losses and ensure efficiency. The company also received at least 12 pressure and flow data loggers which are critical for collecting information on flow volumes and pressures at different sections of the network. In addition to this the water company procured large diameter meters for bulk metering to evaluate water losses in different Business Units.

### **Waste water strategy**

The company also started a database of all customers connected to the centralized sewer system yet not billing due to the fact that they are not supplied from the water companies water system since billing for waste water is usually tied to the consumption of water. This helped in increasing revenues but was later abandoned for unclear reasons. Among the reasons cited was resistance from clients or difficulties by meter readers in accessing premises of waste water accounts. In addition to this the consultant prepared a draft proposal on future requirements for waste water works in Mombasa to meet the increasing need of waste water disposal from areas that are currently served and those that are not covered currently.

### **Water Quality**

Through the TS the company was able to fully equip the waste water laboratory at the Kipevu treatment plant, buy laboratory equipment that included. This was after a water quality addendum to the original project terms of reference, it included definition of a water quality monitoring program, review of existing water quality facilities, propose new water quality facility and personnel and supervision of the procurement of the water quality monitoring equipment.



### 4.3 Water Operators Partnership Project – WOP (Grant funded)

The project which commenced in May 2013 is currently ongoing and is funded through a grant (7.3 million €) from the Embassy of the Kingdom of the Netherlands, Water and Sanitation for the Urban Poor (WSUP-UK), PWN and Vitens Evides International in partnership with Coast Water Services Board and Mombasa Water Supply and Sanitation Company. The goals of the project initially are as listed below as well as mechanisms for measurement of progress. The project is ongoing with slight changes on this original plan, this research has only partly covered it as the work is in progress and review is based on the period from conception of the project to date.

**Table 7 Logical Framework for VEI WOP project (Source ; Mowassco Records, 2013)**

RESULTS CHAIN		PERFORMANCE INDICATORS			MEANS OF VERIFICATION	RISKS/MITIGATION MEASURES
		Indicator	Baseline	Target		
IMPACT	<b>Impact</b>	<u>List of indicators:</u>				<u>Risk statement:</u>
	improved provision of water and sanitation services to residents of Mombasa (0.94 million) and Coastal Water Services Board (2.5 million) with emphasis on sustainability of services, customer satisfaction and access for the (peri-) urban poor	1.1 Proportion of population using improved water sources	72% (2009)	83% (2016) 95% (2020)	Impact report (WASREB) Kenya Health statistics 2010, World Health Organization <a href="http://www.afro.who.int">www.afro.who.int</a> Majidata	<ul style="list-style-type: none"> <li>Potential ‘governance vacuum’ (including asset ownership/development vis-à-vis BoD representation as 100% shareholder) in the transition of CWSB to national level board and Mowasco ownership Mombasa County Council (in the alignment to the new Constitution)</li> <li>Achieving results in a Water Operators Partnership largely depends on attitude and involvement of Kenyan partners (CWSB and MOWASCO)</li> </ul>
		1.2 Proportion of population using improved sanitation	59% population (2008)	63% population (2016)		<u>Mitigation measures</u> <ul style="list-style-type: none"> <li>Due consultation with CEOs and management of CWSB and MOWASCO prior to program development</li> </ul>
OUTCOMES / SPECIFIC OBJECTIVES	<b>Outcome 1</b>	<u>List of indicators:</u>				<u>Risk statement:</u>
	Increased water availability in CWSB service area	1.1 NRW in Mombasa	1.1 35% (2009 / 2010)	1.1 25% and +4,000 m <sup>3</sup> per day (2016) <sup>2</sup>	Yearly progress reports	Outcomes 1.3 and 1.4 are depending on external financing (ORIO); Construction for 1.3 will probably be finished beyond 2016
		1.2 Increased efficiency	1.2 45,000 m <sup>3</sup> per day <sup>1</sup>			

of boreholes, water production systems and bulk water lines		1.2 +4,000 m <sup>3</sup> per day (2016) <sup>3</sup>	IMPACT reports (WASREB)	<u>Mitigation strategies</u> Complementarity of this program with ORIO applications will enhance the chance of successful proposals
1.3 Capacity extension of the Baricho intake and Sabaki Pipeline	1.3 45,000 m <sup>3</sup> per day	1.3 + 15,000 m <sup>3</sup> per day (2018) <sup>4</sup>		
1.4 Industrial reuse of wastewater and desalination for domestic use in Mombasa	1.4 0 m <sup>3</sup> per day	1.4 +3,500 m <sup>3</sup> per day (2016) <sup>5</sup>		
<b>Outcome 2</b>				
<u>List of indicators:</u>				
Increased access to water and sanitation services in LIAs	Number of people:			<u>Risk statement:</u> Outcomes 2.1 and 2.2 are partially (50%) depending on successful applications to Water Services Trust Fund and on commercial loans
2.1 Having gained access to safe water	2. 1 Water coverage: 72% (IMPACT 09/10)	2.1 + 70,000 people	Yearly progress reports	
2.2 Having gained access to appropriate sanitation	2.2 Sanitation coverage: 59% (Majidata 2012)	2.2 + 10,000 people served	IMPACT reports (WASREB)	<u>Mitigation strategies</u> <ul style="list-style-type: none"> <li>The program has allocated 50% co funding already which will service as leverage funding.</li> <li>Program will build capacity at a new pro poor focal unit within MOWASCO for successful applications</li> </ul>

<b>Outcome 3</b> Improved water services	<u>List of indicators:</u>				Yearly progress reports  IMPACT reports (WASREB)	<u>Risk statement:</u>
	3.1 Performance Indicator score (IMPACT)	3.1 118 out of 200 (IMPACT 09/10)	3.1 150 out of 200 (2016)			<ul style="list-style-type: none"> <li>Achieving results in a Water Operators Partnership largely depends on attitude and involvement of Kenyan partners (CWSB and MOWASCO)</li> </ul>
	3.2 Customer satisfaction	3.2 No baseline	3.2 > 6.5 (scale 1-10) (2016)			<u>Mitigation measures</u> <ul style="list-style-type: none"> <li>Phased program (2012-2014/2014-2016) with go-no-go decision</li> <li>Due consultation with CEOs and management of CWSB and MOWASCO prior to program development and during program execution</li> </ul>
		3.3. 8 h/day (IMPACT 09/10)	3.3 12 h/day (2016)			
	3.3 Hours of supply					
	3.4 O&M cost coverage	3.4 114 % (IMPACT 09/10)	3.4. Cost recovery O&M: 150%			

### 4.3.2. Initial progress and redefinition of strategy

The project only started in May 2013 and the initial work was establishing the protocols for the implementation including setting up of a local VEI office in Mombasa with a fulltime Resident Project Manager with technical expertise on water utility management. The main agenda for the project to help it achieve the above targets based on the logical framework above are as follows.

- i. Reduction of NRW
- ii. Improve O&M of production, pipelines, reservoirs of Bulk Water company
- iii. Increase production capacity of Bulk Water Company.
- iv. Look for alternative water sources of industrial use in Mombasa.
- v. Increase access to water and sanitation services(pro-poor)
- vi. Improve customer and employee satisfaction
- vii. Improve water distribution in Mombasa.

Even though the items in bullet (ii) to (iv) are considered important they were briefly suspended as it was clear that the water utility needed immediate alternative plans to help it perform properly in addition to more water supply. This is because upon review of previous work carried out in the AFD funded project under credit number KE514E, the Mowassco and VEI experts shifted their focus to the efficiency of the utility as there were obvious operational and human resource challenges that need urgent focus to sustain the existing situation and later help reverse the downward trend in the company's efficiency. Key amongst this was the biggest challenge of reducing NRW. NRW is a symbol of the utilities cohesiveness and unity of purpose as can be shown below. The key critical areas of focus in dealing with the challenge shifted to fit the framework shown below for the initial VEI WOP project for Mombasa Water.

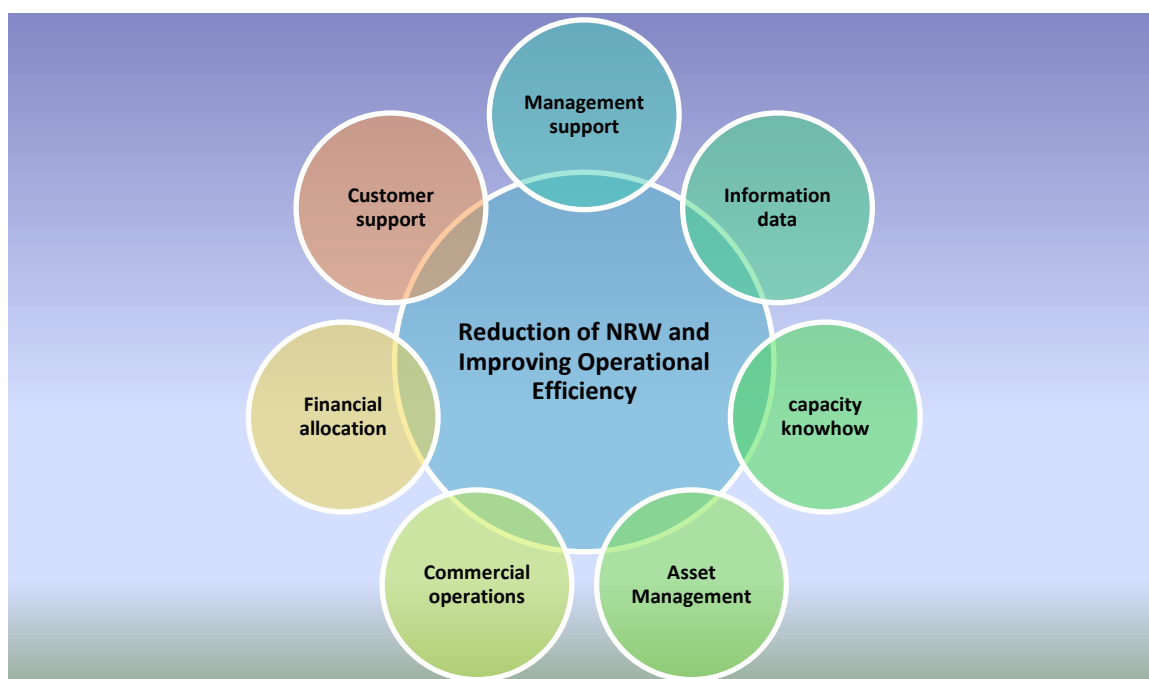


Figure 20 The manager's NRW Handbook

### 4.3.3 Outcomes of WOP project to date - Analysis

With a change in focus the approach methodology was changed by the project team to concentrate on the following key areas. Pilot projects for Non-Revenue Water reduction, poor strategies to improve water supply to low income areas, recruitment of staff to oversee project implementation, training of staff to improve their efficiency, implementation of electromagnetic metering systems for large consumers and equipping of Business Units with equipment, pipes and fittings

#### Pilot projects for Non-Revenue Water reduction

Under the Water Operators Partnership project, Mowassco has established nine pilot areas including some adopted from the TS project for continuity purposes whereby studies are being conducted to evaluate service levels, the key areas of works carried out in this pilot areas are listed as below.

- a) Preliminary Diagnosis of NRW Components:
  - i. Global Measurements of Water Produced or Transferred between pilot area
  - ii. Global Measurements of Water Sales, including Meter Reading and Billing;
  - iii. Billing of Authorised Unmetered Consumption;
  - iv. Periodicity and Consistency of Measurements over time;
  - v. Assessment of Global losses
  - vi. Assessment of Feasibility of Detailed Diagnosis via Pilot Area Surveys
- b) Detailed Diagnosis of NRW Components:
  - i. Identification of Representative Pilot Areas;
  - ii. Setting-Up of Representative Pilot Areas;
  - iii. Customer and Meter Survey in Pilot Areas;
  - iv. Assessment of Customer and Meter Data Base Reliability in Pilot Areas;
  - v. Assessment of Leakage in Pilot Areas;
  - vi. Assessment of Meter Under-Registration in Pilot Areas;
  - vii. Assessment of Illegal and Unregistered Consumption in Pilot Areas;
  - viii. Assessment of Authorised Unbilled Volumes in Pilot Areas; and
  - ix. Extrapolation of NRW Components to Entire Study Area.
- c) Implementation and Monitoring of the Action Plan for NRW Reduction (Seureca, 2013).

The diagram on the left shows one of the pilot areas within Mowassco's West mainland Business Unit. The area is the utility's second biggest in terms of connections and also the biggest source of revenue for the company as it contains the industrial area within Mombasa County. The other Business Units with pilot area projects are Likon,. Island North, Nyali and Kisauni. The establishment of pilot area is an ongoing activity with an aim of having 40 pilot areas within Mowassco with complete district and customer metering.

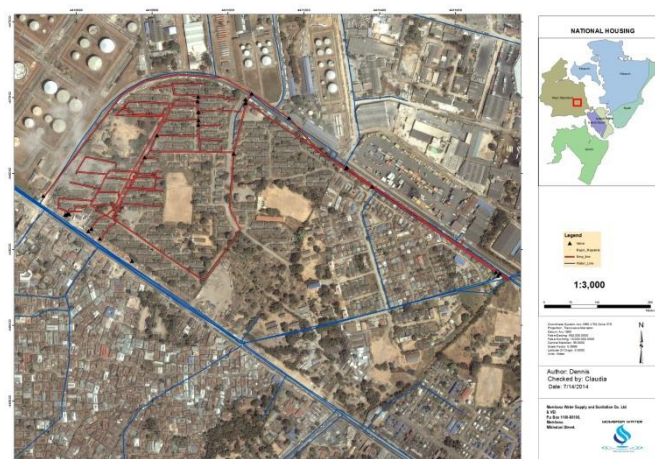


Figure 21 West Mainland Pilot Area (Source; Mowassco Records, 2014)

## Results from Pilot Area Work

The pilot areas are used to train Mowassco staff on the IWA water loss management style, customer service and also on proper metering trends and leakage repair methods.

The pilot areas have helped the company unearth many causes of inefficiency. These include; meter readers colluding with customers to defraud the company, meter tampering by customers or meter readers for exchange of bribes, meter under registration, long lags in leakage repairs, meters that are on site and are not in the database, an example is, in Kisauni Business Unit, the pilot studies led to the discovery of 200 meters that were connected but were never billed. Meters that are disconnected and reconnected but never reactivated in the database hence billed fraudulently. Unknown customer meters of the utility installed without following due process. Poor leakage repair and workmanship skills by company artisans

## Pro poor strategies

- a) Capacity Development of the Internal Pro poor team of MOWASCO
  - i. Pro-poor capacity assessment of MOWASCO was undertaken through workshops, focused group discussions and questionnaires.
  - ii. Data analysis and report on pro poor strategy has been compiled
  - iii. A sociologist was recruited to lead the utility's Low Income Areas engagement.
  - iv. WASSIP-Additional Funding from the World Bank has also deployed a sociologist to support WASSIP project Low Income Areas engagement.
  - v. Exposure visit by meter reading supervisors, commercial officers and technical officers to Nakuru was done for Low Income Areas and NRW (DMA) benchmarking.

## Develop Pro-poor Strategy and action Plan and support Extension of Services to LIA's

The company has cooperated with the World Bank, WSUP, VEI and is currently utilizing funding from the WASSIP –AF (Water and Sanitation Services Improvement Project – Additional Funding) in ensuring that the Low income areas are accessed by water and sanitation services. A team is currently operational within Mowassco and spearheaded by a project manager from WSUP, sociologists from both the World Bank and Mowassco and other key stakeholders representing communities within

Mombasa, officials from the county government and local politicians. The cooperation has seen the commencement of construction of a water pipeline to improve water supply to the following areas; Shika Adabu Location (Ujamaa pipeline), Likoni Location (Bofu and Landi pipelines).



**Figure 22 Site visit to LIA by Mowassco and County officials**



## Training and capacity building

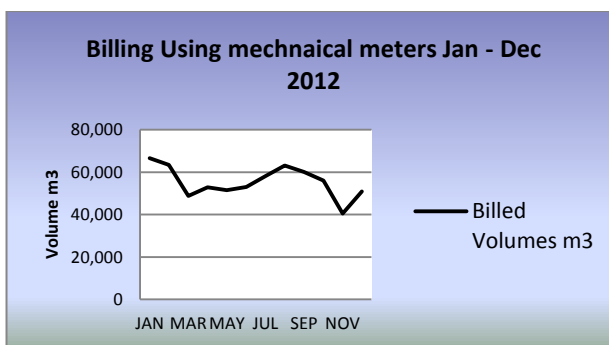
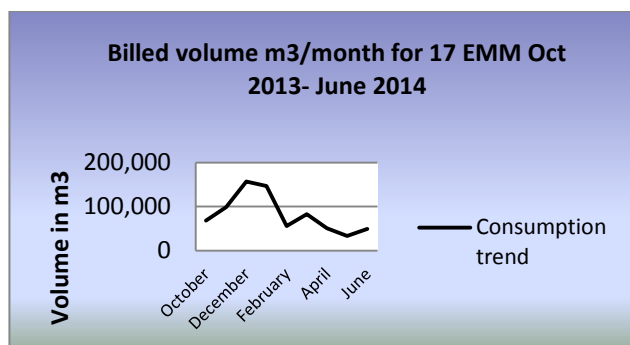
Through the project, there have been continuous training missions under Water Services Providers Association and other 16 water utilities within Kenya. These include utilities from the four main cities (Nairobi, Kisumu, Eldoret and Nakuru) in (<https://vimeo.com/search?q=vitens+evides+international>) Kenya. In addition to that VEI grant has through the ongoing project brought in Dutch water experts from PWN/AQUA NET, Evides and Vitens water utilities to work along Mowassco staff on the job training programs whereby the teams together tackle job related problems and submit reports indicating results. The training also targets senior managers and middle level managers whereby some have been sponsored in education programs in Netherlands while others have been visiting Netherlands in missions meant to improve their corporate management skills through benchmarking with senior Dutch water governance officials in the water utilities in the country (<http://www.vitensevidesinternational.com/media/>).



**Figure 23 Onsite training by VEI experts and Mowassco artisans**

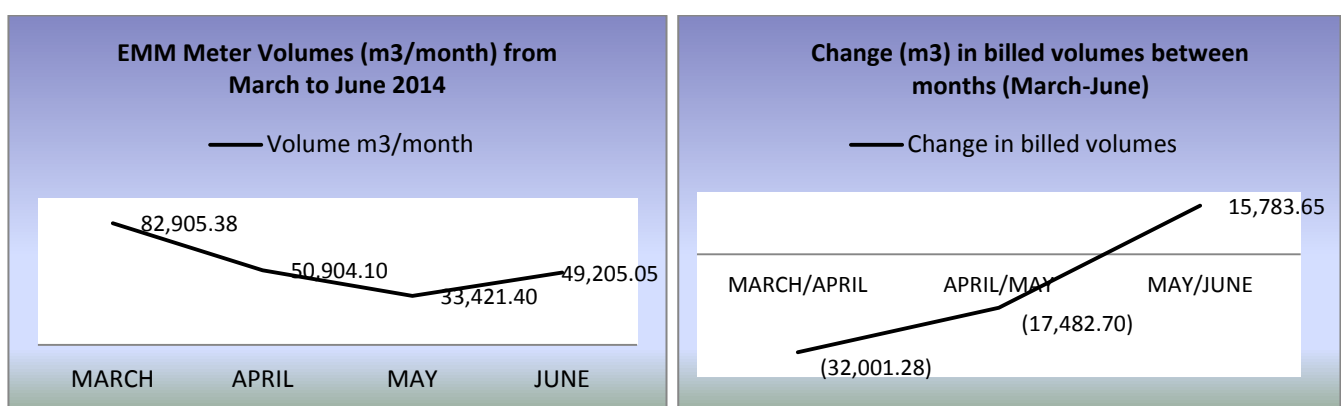
## Implementation of electromagnetic metering in large customers

Mowassco's tariff is a volumetric tariff whereby consumption determines charges in directly increasing tariff bands. This means that higher consumption translates to more revenue, and therefore financial stability if well managed. The company has experienced serious challenges with mechanical meters through some persons tampering with their functionality, fraudulently canvassing of meter readers with clients or under registration due to silt in water networks after leak repairs are completed. To solve this problem the company introduced through assistance from VEI experts, electromagnetic meters which apply Faraday's induction law which by which meters converts electric current generated by a moving conductor (water) across a magnetic field into volumetric measurement of water flow. The meters are also fitted with remote transmission system hence minimizing personal contact with corrupt meter readers. The EMM meters are currently in a transitional monitoring phase whereby the company experienced some challenges as expected initially due to the fact that this was a new technology and that the institutional experience as well as the climate related but issues unforeseen caused technical problems, an example is the high humidity in Mombasa that initially caused the meters to malfunction. However the analysis of a sampled data in 2012 while using ordinary mechanical meters and a period from April to June while using EMM meters has been analysed below.



**Figure 24 Comparison of billing between Mechanical and EMM meters for 17 Major clients**

From the data it can be seen that the billing while using the mechanical meters was fluctuating with less differences compared to the EMM meters, from calculation the average volume for the 17 accounts under the old meters as at 2012 was about 55,397m<sup>3</sup> per month, however, upon replacement with the EMM the billing was fluctuation more for the period from October 2013 to March 2014, however the average for the EMM meters for the period was about 82,395 m<sup>3</sup> per month. However, it is important to note that the irregular billing was characterized by a period of less capacity within Mowassco staff in reading the meters as well as programming them; this could have led to errors in billing customers. As a result Mowassco and VEI team brought in an expert from Badger, the supplier of the meter, who analysed and technically adjusted the meters to Mombasa's climatic conditions, after the period (March), there has been sustained billing though water shortages have affected a proper analysis of their performance. In conclusion, the EMM meters are still under surveillance but their usage is essential to avoid water losses as well as ensure that customer complaints are addressed using factual data.



**Figure 25 Stabilization effect after adjustment of EMM meters by supplier to suit Mombasa's conditions**

From the above graphs it can be seen that the volumes increased in March, dipped in May and then rose in June. In addition, during this period the biggest consumer in Mombasa County, which is the refinery shut down its operations before returning to work though at a minimum basic operational level.

This period also represented gradual positive changes in volume between March/April, April/May and May/June. However from the previous billing the refinery included, there has been an average reduction from the downscaling of operations at the refinery by about 13,760 m<sup>3</sup>/month. This at the rates charged to industrial customers, is about 2.5 million/month extra revenue foregone. The overall impact from the data analysed is the difference of the old and new EMM meters which is about Kshs 4.75 million per month in terms of improved accuracy in metering of 17 major accounts, this translates to only less than five months for the EMM meters to repay themselves considering the whole project cost Kshs 21 million. Upscaling the project could increase the company's revenue greatly.





**Figure 26 Stores funded by VEI grant being inspected by the Dutch envoy to Kenya**

### **Equipping of Business Units**

Through utilizing funds from the grant, the water utility has been able to set up stores (for the six Business Units and buy fittings and pipes as well as hand equipment for artisans to ensure that they are able to repair leaks, rehabilitate old sections of the networks, install new connections and other minor works related to the provision of water services. This decision was reached at, after evaluating that Mowassco did not have the necessary financial capacity to kick start an aggressive campaign of active network maintenance. The initial

funding for the materials and equipment for the six business units was around 29 million Kenya shillings. However, the procurement was marred by allegations of corruption leading to its suspension at the time of collecting data for this research.

## **4.4 Additional Projects**

### **Background information**

This section reviews the utilization of loans in funding other projects that were geared towards the water sector in Mombasa County and that would have an impact on the efficiency of water services provision. This was carried out by the Government of Kenya through the former Ministry of Water and Irrigation currently referred to as the Ministry of Environment, Water and Natural Resources with an aim of increasing water supply to Mombasa through rehabilitation of network transmission assets from the water sources, expansion of production capacity by digging additional wells, raising offtake head works capacity, in addition to rehabilitating pipelines. Mombasa is at the farthest end of all the bulk supply pipelines supplying water from various sources that are distant in the coastal part of Kenya, in contrast, there are consumers of water along the way as well, and other water utilities receiving water from the same source due to scarcity of water resources in the region.

These means that the demand in Mombasa is partly met due to nonexistence of a reliable quota system of sharing water or the existence of a weakly monitored sharing system that is affected by allegedly 'regional politics'.



Figure 27 Mowassco Water sources and transmission routes (Source; Mowassco Records, 2012)

To understand the implication of these projects mentioned above there is need in revisiting information about different water sources and elaborate their contribution towards the efficiency of service provision. Any investments carried out in any of them would have an impact in service provision efficiency because additional water into the utility's network means that the utilities efficiency indicators are all affected.

### Background information on main water sources

The main sources of water (Tiwi aquifer/wells, Marere springs, Mzima springs and Baricho wells) for Mombasa Water are as shown below in Figure 267. As shown in subsequent sections, the GoK through funding from World Bank, IDA, IBRD and AFD has applied for funding under Water and Sanitation Services Improvement Program (WASSIP) to fund water supply services. The water resource development projects aim at pipeline capacity expansion or rehabilitation to boost water supply to consumers targeting those within Mombasa County. The main schematics of pipelines and water sources targeted in the funding are as shown in Figure 27. In addition to understanding the layout of water sources there is also need to revisit the consumption of water within the utility, this will help in the interpretation of the outcomes of investments.

## Background information on consumption per Business Unit per day and supply sources details

The table below indicates the average daily consumption per Business Units (Figure 18) and the specific water source supplying the area.

**Table 8 Average consumption per BU per day in m3**

No	Business Unit	Average Volume (m <sup>3</sup> ) Consumed by each area/day (2011-2014)	Water Source
1	Island North	3,800	Baricho wells, Mzima springs
2	Likoni	750	Tiwi wells, Marere springs
3	Kisauni	6,812	Baricho wells
4	Nyali	4,792	Baricho wells
5	West Mainland	8,341	Mzima springs, Marere springs
6	Island South	3,314	Baricho wells, Mzima springs

The production capacity of the sources are shown below but it is important to note that, as shown earlier in figure 27, the water is used by other users along the pipeline routes, hence the actual volumes delivered to Mombasa per day are not as shown in the table but are lower due to consumption along the way by major towns like Malindi, Voi and Kwale and also due to the fact that not all sources are developed to full capacity abstraction. There is also need to understand that the distribution of water is sometimes affected by allegedly regional political interests as the water sources are far flung and need to satisfy local needs first. This interferes with fair distribution.

**Table 9 Production capacity for water sources supplying Mombasa** (Tahal Group & Bhundia Associates, 2013)

Water Source	Current Capacity (m <sup>3</sup> /d)	Year Developed
Mzima Springs	35,000	1957
Marere Springs (with Pemba)	12,000*	1923
Baricho Wellfield	90,000*	1980
Tiwi Aquifer	13,000*	1980
* The WASSIP projects targeted increased capacities for Marere Springs, Baricho Well field and Tiwi Aquifer on ongoing rehabilitation projects.		

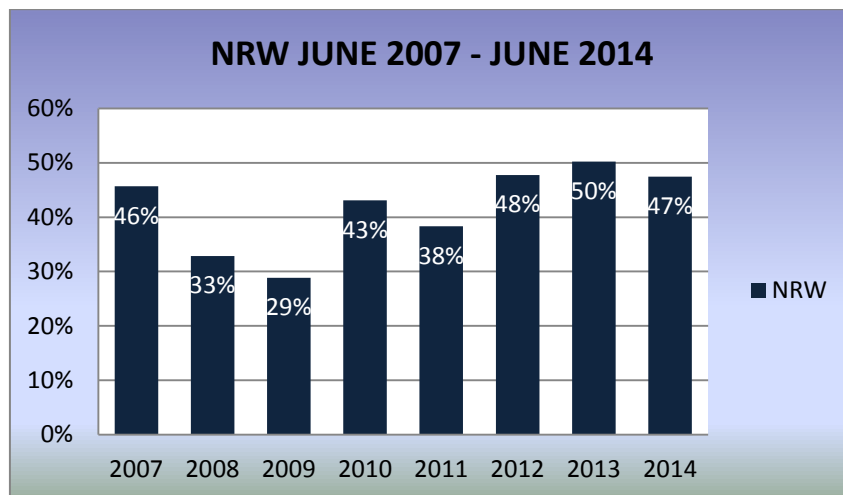
Lastly, it is also important to note that there are system losses in the supply of water through;

Leaks and bursts in the pipeline, illegal consumption by customers whereby the metering is not captured hence consumers use water but don't pay for it, inefficient metering whereby meters under register volumes consumed due to mechanical inefficiencies, unavoidable annual real and commercial losses, water that is used by the utility for operations and unbilled and water used by fire department and unpaid for.

The information in the next section (Table 10) shows the nature of projects carried out, their localities and the various environmental, technical, socio-economic influences on Mowassco's efficiency. Furthermore, reasons that are regional have an effect on the efficient provision of water supply services in Mombasa County, for example water needs in other

parts of the region. The increase in water also has led to increase in NRW as the network within Mowassco is still old therefore losing even more water.

Form the graph below, it can be seen that the NRW in Mombasa County oscillates from approximately 30 % to around 50 % over the years; the issues causing the variations may range from technical issues like pipe conditions, repair works and supply interruptions to climatic ones like lower supply levels. The utility’s own billing and collection efficiency also affects the NRW levels whereby increased billing leads to lower NRW and vice versa at constant produced water. NRW is an accepted standard for benchmarking in water utility efficiency as it reflects the overall output of the utility which is affected by the utility’s departmental efficiencies in discharging their mandate.



**Figure 28 Non Revenue Water trend January 2007 – June 2014**

#### 4.4.1 Background information on WASSIP projects – multi lateral loans

There have been various multilateral loans funded projects to boost additional water supply, a summary is as below.

**Table 10 Details and summary of other multilateral loan funded project**

S/NO	PROJECT NAME	BUDGET (Ksh)	SCOPE	REMARKS/IMPACT
1	Rehabilitation Of Mzima Pipeline – WORLD BANK	<b>1,106,347,157.00</b>	Rehabilitation of: a. Head Works b. 28 Km Access Road c. Mazeras Tanks d. 26 Km Pipeline e. Valves & 22 Water Kiosks f. 2 River crossings	<ul style="list-style-type: none"> <li>Additional 5,000m<sup>3</sup> per day is expected</li> <li>Substantially Complete and target achieved.</li> <li>Completed and commissioned</li> </ul>
2	Baricho water works rehabilitation-AFD	<b>988,052,006.10</b>	a. Development of 8 Wells b. Replacement of 13 Pumps c. Replacement of 6 Transformers d. Replacement of 21 Valves e. Replacement of 11 Power poles f. Installation of Transformers & replacement of damaged cables. g. Drilling and Equipping of New boreholes No. 2 and 6. h. Extra-ordinary circumstances:-Failure of New 350KVA Transformers i. Tools and equipment's	<ul style="list-style-type: none"> <li>Drilling and equipping of New Boreholes No. 2 and 6 was commission by end of October 2013</li> <li>Maximum capacity of about 90,000m<sup>3</sup>/day was created.</li> <li>Replacement 70mm<sup>2</sup> existing cable of total length 589m was replaced.</li> <li>Complete and commissioned</li> </ul>
3	Mombasa Network Improvement- Lot 1-AFD	<b>942,129,112.00</b>	a. 40.23 km of Transmission and distribution pipe lines rehabilitation and extension, DN 110-700mm. b. Construction of water kiosks c. Installation of bulk meters d. Rehabilitation of 2 storage tanks at Nguu- Tatu e. Supply of sewer maintenance equipment. f. Construction of G.I.S Building.	The improvement is an alignment to the effective utilization of increased production from Baricho Works ongoing and expected to be complete by August 2014

4	Marere Pipeline-AFD	New	1,328,855,388.30	<ul style="list-style-type: none"> <li>Improvement of Votia and Mwaluganje intake works</li> <li>Improvement of the treatment plant at Marere head works</li> <li>Extension of power lines to Marere head works</li> <li>Replacement and rehabilitation of 56Km pipeline including appurtenances</li> <li>Repair of 1,140m<sup>3</sup> Kaya Bombo Reservoir</li> <li>Rehabilitation of Pemba Dam and Treatment Works.</li> </ul>	<ul style="list-style-type: none"> <li>Delivery of 500mm dia. Steel pipes to site is slower than the rate of pipe laying and supplier has been warned to speed up the process.</li> <li>Expected to increase supply to Mombasa by about 7000m<sup>3</sup>/day.</li> <li>Works ongoing and expected to be complete by August 2014</li> </ul>
---	---------------------	-----	------------------	--	---

#### 4.4.2 Outcomes of Loan Funded infrastructure Projects

During the implementation period of the above projects, the actual volumes delivered to Mombasa for the period 2007 to 2014 were as shown in the graph below. This period experienced several financial interventions mainly on infrastructure development or rehabilitation. Some projects have been completed and commissioned while some are still in progress. The trend in water production and consumption per annum is as shown in figure 28.

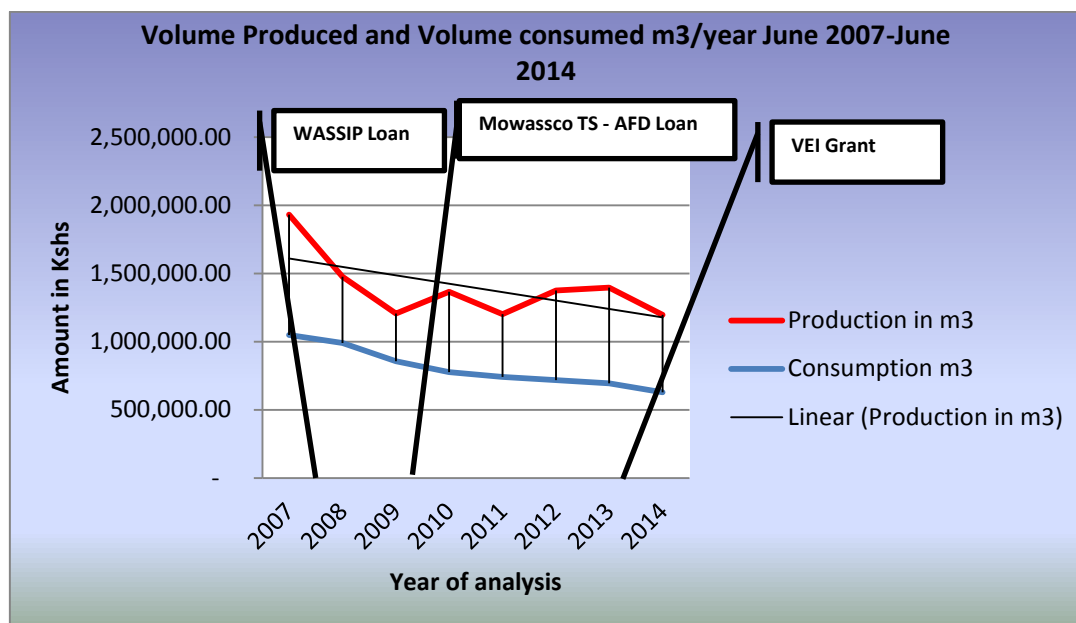


Figure 29 Water Production and Consumption trend 2007 - 2014

From the above graph it can be seen that from 2007 to 2009 the supply of water depreciated steadily because of deteriorating pipeline condition and also due to the fact that the Mzima pipelines and head works as well as the Baricho water wells which are the main sources of water were in initial stages of rehabilitation hence their total output decreased due to technical reasons as both pipelines are single mains with no alternative of supply. Thereafter, there was an increase in production after 2009, when pumps in Baricho wells resumed regular operations, by end of 2012 the WASSIP funded Tiwi wells rehabilitation and Mzima pipeline was partly completed, hence, boosting supply. By 2013 December most of the WASSIP projects were completed except the Marere pipeline rehabilitation and Mombasa Network rehabilitation, hence the steady increase in water supply.





**Figure 30 Mzima pipeline repair kit,**  
(Source; Mowassco records, 2013)

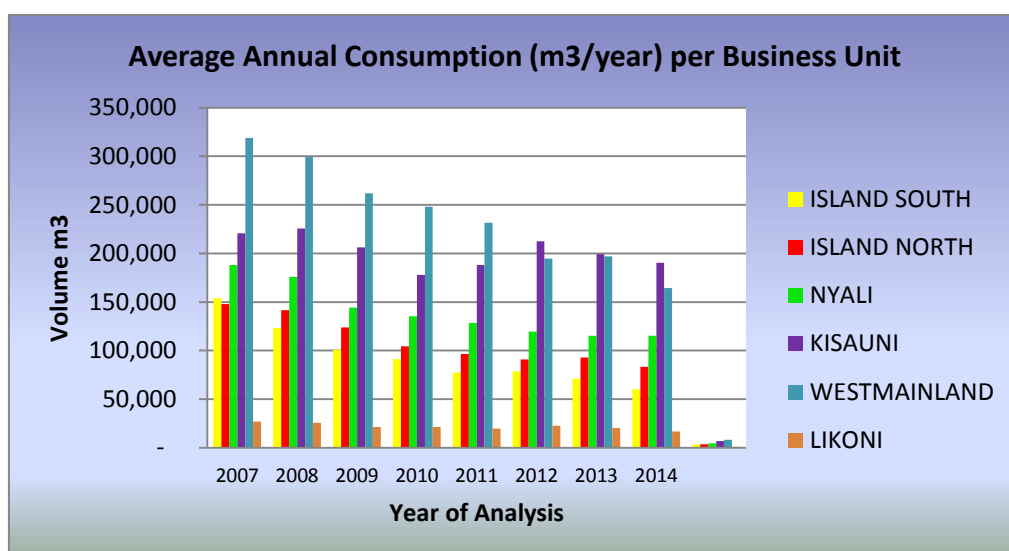


**Figure 31 Hoisting of pumps in Tiwi wells ,**  
(Source; Mowassco Records, 2012)

### Consumption by Mowassco - background

The consumption for the analysis period 2007 up to 2013 which is the period that data recovered could be analysed, experienced major infrastructural improvements targeting to reinstate the existing assets aiming to reduce system losses, and also to ensure that they perform to their optimum capacity. Most of the water systems were developed before 1985 this means that they have outlived their intended service horizon; this means that the systems has extended the design capacity they are expected to serve, according to its design specifications. After this period lapse, any water system's efficiency decreases rapidly, this could be due to environmental reasons or other technical and operational reasons. Consumption within Mombasa is analysed based on the utility's Business Units, which are the billing centres. There is rampant water theft in Mombasa due to poor supply reliability in some areas and lack of efficient systems to deter water theft or vandalism.

The consumption for the different Business Units is shown below.



**Figure 32 Average consumption m3/year in BU -2007-2014**

From the graph, it is evident that the billing has been decreasing gradually over the years, despite heavy investment in water production and transmission. West mainland is the biggest revenue earner for Mowassco as it contains the industries within Mombasa County; some of



the biggest consumers are the Kenya Petroleum Refinery Limited, The Kenya Electricity Generating Company, The Kenya Ports Authority, Kenya Maritime Authority and the Kenya Meat Commission among many others. The (MOWASSCO, 2012)(MOWASSCO, 2012)(MOWASSCO, 2012)(MOWASSCO, 2012)(MOWASSCO, 2012) above graphs showcase the results in terms of water supply and consumption within Mowassco. There is an inconsistency with increased production but a decreased consumption. This can translate to deteriorating utility performance as it means more revenue is lost with additional water supplied. This could be through poor metering practices and illegal water consumption.

## 4.5 MOWASSCO Tariff as a Source of Finance (2007-2014)

### 4.5.1 Tariffs – Background information

Mowassco relies on a consumption based tariff whereby consumers are billed with banded range of charges with increasing monetary value per additional increase in consumption. This kind of tariff is suitable for ensuring that clients with higher consumption rates and commensurate ability to pay higher amounts of money cross subsidise lower volume consumers with low ability to pay. This is achieved by financing most of utility operational costs from mostly high end consumers like industries and commercial entities.

According to Mowassco (MOWASSCO, 2012), the water utility meets its expenditures from tariff costs, the expenses can be broken down as follows.

**‘Personnel Expenditure** – This includes Basic salaries, Allowances, Wages, Statutory Contributions & Deductions and Wages for the Personnel employed by Mombasa Water Supply and Sanitation Company. Personnel Expenditure is fixed at a range not exceeding 35% of the O&M cost during the tariff period (MOWASSCO, 2012).

**Training Expenditure** – Training expenses constitute less than 1% of the total O&M Expenditure (MOWASSCO, 2012).

**Administration Expenditure** – This includes expenses for communication, insurance, bank charges, stationery, professional fees etc. This expenditure is forecast to be maintained at 20% of the total O&M Expenditure (MOWASSCO, 2012).

**Board Expenditure** – This includes expenses for MOWASSCO - board meetings, allowances to the directors, board honoraria, director’s fees etc. This is usually around 1% of the total O&M expenditure as recommended by WASREB (MOWASSCO, 2012).

**Other Operational Expenditure** – This includes expenses for electricity, chemicals for water treatment, fuels and lubricants for generators, water abstraction fees, fuel for vehicles, and other miscellaneous expenses. The total operational expenditure is expected to be maintained at 94% of the total O&M expenditure (MOWASSCO, 2012).

**Maintenance Expenditure** – This includes expenditure for maintenance of vehicles, for minor investments carried out under recurrence expenditure and costs for maintenance of assets being used by Mowassco(MOWASSCO, 2012).

**Repayment of Debts** - Mombasa Water Supply and Sanitation Company has outstanding payments due to the Coast Water Services Board. The company did not make a provision for repayment of the debts when considering tariff setting. Reasons are not given for this decision in data analysed (MOWASSCO, 2012).

**Regulatory Levy** - Mombasa Water Supply and Sanitation Company is currently paying 1% of its collection to the Water Services Regulatory Board as Regulatory Levy”(MOWASSCO, 2012).

The structure of the tariff has been reviewed several times in the past this is shown in the table below.

**Table 11** Mowassco's water consumption Tariff review since 2010 (MOWASSCO, 2012)

Type of customer	Volumetric charge (Kshs/m <sup>3</sup> )			
<b>Domestic/Residential/Commercial / Industrial/ Government Institutions</b>				
<i>Consumption Block (m<sup>3</sup>)</i>	Current Year 2010/11	Projection years		
		Year 2011/12	Year 2012/13	Year 2013/14
0-6	44.16	44.16	46.37	51.00
7-20	44.26	53.11	55.77	61.34
21-50	53.11	63.73	66.92	73.61
51-100	79.67	95.60	100.38	110.42
101-300	132.78	159.34	167.30	184.03
>300	177.04	185.89	195.19	214.71
<b>Schools</b>				
<i>Consumption Block (m<sup>3</sup>)</i>				
0-600	40.00	48.00	50.40	55.44
601-1200	50.00	60.00	63.00	69.30
>1200	90.00	200.00	210.00	231.00
<b>Water Kiosks (m<sup>3</sup>)</b>	35.00	35.00	35.00	35.00

Payment of water bills comprise of payment for sewer services usually billed as a percentage of water supplied or consumed this is only charged to consumers connected to the centralized sewer system in the Island and West Mainland.

The sewage generated is estimated to be 75% of water consumed hence sewerage tariff is 75% of the water tariff. The justified costs approach that analyses the expenses and investments attributable to sewer are also not applied in coming up with the sewerage tariff since the company has not delineated sewer operations data from its other operations. The sewer tariff is as captured in the table below.

**Table 12** Mowassco sewer discharging tariffs since 2010 (MOWASSCO, 2012)

Consumption band (m <sup>3</sup> )	2011/12	2012/13	2013/14
	Volumetric charge	Volumetric charge	Volumetric charge
0-6m <sup>3</sup>	33.12	34.78	38.25
7-20m <sup>3</sup>	39.83	41.83	46.01
21-50m <sup>3</sup>	47.80	50.19	55.21
51-100m <sup>3</sup>	71.70	75.29	82.82
101-300m <sup>3</sup>	119.50	125.48	138.02
> 300m <sup>3</sup>	139.42	146.39	161.03

MOWASCO has to achieve the objective of meeting full cost coverage, operational efficiency improvement is necessary. The company has been trying to put in place measures that will help in the reduction of NRW and other cost cutting measures.

The tariff has been reviewed severally because of the following reasons;

- i. Drastic rise in consumer price index from “a base of 100 in March 2010 to 115 in March 2011 increased by 15% for the period”.(MOWASSCO, 2012).
- ii. Production costs like electricity and chemicals has increased by more than 23% and thus putting more strain on the Bulk Water Company (currently run by CWSB). The company is in charge of abstraction of water and transmission to water utilities in the coastal region.
- iii. The tariff increase will provide revenues for the company to undertake maintenance of the infrastructure and ensure that the Bulk Water Company operates sustainably.

Notwithstanding, there were some assumptions made in the review of the tariff (MOWASSCO, 2012) and these are;

- i. Projected expenditure increase of 10% per annum
- ii. Increase in volume of water produced and no increase in volume of water supplied, reason could be the fact that in planning the assumption is usually for the worst case scenario for the water utility to meet its cost and other stakeholder needs.
- iii. Statistics gathered for the tariff calculation was accurate
- iv. No increase in tariff for low income earners for the first year in line with sensitivity to low income earners and water as a basic human right.
- v. Charges in subsidised water sold by water kiosks will not be altered
- vi. The regulatory levy was calculated at 1% of the billed amount while the abstraction fee is at Kshs 0.50 per cubic meter.
- vii. Loan repayment was factored to start in the financial year 2012. These funds were to be channelled to an escrow account to be paid to the treasury by the bulk water company when due.
- viii. Sewer connections are expected to increase at a rate of 20% per annum
- ix. The customer distribution was assumed based on a survey to be as in table Table 13

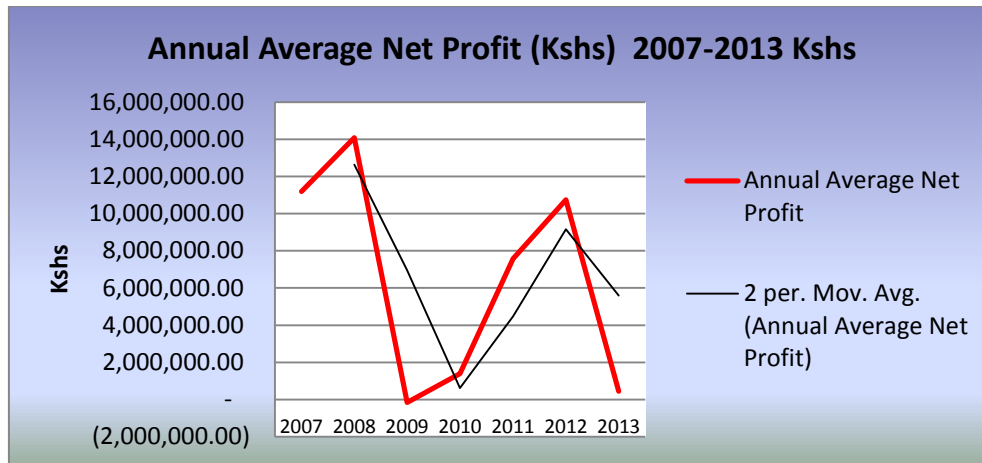
**Table 13 Customer consumption category within Mowassco**

Water consumption band	Percentage of consumers
0-6m <sup>3</sup>	16%
7-20m <sup>3</sup>	20%
21-50m <sup>3</sup>	30%
51-100m <sup>3</sup>	24%
101-300m <sup>3</sup>	6%
> 300m <sup>3</sup>	4%

Mowassco’s net profit is detailed in the graph below for the period from June 2007 to June 2014. The net profit trend is very irregular with sharp peaks before it falls and sharp peaks before it rises.

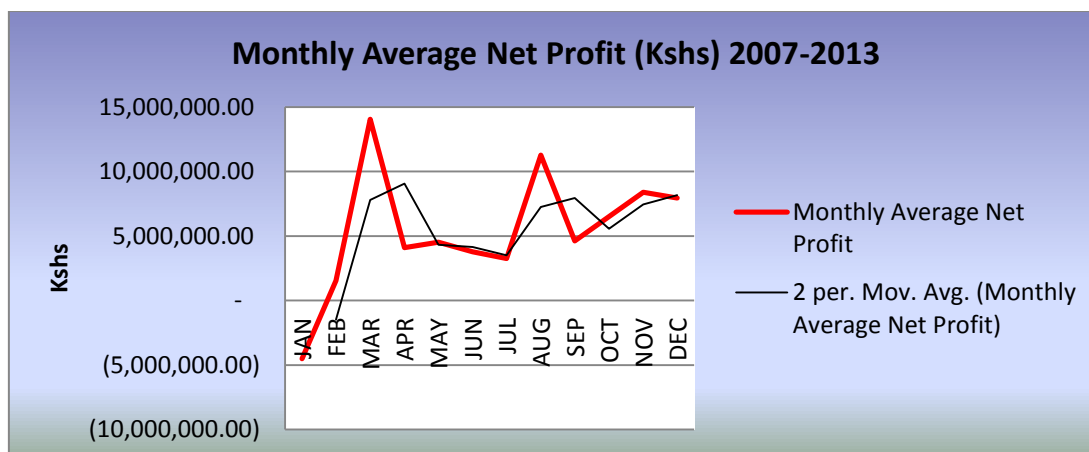
The billing is based on the banded tariff as explained earlier and this has been reviewed severally and justified by the main reason that 100 % cost recovery is essential for the utility to meet its obligation. However this is not a measure that adequately addresses the issue of tariff review as efficiency is best showcased by a utility’s ability to deliver services meeting acceptable technical and social standards and at the same time doing so at environmentally, socially and economically acceptable costs per every cubic meter supplied. The reasons for the rapid changes in billing are attributed to the below factors.

- i. Operational challenges
- ii. Environmental or climatic issues affecting water supply
- iii. Technical performance
- iv. Commercial reasons
- v. Customer payment characteristics



**Figure 33 Annual Net Profits 2007-2013**

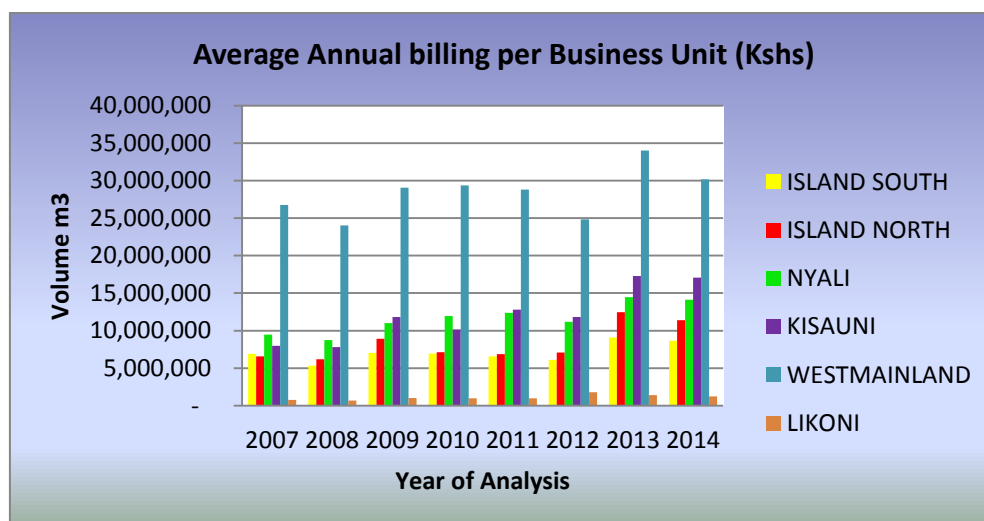
The above graphs (Figure 32) indicate the trend in Net Profits within the company which seem to increase rapidly in 2007 to 2008 and then fell steeply in 2009, the reason is because in 2007 the volume of water produced was so high where else in 2009 most of production was reduced because of ongoing rehabilitation in the bulk water production systems. However in 2009 to 2012 there was an increase in billing upon the increase of the water tariff as well as the slight increase in production after commissioning of some projects meant to boost supply. However between 2012 and 2013 The supply stabilized steadily but the net profits steeply dipped, according to reports by Seureca Consulting Engineers reports (Seureca, 2013), the bulk water meters used to bill the water utility were faulty hence the reduction in revenue despite an 'increase' in production. Some of the sources that are springs could have been affected by drought hence reducing water available for abstraction. This means that the utility was paying fictitious production costs that did not translate to sales revenue. This proposal is supported by the fact since the installation of electromagnetic meters by the CWSB; the metered bulk production has been declining since 2013 compared to previous immediate billing despite continued increased production after completion of the WASSIP projects. This means that earlier rises in production were largely erroneous and as a result to meter inaccuracy.



**Figure 34 Monthly average Net Profit January to December (2007 - 2013)**

Whereas there is a rapid change in trends of net profits the general average for the water utility per annum shows some consistency between months, between January and March there is an increase in profits before a decline in March, in May to July there is a slightly stable billing rate with a slight rise in April, May then a fall in July after which there is a gradual rise in July to August after which there is gradual fall to September before again rising between September and November and rising towards December. This is related to consumption and climatic patterns in the County. In January most schools are open as well as other institutions and then close in May, during the period we also have rains which may affect house hold consumption patterns. The students then have holidays in May August and December, during these periods especially August and December; Mombasa receives a lot of visitors being a holiday destination for both local and international tourists. While this cannot be the only reasons explaining the trend it is purported that they are the easily obvious reasons.

**The annual (2007-2013) billing in the six Business Units is summarised as below.**

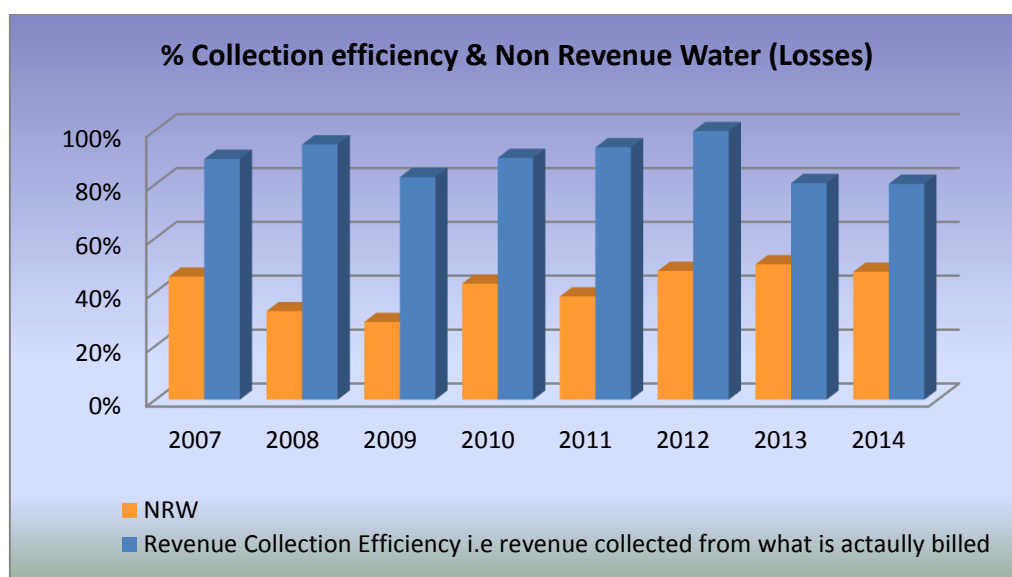


**Figure 35 Average annual billing per BU in Kshs - January 2007 - June 2014**

From the graph it can be seen that West Mianland is the most resourceful business unit in terms of revenue followed by Kisauni, then Nyali, Island North, Island South and Likoni trailing. The above reason is because Kisauni happens to be near the reservoirs and also has the highest number of connections while West mainland constitutes of higher band consumption customers. The same trend is replicated in the consumption pattern, this is a good example of how the current tariff cross subsidizes the smaller consumers by providing most of the revenue needed to run the water utility.

### Tariff billing and losses

To summarise billing is a factor of consumption, collection and loss reduction, this can be illustrated in the graph below.



**Figure 36 % Collection Efficiency in Comparison to Water Losses 2007-2014**

The above graph illustrates that collection efficiency and losses are not related, an increase in collection efficiency does not necessarily translate to a reduction in losses. This is because collection efficiency is a function of total volume billed and NRW is a function of total production. Billing is calculated from production less what is actually charged on customers, either estimated or actually metered at consumption point by the utility. However NRW is indirectly related to billing whereby an increase in billing results in a reduction in NRW and vice versa. This is one of the weaknesses of the IWA utility NRW model, it does not take into consideration what is billed but never paid for (uncollected) as eventually some become bad debts and represent revenue out and not revenue in, to the utility, they therefore qualify to be NRW.

### 4.6 Subsidies – background information

Mombasa has an explicitly targeted policy for low income areas administered through the Water Kiosks Policy; this is a system whereby designated and licenced vendors are given permission to own kiosks that sell water at certain recommended prices, normally Kshs. 2 per 20 litres. The kiosk is administered through the water kiosk policy which contains regulations for authorisation, management and termination of contracts to offer such services on behalf of the company. In conclusion, subsidized water in Mombasa County is normally through licenced agents but with a strict code of requirements developed and ratified by the water utility.

#### 4.6.1 Kiosks volume of sales

Subsidized water in Mombasa is in usually two forms through untargeted subsidy where large consumers with larger band consumption range pay more and hence subsidize lower band consumers and secondly, through the water kiosk tariff which focuses on supply to lower income areas and parts of the population that are considered vulnerable. According to data obtained from (MOWASSCO, 2012), the Company, Mowassco has conducted surveys to establish distribution of consumers of water among the key methods authorized to be used to provide water services. The breakdown is shown here.

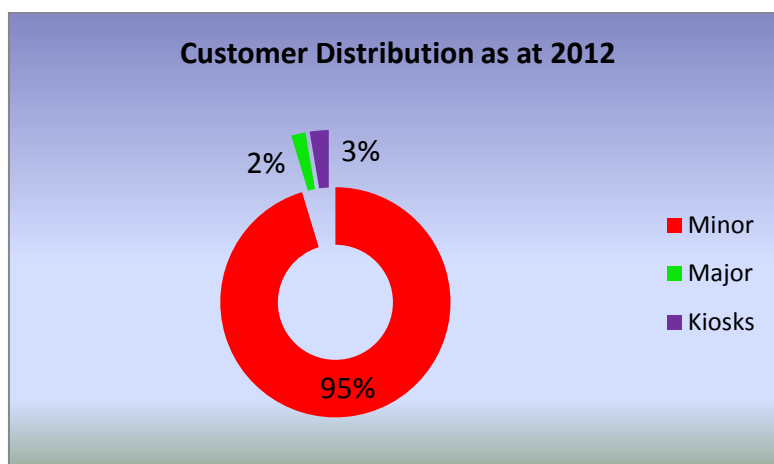


Figure 37 Mowassco customer numbers distribution by percentage

Majority of its customers are small scale consumers who account for 95 % of its database while major customers account for 2 % and water kiosks account for 3 %. There are approximately (Mowassco statistics) 1,825 kiosks distributed within Mombasa County (2012 records). The number is quite high considering the density of Mombasa County's low income area. The intention is to avail water to the poor with ease of infrastructure layout, management using the local residents and groups, and also do so at subsidized price of Kshs 2 per 20 litre container. This is affordable and approved rate sanctioned by the WASREB for Mombasa County. However a comparison of consumption volumes from kiosks and the revenue received from Kiosks (2008-2013) brings out clear suggestions that the system is susceptible to abuse. From Mowassco data as at 2005-2010, 1,244 kiosks consumed on average , 3200 m<sup>3</sup>/day combined, this is based on (Seureca, 2013). The graph on trend for billing from water kiosks is shown below.

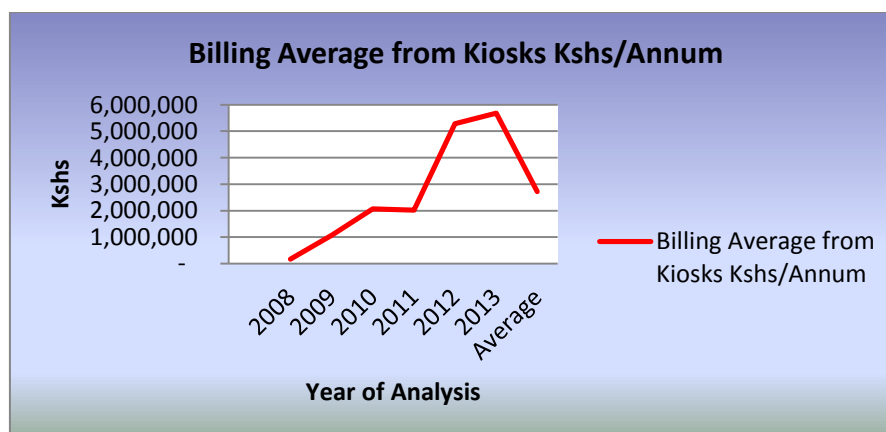
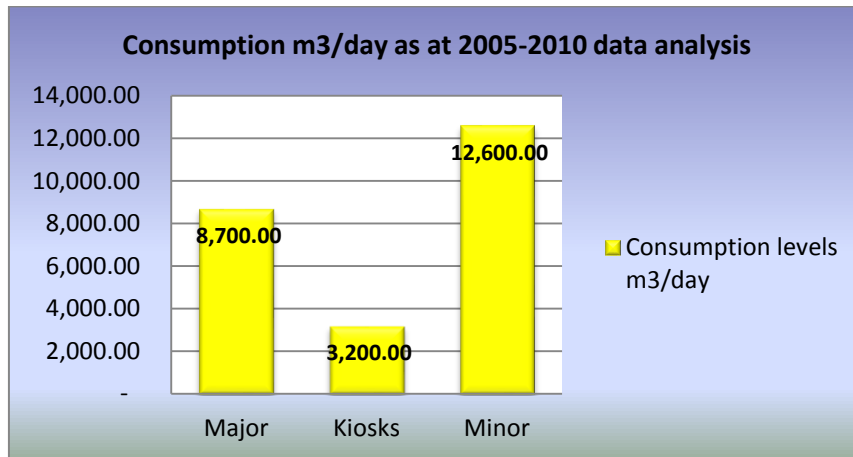


Figure 38 Billing trends for water kiosks 2008 - 2009



In contrast and based on Seureca consulting engineers analysis of Mowassco data, the water kiosks consume 3,200 m<sup>3</sup>/day at Kshs 35/- per m<sup>3</sup>, this translates to an average of Kshs 116, 105,120.00/ = per annum at 90% collection efficiency. However, what was recorded as revenue from the kiosks for the period 2007-2013 is about Kshs 2, 713,970/= per annum from collected and recorded volumes of earnings from water kiosks. The huge discrepancy suggest some unclear circumstances through which the company losses money.

The consumption per customer category is as shown below and is based on 2005 to 2010 data analysis according to Seureca Consulting Engineers reports compiled during the TS project.



**Figure 39 Average daily consumption by customer categories 2005 - 2010**(Seureca, 2013)

The data obtained is used as it is what was obtained from past records, the current information might not deviate largely from this information but may increase as the number of water kiosks then was about 1,244 and currently it is about 1,825. The volume consumed or sold through water kiosks may be higher; the tariff has also changed since then. This means that the revenues gotten are far much below what is expected even at 90% collection efficiency. The information analysis indicates that the water kiosks are sources of huge revenue losses to the water company. The water kiosks are also prone to charging higher rates than recommended and hence even defeating the cause of intention for their existence.

#### 4.6.2 The water kiosk policy

There are some rules that are applied for water kiosks, these rules are contained in the company's water kiosks policy and are used to govern their establishment, operations and management of the water kiosks. Some of the rules obtained from Mowassco (MOWASSCO, 2011), are shown below.

- i. *“Display the license document at the kiosk during hours of operation.*
- ii. *The minimum consumption billed under kiosk rate is 50 m<sup>3</sup>, failure to record the minimum consistently for a period of three months may result in the withdrawal of the license unless there is another licensed water kiosk within 200meters.*
- iii. *Bills must be paid promptly on demand*
- iv. *The water kiosk must be maintained by the licensee in a clean and hygienic condition including provision of sufficient spill drainage.*
- v. *The retail water at KShs 2.00 per unit of 20 litres or part thereof and an approved 20 litres measure be available, clearly marked; "20 litres price KShs 2.00 and display the price at the top of the kiosk.*

- vi. *Water shall only be sold for domestic purposes and into containers of a nominal 20 litres capacity or smaller unless written authority for the supply into larger containers and for other uses has first been obtained.*
- vii. *Hose pipes shall not exceed 30 cm long.*
- viii. *The hours of sale shall be according to the prevailing water rationing regime.*
- ix. *A notice shall be displayed in a prominent place, in English and Kiswahili language as follows **Kiosk in Changamwe flouting the policy***
- x. *This License shall not be transferable and will be subject to annual renewal at a fee as per the gazetted tariff.*
- xi. *Shop items may also be sold at the kiosks with approval by the relevant licensing authority but shall exclude toxic and hazardous items like poisons, insecticides, paraffin etc.*
- xii. *The security of the meter and the general infrastructure at the water point is the responsibility of the Licensee. Tampering with the meter or vandalism of any sort shall result in cancellation of the license and any other penalty the licensor may deem appropriate.*
- xiii. *Extensions to existing facilities are not allowed and will result in withdrawal of license and dismantling of the said extensions.*
- xiv. *Should the meter stall, the kiosk operator shall notify the office immediately.*
- xv. *Any illegal activities on the water connection shall result in withdrawal of the license.*
- xvi. *The section of the pipe connecting the meter to the delivery point must be open to facilitate inspection.*
- xvii. *The License is subject to cancellation without notice if any of the conditions set out above are not fulfilled or if in breach of the regulations of the Water Act or conditions of supply as contained in the supply agreement form.*
- xviii. *The inspection and investigation team shall conduct spot inspection of the kiosk at least once quarterly, and shall have the right of access to the inside and the surrounding of the kiosk. Any obstruction to the inspection team shall result on immediate withdrawal of the license.*
- xix. *A monthly and quarterly kiosk inspection reports shall be tabled before the CMT by the Head of Commercial Services.*
- xx. *Company staff and/or their immediate family members are not eligible to apply for water kiosk licensing*
- xxi. *Water kiosk accounts are not transferable from one person to another and are not be relocated outside the boundaries of the plots to which they were registered. Any operator wishing to relocate the water kiosk account outside the boundaries of the plot to which his /her kiosk was registered, should terminate the account and apply afresh for the next proposed location at which they desire to operate subject to our regulations''(MOWASSCO, 2011).*



**Figure 40 A water kiosks flouting the policy guidelines, 2014**

- xxii. *Organized groups will not be allowed to operate more than one water kiosk each*
- xxiii. *Under ground water storage tanks are not allowed and above ground water tanks should not exceed 2000 liters.*
- xxiv. *Only one water kiosk per water meter should be allowed*
- xxv. *Pumping directly from the main line shall not be allowed and if discovered shall lead to withdrawal of the license.*
- xxvi. *Inspection shall be made to existing facilities before renewal of the license*
- xxvii. *A standard application form for water kiosk shall be used ( Appendix 2)*
- xxviii. *The local government administration shall authenticate the identification information provided by the applicant and any concerns about the applicants.*
- xxix. *The company reserves the right to alter or revise the conditions without reference to the licensee'' (MOWASSCO, 2011).*

From field visits it was evident that few kiosks observe these rules, most of them flout the rules with impunity even some domestic consumers selling water as kiosks. It was not clear if the kiosks registered as domestic consumers are generally registered as so as this is in contravention of the policy and is another source of revenue loss to the water utility.

Based on this observation and findings in the current status of various financing options (Loans, Grants, Tariffs and Subsidies) within the utility and after an analysis of progress to date the research seeks to address critically the effect of each financial mechanisms' influence on water utility's efficiency. The analysis is based on interpretation from the structured questionnaires responses by senior and middle level managers as well as interviews and data reviews of Mowassco records and statistics and information covered in the previous sections including the literature review on utility efficiency and financial mechanisms.

## 4.7 Are the finances utilized in line with the water needs of the residents of Mombasa County?

This section reviews the extent to which various financial options respond to the needs sensitivity of the residents. It seeks to answer the first research question on the utilization of the mechanisms and if they are sensitive to the needs of the residents of Mombasa County

### 4.7.1 Loans

Loans have been employed by the authorities mainly for water infrastructure development and rehabilitation. This is reasonable because this mechanism is appropriate for assignments of such nature due to the significantly high amount of funds required, in addition, expertise in such projects which sometimes is limited within the country necessitates the need to source from overseas. The Kenyan constitution does not allow previously and currently for the water utility to independently enter into multilateral or bilateral financial agreements without the involvement of the national government. To this extent, it can be proposed that loans are an appropriate method of funding large scale infrastructure projects. According to questionnaires from Mombasa Water senior and middle level managers as well as consultants familiar with the company's operations, questions were asked to check various indicators of suitability of loans as needed by residents as a source of finance for the water utility.

When the managers were asked whether loans are adequate to meet the financial needs for which they are usually invested in, 30 managers out of 32 managers responded to the question, in the response they were required to rank the various options on a scale of 1 to 5 depending on suitability of the indicator according to their perception.

A summary of the rankings is shown below.

**Table 14 Utilization of loans to meet needs of residents**

		Adequacy of available financial resources	Responsiveness to investment needs	Prudence in management and accountability	Needs sensitivity	Reliability of funding source
N	Valid	30	30	30	30	30
	Missing	2	2	2	2	2
Mean		2.2667	2.1333	3	2.8333	2.5333
Median		2	2	3	3	2
Mode		2	2	4	4	2
Std. Deviation		1.08066	0.81931	1.0171	1.08543	1.10589
Variance		1.168	0.671	1.034	1.178	1.223

### Adequacy

While the adequacy of funds had a mean of about 2.3, A bigger percentage (40%) of the managers felt that the loans as a source of finance seldom meet the intended needs in terms of adequacy, while (26.7%) felt the loans never at all meet the intended needs, some (20%) felt the loans meet the intended needs while others (13.3 %) felt half the time the loans met the intended need. In actual sense the feeling indicates that most managers felt that the loans are inadequate since a majority were in disapproval of their adequacy as a source of finance.

The reason for this difference in opinion can be suggested to be the lack of understanding by some of the respondents on the financial arrangements of these loans, their limits and the intended usage, this is concluded from the fact that from review of company data it is evident that loans have been utilized to expand infrastructure, however the amounts are clearly

inadequate to meet the need. In this case loans are a preferred source of revenue but an inadequate one to address all the demand for investments in the water sector. From the interview with the acting General Manager Finance, she alluded that loans have helped the company to ease its burden on service delivery and capital investments but also, there are problems when the utility cannot apply for credit independently but has to seek approval from CWSB and the national government, which is normally the case and hence makes loans hard to access and therefore inadequate in some cases where needed.

### **Responsiveness to investment needs**

When it came to the question on how fast loans can be accessed to meet service provision needs, a significant number (43.3%) felt that loans are never on time, some (23.3%) felt that loans are never available on time while a number of them (30%) felt that loans are half the time available when needed, only (3%) few felt that loans are usually available on time when needed. The fact that loans and especially bilateral and multilateral loans are negotiated at national government level, the process involved makes it a slow process from approval from funding agencies or governments, to disbursement to utilization, in some cases there has been delays in work (Seureca TS MLD report 2012) due to slow pace of the process during project implementation.

### **Prudency in management and accountability**

The manner in which loans are utilized prudently was also reviewed; some (16.7 %) managers felt that there is never monitoring of utilization of funds, while others (33%) felt that indeed usually there is some form of monitoring, there were others (30%) who felt that monitoring of utilization is done half the time while the rest (26.7%) felt that monitoring is rarely done during project progress, the rest thought that it is done always. The monitoring of loans and how they are utilized is essential to ensure that in case of construction, standards are adhered to and the finances are properly utilized for quality assurance in discharging contractual obligations by various stakeholders. There have been cases that from monitoring allegations of embezzlement of funds were confirmed and officials interdicted though the matter is still in court, this will deter leaking of funds meant for development and improvement of water service provision.

### **Needs sensitivity**

When it comes to needs sensitivity, the respondents had varying opinions, a majority (36.7 %) opined that there were adequate stakeholder consultations before projects are allocated, however, 26.7 % felt that this is done seldom; while some respondents (23.3 %) and others (13.3 %) felt that the consultations are done half the time and never at all respectively.

Crucially, all the documents for the rehabilitations project never underwent technical, financial and socio economic feasibility evaluation; this is interesting as the authorities may have overlooked the need to conduct these studies due to the constrained nature of available water resources and the need to meet pressing demands. This however, does not imply that the consumption evaluations were any less important as the demand for additional water was higher with a deficit of about 60% (Tahal Group & Bhundia Associates, 2013). An investment of about Kshs 4.5 billion Kenya shillings has only changed the demand by 12 % and has taken collectively 7 years to complete.

The utilization of loans is mainly on infrastructure and therefore the usage is relevantly directed to where it is needed most, this implies that loans are utilized based on needs sensitivity, however there is room or need for investing loans that are well structured and enumerated. Detailed procedures of cost recovery in operation and maintenance and value

addition to the water utility should also be incorporated. This could be in bottled water sales or demineralized or deionized water sales for industries or even investments outside the water sector that can be profitable to the water utility.

### **Reliability of loans as a source of finance**

On the issue of whether loans can be relied in funding the water service provision capital and operational expenditures, almost half (46.7 %) of the managers had an opposing view, 20 % felt that this was the case half the time while one 13.3 % felt that this was never the case and another (13.3 %) felt that this was rarely the case meaning it is not reliable to have loans when funds are needed. Only a paltry (6.7%) felt that loans are available when needed. The GM-Finance noted that the utility accesses credit only with approval from GoK and CWSB hence making it a tedious endeavour to secure funding. It is evident that loans have a low reliability for funding the utility when considered in terms of ability to be utilized whenever need arises.

#### **4.7.1.1 Are loans utilized in line with the needs of residents of Mombasa County?**

It can be concluded that indeed loans are utilized in line with the needs of Mombasa County since it is a foregone issue that water demand exceeds the supply (MOWASSCO, 2014). By funding water production efficiency they indeed help in meeting this need. However the loans are inadequate, take long to operationalize and hence the effects are sometimes hard to compute immediately. There is adequate consultations before loans are employed normally through social economic and environmental impact assessments. However, the biggest challenge is that loans for rehabilitation project are not subjected to economic and financial analysis unlike the case for capital works projects; this means that there are chances of overlooking some crucial factors before deciding to utilize the loan.

Lastly loans are not a reliable source of finance for immediate needs, they are reliable for large infrastructure or capital projects like the Mwache Dam but not for projects needing immediate and urgent intervention. This could be emergency infrastructure challenges like bursts on mains pipes. As a result loans are only appropriate for long term projects. In summary, loans are utilized in line with the long term needs of the water utility but not in short term measures. Loans are also utilized in mainly capital projects or rehabilitation projects but not operational efficiency improvement projects.

#### **4.7.2 Grants**

In Mombasa County, grants have mostly been directed at strengthening the capacity of personnel in the daily discharging of their duties, this has mainly been in form of training or provision of equipment and materials for connecting pipes to new customers or for normal operations. The grants have also been used to enhance utility's efficiency in metering water through acquisition of better water metering systems that help in deterring human related and technical related losses. The research targeted 32 senior and middle level managers and previous consultants who have worked with the company on various projects in the last 7-8 years. Out of these 31 responded to this question with one skipping it.

**Table 15 Utilization of grants to meet needs of Mombasa**

		<b>Staff training requirements met from allocated funding</b>	<b>Review of organization structure</b>	<b>Training and skill mix compatibility</b>	<b>Improvement of operational and skill capacity</b>	<b>Engagement of staff in development of company strategic plans</b>
N	Valid	31	31	31	31	31
	Missing	1	1	1	1	1
Mean		2.5806	2.2581	2.6129	2.6129	2.7742
Median		2	2	3	2	3
Mode		2	2	3	2	3
Std. Deviation		0.80723	0.68155	0.88232	1.05443	0.84497
Variance		0.652	0.465	0.778	1.112	0.714

### **The ability to meet training needs**

When the managers and consultants were asked whether staff training needs were met whenever grants were utilized a majority (51.6 %) felt that this was not the case, while 29 % and 16.1 % felt that resources from training and capacity building meet the training needs half the time and usually, respectively. Only 3.2 % of the managers and consultants felt that the allocations never meet the needs. From this information and from review of company data, it is evident that there is a relatively split satisfaction on how training and capacity building is able to meet the needs of the company. This could be reason for the company to review its Human Resource policy on training and education and to ensure that employees appreciate the training programs they are engaged in and also that they are able to utilize the skills in an innovative manner and while motivated by the skills acquired.

### **Review of organizational structure**

The extent to which staff is involved in the process of harmonizing the organizational structure the more localized and owned by the staff it becomes. According to the survey, most (48.4 %) of the employees feel that the organizational structure currently is rarely harmonized and neither are the personnel position based on any aspirations, 38.7 % and 12.9 % feel this is done half the time, and that it is currently okay respectively. This again is an indicator that points to the fact that staff engagement in the review as well as their posting should be harmonized to increase their productivity. Mowassco was formed by employees of three different institutions (NWCP, Municipal water department and Ministry of Water and Irrigation employees in the region); this could be the case explaining the high levels of discontent on the issue of harmonization of staff skills in the organizational structure.

### **Training and skill mix compatibility**

The intensity to which on job training is administered and the frequency of it are different inputs with different effects, while frequency relates to the number of times in a given period, intensity refers to the level of depth in a training session and how it is absorbed. This in turn signifies the absorption of capacity of the trainee and is determined by the skills he already has on the subject matter.

From the respondent's viewpoint, 9.7 % feel that training is not based on the employee's skills, 38.7 % feel this is the case half the time while 35.5 % feel this is the case rarely, the rest (16.1 %) feel that this is usually the case. In this indicator there is a feeling of reservation on the manner in which employees feel that training they receive is not allocated based on

skill, or minimally meets their skill needs. This is something that Human Capital department should address.

### **Improvement of operational capacity**

In line with the above comments, there is rarely any noted change in employees utilization of skills after training, actually, 41.9% of respondents alluded to this fact while another 16.1 % noted half the time there was some change, there were at least (29 %) some who confided that there was noticeable change after training at their work place while 12.9 % felt no change at all. It is important to note that the response is varied but a majority feel that training does not add value; this could be because of the results from the other indicators above show that there is less motivation in company strategy formulation and consequently in the additional capacity building hence demotivating employees.

### **Development of strategic plan**

The company strategic plan is a symbol of unity of purpose and focus within the company towards meeting its objectives and goals, when developed by employees themselves they can own the process of implementation with higher levels of confidence and determination. On the other hand if not engaged there may be chances of slow adoption or even resistance. The managers and consultants who have worked with Mowassco felt that (45.5%) half the time this was the case as they were not involved in developing strategies, another (41.9 %) felt that this rarely was the case while the other two groups of respondents each at 6.5% felt that usually or always this was the case. Majority have reservations on engagement in development of the company's strategic plan. This means that they may not be willing to responsibly own and implement it but may have to be forced by their bosses to work towards it. This is not a preferred scenario for an efficient utility, therefore there is need to change the way it is being implemented or formulated.

#### **4.7.2.1 Are Grants utilized in line with the needs of residents of Mombasa County?**

There is limited period of analysis to evaluate the impact of grants, the current grant project has only been implemented for less than two years, however the utilization and its effects have already had some impacts on the needs of Mombasa County. It is obvious that the service levels and satisfaction of residents needs are a function of the utility performance. In Mombasa, Mowassco's performance greatly affects or determines whether the needs of the residents are met at the desired levels. By utilizing the grants to ensure that the capacity of employees is enhanced and the operations of the utility are properly conducted, the needs of the county are met in an appropriate and desired level. However this has been met with limited success, from the survey conducted, the employees are less positive on the impact of training received as they fill that it does not complete their roles and responsibilities appropriately. Therefor in terms of capacity development, this research concludes that there is more to be done.

However, in terms of equipping the utility with technology, expertise and materials and equipment, this research concludes that the positive results from EMM billing, training on dealing with contemporary water utility challenges and empowering the company's technical and commercial efficiency is a positive way in meeting the needs of residents who desire better service and response to their needs.



### 4.7.3 Subsidies

As discussed earlier subsidies have been used in Mombasa to provide water services to the poor, however this has not been seamless. The method adopted by the water utility is to have community water points or water kiosks which in turn serve a group of households. This method of service delivery suits low income area because of lack of adequate infrastructure, ability to pay for individual metered connections, ability for inhabitants to accommodate infrastructure construction due to poor planning of the low income areas and lack of a clear land tenure and planning system.

However the survey sort to establish if the kiosk policy was well applied by the water utility and whether the managers and consultants who have previously worked with the water company perceive a success or failure of the approach. The response was negative from interviews with both the Business and Customer services manager and the Ag Finance General Manager.

**Table 16 Utilization of subsidies to meet needs of Mombasa**

		Consistency of water prices in low income areas	The revenue collected from subsidized sources	Location of water kiosks	Investment to meet pro poor water supply needs	Prudency in management of subsidized financial interventions
N	Valid	29	29	29	29	29
	Missing	3	3	3	3	3
Mean		2.1034	2.0345	2.2414	2.4138	1.9655
Median		2	2	2	2	2
Mode		2	2	2	2	2
Std. Deviation		0.93903	0.90565	0.95076	0.90701	0.82301
Variance		0.882	0.82	0.904	0.823	0.677

### Pricing of water to target the poor

From the survey only 29 respondents answered the question on water utility subsidy applied by Mowassco, among these, 44.8 % percent were of the view that the recommended price is not applied by kiosk owners, 27.6 % felt that the price is never applied, 17.2% felt that the price is applied half the time and 10.3 % felt that the recommended price is usually applied in water kiosks. This is a significant reason to discredit the performance of the water kiosks, according to the interview with the General Manager Business and Customer service, most poor households buy water at higher price than recommended by the utility as the Kiosks owners hike the prices. In addition to this the Water and Sanitation for The Urban Poor WSUP-UK's, Mombasa Project Manager, concurred with the sentiments when he suggested that the pro poor approach currently being implemented under WOP in low income area water supply is a better solution to inefficiencies of water kiosks.

### Revenue collected from subsidized water sources

In addition to the above the survey also covered the efficiency of subsidized water sources meeting their quota of contribution to the water company's operations in terms of financial basis. When asked if the revenues collected from water kiosks meets their expectations, again the managers and consultants had varying views with 31 % answering never, 41.6 % answering rarely, 20.7 % answered half the time and 6.9 % answered usually. From the above it is clear that water kiosks could be sources of revenue loss to the company. This can be supported by calculations from the billing volumes, it was shown earlier in the thesis that the

average billing between 2007 and 2013 was about Kshs 2, 713,970/= per annum, the consumption average between 2005 and 2010 for water kiosks was about 3200 m<sup>3</sup>/day, this translates to Kshs 116, 105,120.00/ = per annum at 90% collection efficiency. This is clear evidence supporting the opinion of the consultants' and managers' that water kiosks sustainability is untenable. What this implies is that the revenue lost is embezzled by unknown persons, either the kiosk owners or even corrupt company employees may be involved.

### **Location of water kiosks**

The other important factor surveyed was whether water kiosks are located in areas that enable them to serve the low income residents, again there was varied response 44.8 % rarely felt that the kiosks were located appropriately, 20.7 % felt that they are never located appropriately, 27.6 % felt that they are half the time located appropriately, some respondents felt that usually (3.4%) and always (3.4%) the kiosks were located appropriately.

Water and sanitation is affected by distance between consumers and sources, in situations where the accessibility is limited, and then you have challenges related to water like diseases or poor hygiene. In the above survey the proximity of low income dwellers to water kiosk is questionable from the utility point of view, in essence it is an indicator of why the water kiosks may not be an appropriate solution for low income dwellings or probably their implementation needs an overhaul.

### **Company's investments to meet pro poor water demands**

When asked whether the company was doing enough to ensure the water demands of the low income residents were met , 44.8 % said rarely, 13.8 % said never, 27.6 % answered half the time and 13.8 % answered usually. Again, this supports the previous statements which clearly show that the water utility as the body in charge of implementing low income water supply, partly fails when some of the most critical requirements like location and pricing are not met. This means that the poor cannot access water easily, even when they do it, is not affordable compared to their financial ability. In this aspect investment means all the tools from policy formulation to human, financial and social economic capital. If this is not done according to the laid down guidelines, the situations of inefficiency arise and from the survey results, the general consensus is that the company needs to invest more on low income water supply.

### **Prudency in management of subsidized financial interventions**

By prudency the research means that due diligence is applied in the way the water kiosks strategy as a method of availing water to the poor is managed and how efficiently it is implemented as per the laid down guidelines in the company's kiosk policy. Based on the survey whose respondents included senior and middle level managers in the water utility as well as consultants answered 44.8 % rarely, 31% never, 20.7 % half the time and 3.4 % usually, what this means is that majority are of the opinion that the water kiosk policy implementation is below standards set. The kiosk owners flout many rules regarding the provision of services to the poor, in addition the intended target are not easily accessed and even when accessed the pricing is way above the recommended price. This is clear indication of the failure to achieve its target. Though the finding could not be statistically tested, a majority of managers in the utility say this, therefore, is a clear pointer to likely outcomes were the findings to be tested. This means that the management does not meet the prudency levels it sets in management of the water kiosks.

### 4.7.3.1 Are Subsidies utilized in line with the needs of residents of Mombasa County?

The conclusion of the research is that subsidy as a form of financing water services may have failed in Mombasa County, from survey results most of the managers disapprove the kiosks mechanism, from interviews with the WSUP pro poor expert, the Business and Customer service General Manager and the Operations Manager, they all agree that the kiosks are not operating at desired levels of service. Furthermore water kiosks charge higher prices in some instances hence not serving their purpose effectively. In addition, most of the water kiosks are spatially wrongly located in areas that are not considered low income and their management is under cartels with sometimes powerful political godfathers. They make it impossible to correct the many faulty issues regarding the kiosks mechanism. Lastly, revenues recovered from water kiosk sales are far below what is expected, this has been demonstrated through review of kiosks revenue compared to estimated consumption. In general this indicates that the Kiosks are also a source of revenue leakages for the company. As such despite their positive impact in some areas this research concludes that the water kiosks need to be reviewed as they do not appropriately meet the needs of residents or the water utility, as a result they are not utilized in line with the needs of the residents of Mombasa County.

### 4.7.4 Tariffs

Tariffs in Mombasa are volume based where increase in consumption translates to increase in rates per meter cube of water consumed. The tariffs have been reviewed earlier and severally the main reason being the ability of the water company to meet its cost, (FCR- see page 31). A survey was conducted to evaluate how efficient the tariff was in improving the water service provision efficiency, with a specific focus on the opinion of the water utility managers.

The findings are as shown in the table below.

**Table 17 Utilization of Tariffs to meet needs of Mombasa**

		Cost recovery	Equity and fairness	Resources conservation	Acceptability	Simplicity and transparency
N	Valid	30	30	29	30	29
	Missing	2	2	3	2	3
Mean		2.8333	2.6	2.7241	2.9333	3.5517
Median		3	2	3	3	4
Mode		2	2	2.00a	2.00a	4
Std. Deviation		1.26173	1.22051	1.16179	1.33735	1.12078
Variance		1.592	1.49	1.35	1.789	1.256

a. Multiple modes exist. The smallest value is shown

The survey was conducted on 32 senior and middle level managers and several consultants who have worked with the water company before. 30 responded to the questions on cost recovery, equity and fairness and acceptability, while 29 responded to the questions on resources conservation and simplicity and transparency.

## **Cost Recovery**

To assess the strength of the tariffs in meeting the cost of running the utilities the survey was administered to the respondents on the issue, the respondents answered as follows, 10 % answered always, 23.3 % answered usually, 23.3 % answered half the time, 26.7 % answered rarely and 16.7 answered never. This is an indicator that a majority of the managers and consultants are of the opinion that the tariffs indeed do meet the costs of running the operation. From the company's records this can be proofed as the formulae used to calculate the tariff is formulated with consideration for full cost recovery for the water utility (MOWASSCO, 2012).

Through tariffs the company is able to finance its operational costs as well as minimal expansion and connection works. However considering that the average losses are above 45 %, there is a lot of revenue lost that could be used to further improve services and even lower the tariff costs.

## **Equity and fairness**

The respondents were also questioned on their perception on the equity and fairness of the tariff, the main reason behind this question was to establish from the respondents point of view if they consider the billing charged on customers as a fair value of service and according to their capability. 20% answered never, 33.3% felt that this is rarely the case, 20 % felt that this is so half the time, 20% felt that usually this is the case while only 6.7% felt that this is always the case. From the above analysis more than 50% corroborate to the opinion that the tariffs are expensive to the common residents of Mombasa County. This therefore makes it expensive to have individual connections, coupled with the intermittent nature of supply; it is a potential reason for reduction in actual billed consumption and increased water loss probably due to illegal consumption in the county.

## **Resource Conservation**

Tariff should be affordable but also penalizing enough to ensure that wastage of water is avoided, this means they should be deterrent to wastage of treated water. The respondents were asked if they perceive the tariff to deter wastage of water. They responded as follows. 17.2 % answered never, 26.7 % answered rarely, 24.1 % answered half the time, 27.65% answered usually and 3.4 % answered always. This is contradictory; while the respondents agree that the tariffs are costly they don't seem to agree that these should lead consumers to use water more conservatively. The reason could be the financial capacity of the respondents does not compel them to efficiently use water or may be it is lack of awareness on proper usage of pipe water to avoid wastage of treated water. This implies that the water lost could reduce water available for other users elsewhere, hence not socially responsible.

## **Acceptability**

The formulation of tariffs should always be guided by stakeholder involvement in arriving at utility rates, this cultivates trust and acceptability of tariff rates charged to consumers, the survey asked respondents to evaluate the involvement of stakeholders in Tariffs formulation, 16.7 % answered never, 26.7% answered rarely, 16.7% answered half the time, 26.7% answered usually while 13.3 % answered always. This question had a varied opinion that was dispersed along the scale. This could imply that there is some level of satisfaction with stakeholder consultation on tariff rates though some feel that there is need for improvement on the process. From Mowassco Tariff Adjustment Proposal, there was adequate consultation though the main focus is cost recovery for the utility and meeting the production costs. The

important fact to note here is that this is from the utility manager's perspective; a consumer survey would best evaluate the level of satisfaction within the consumers themselves.

### **Simplicity and transparency**

The respondents were also asked to evaluate how simple and transparent the tariff is and how based on their judgement and their interactions with customers on their daily responsibilities. Their response was varied with 24.1% saying they are rarely simple and transparent, 20.7 % answered this was half the time the case, 31% concurred that this was the case usually and 24.1% answered this was always the case. From this response it is evident that most of the managers or consultants agree on the simplicity of the tariff and their acceptability, again this is contrary to findings on the cost of the tariffs compared to the economic ability of the residents in the county. However, this could be different from the actual capacity of the respondents who may be can easily afford and understand the tariff structure.

#### **4.7.4.1 Are Tariffs utilized in line with the needs of residents of Mombasa County?**

From the findings of this research it can be concluded that indeed tariffs are important to ensure that the needs of the residents are met, this is by funding operations of the water utility, the cost of producing water and the improvement works on the pipe networks within Mombasa. Whether the tariffs are utilized as per needs is contentious, the tariffs help to generate full cost recovery, however the tariffs do not do so at economically sustainable and socially responsible rates, this is because a majority of the population survives on less than a dollar per day and yet the water costs have been reviewed every two years in the last 5-6 years. This implies that despite the fact that the water utility meets the needs by supplying water to its capacity, the needs are met at above normal costs as such the question elicits varying conclusion in that from the point of perspective of reliability of supply the answer is yes, but considering the financial and economic needs of the residents a majority of individual connections may pay but at very expensive rates. So in this case the answer would be no. In conclusion tariffs should be economically and socially sustainable; the current tariffs meet this requirement partly, even with the above situation the company is making 50 % losses, the whole tariff system needs to be evaluated as it is misleading to assume that because the company meets full cost recovery that this financial mechanism is fault proof, if the company improved its performance and saved on the losses, it could review tariffs downwards and make water more affordable to extra residents.

## **4.8 What are the strengths and weaknesses of different funding approaches for water services provision with respect to Mombasa County?**

This section is intended to emphasize the influence of financing options on efficiency but based on an insight of each particular funding method and their specific effects on the efficiency of the water utility. This can be best showcased by looking at the strengths and weaknesses of each mechanism in terms of influence on efficiency. The comparability of each method upon reviewing questionnaire response, interviews and secondary data reviews, shows that different options have different influence on different sections of utility efficiency. This is further captured in the consequent sections.

### **4.8.1 Strength and weakness of Loans**

#### **Strength of loans as a source of financing water in Mombasa County**

Loans are arguably one of the sources of finance that have been used to transform water services provision over the years in Mombasa County, Kenya. The funding of water services ranges from conservation efforts to abstraction and transmission, to maintenance systems and even policy and research. However, what is also important is to note that even as loans are utilized to fund water and especially important in developing countries, where mobilizing funds for massive infrastructure projects is a challenging task, loans have contributed to some problems rather than solutions to the challenges. These problems are related to mainly on equality, whereby ensuring that all benefit equally is a challenging task. However it is important to note that the research in Mombasa identifies the influence of loans on the efficiency of water service provision on two main aspects.

Among the strength of loans with respect to Mombasa is the fact that, loans have been used to improve the condition of assets that transport and store water, examples are the rehabilitation of 28 km length of badly leaking Mzima pipeline, rehabilitation of Marere pipeline, additional wells and refurbishment of existing wells in Baricho, rehabilitation of networks within Mowassco, rehabilitation of water storage facilities in Mazeras and Nguu tatu and also improving the ability of the water utility to improve its efficiency. This is achieved by additional volumes of water available for sale, due to increased production from the sources, in turn, this provides for recouping revenue needed for operations. The other important thing to note is that, by utilizing loans in improving water transmission and reducing water losses, the conservation of the environment is partly achieved as there is less water abstraction needed at both Mzima and Marere springs, same as the wells of river Sabaki, where less water is abstracted than should be done with poor pipe network systems. Leaking networks have higher transmission losses; this prolongs the sustainability of the water sources by allowing for recharge, hence also preserving energy demand for pumping more water. Thus, also have environmental benefits due to less energy needs, alternatively it also helps alleviating the debt burden of future generations. In conclusion, multilateral and bilateral loans have two strong key points, they are useful in large infrastructure project finance like the Mzima, Marere Transmission pipelines and secondly, the fact that since loans are mutually and legally binding, Mowassco, Gok, CWSB and donors are in contractual terms obliged to guarantee completion of water projects without any loss of funding, this ensures success of most loan funded projects.

#### **Weakness; the problem of multilateral or bilateral loans in financing water**

The problem with multilateral and bilateral loans as a source of financing water in Mombasa is that among other things they do not have a mechanism to ensure that they are utilized in an

unbiased manner, while multilateral and bilateral loans transform to a debt obligation of all citizens in the Coastal region and other places, the benefits of loans and the projects through which they are channelled are equally not distributed, it is entirely based on Kenya's political and economic incentive or donor country or aid agency geopolitical, economic or foreign policy. Coastal region's investments in projects are mainly intended to target Mombasa City where almost half of the population in the region lives. However, a majority of the population is also non indigenous compared to other areas surrounded by the pipeline. Owing to alleged local politics, and demands for scarce water resources in the region, Mombasa does not receive equitable distribution of water like the other areas in the region. This fact notwithstanding that, being the company with the highest revenue collection among the regional utilities, the company funds almost all the energy needed for producing water at Baricho wells and also buys mostly from the same source. In contrast the other companies have gravity flow systems meaning they pay less for every cubic meter of water supplied by the CWSB. In other words most residents of Mombasa County pay for water at higher prices compared to the rest, this is the money partly used to service these loans, but in reality they have less access to water compared to residents of other towns in the region like Kwale and Malindi, this shows geographically or economically variation in equitable distribution of benefits as well as liability for debt repayment, the argument then would be, it would be fair that loans are utilized in manner that helps in achieving the highest threshold for equality and fairness. This is one thing that this research seeks to assert that loans do not meet this threshold, an example is Mombasa County, Mowassco pays the highest revenue for water production and yet has the biggest deficit in meeting water demand compared to the other water service providers benefiting from water supply from projects funded by loans, whether a threshold for equality on loan investment exists or not, over reliance on loans may translate to impoverishment of certain sections of the society and enrichment of others in the long run due to imbalances, an example could be a case of two household with the same income and variant expenditures but in the same region, simply because one part like Mombasa, has higher rates of water costs due to tariff structure, it may get poorer as this implies more costs per household, as compared to one in another area in the same region. Adequate access normally translates to other health benefits and vice versa. For example, hygiene conditions, the household charged higher is disadvantaged compared to the household in the other region charged less per cubic meter despite the fact that it they may have the same income.

In most cases, these sections of society are usually unfortunately the most vulnerable sections and are normally without adequate and formidable representations within the echelons of key decision making organs of the society in which they live in. However it is important to note that it is the lack of mechanisms that are exhaustive, adequate and with a clear methodology for selection, administration and utilization of loans within the current world order that makes loans to be susceptible and non-conformity with the acceptable tenets of equality. Among all beneficiaries, in a certain country or region, with regards to distribution of wealth, all deserve equal treatment, especially where there are cases of debt. In mechanisms where loans are repaid from investments, this problem is addressed but in most cases like in Kenya there are no legal mechanisms to protect public funds against default by a certain party for example the CWSB if it is benefitting from a loan funded project.

Another challenge of loans and especially in the provision of water and sanitation services in Mombasa is that the fact that they have to be negotiated and disbursed through multiple departments including treasury (Ministry of Finance) and the CWSB it makes them also prone to diverging interests and opinions on their utilization. This slows down the pace with which projects can be conceptualized, initiated, implemented and completed. In other words, coupled with the stringent procurement processes, the bureaucracy in loans utilization is

tedious, for example, in Mombasa the procurement of customer meters through the AFD funding delayed by more than two years due to the extraneous process of amending goods specifications, while the bulk water meters were initially intended to be procured in January 2012, they have never been bought at the time of conducting this research, again, this due to extraneous procurement process stipulated by AFD and GoK. Due to lack of flexibility to amendments and due to contractual obligations for donor based loans, development may take time to trickle down to the intended recipients such that when some projects are completed the impact is negligible, despite an increased demand, or other macro-economic or political situations. An example is the water projects carried out in Mombasa, despite the fact that negotiations started in 2007, projects were completed in 2012 and 2013 and some are still on going, this means there is a lot of time lag associated with disbursement and utilization of loans. The demand increased over the same period.

Loans have also been used as a tool for political mileage and interference with internal cultural and democratic and economic processes, a case in point is the structural adjustments proposed by the World Bank in the 1990s, while they may have improved performance in some countries, some countries still lag behind with increased poverty and corruption entrenchment.

Loans have also been channelled based on the ability to repay, while this makes economic sense, does it mean that the high risk countries or projects should be abandoned all together? And if so, does it mean that the threshold for basic water consumption is met? An example is in Kenya whereby the World Bank focuses on projects mainly on the basis of their financial and technical viability; case in point is the WASSIP program in Mombasa and other parts of Kenya. Water is a basic human right and cannot be limited to access where possibility of repaying is plausible. In the region, the bulk transmission lines focus on Kwale, Voi, Malindi and Mombasa and along the way by pass arid regions with poor inhabitants who cannot access water. Therefore loans need to factor in the chance that financial and economic risks should be tempered with the requirements of basic human rights and where possible flexibility to ensure that the latter is a priority in deciding whether a project should be funded or not, not just over relying on financial and economic analysis as was the case in all the investments done in Mombasa. Important life support systems for humanity should be factored in evaluating feasibility for funding projects. Some parts in Kenya were for many years under developed because of lack of any economic or financial viability. The people leaving in these areas have suffered from access of the most basic of human needs including water. This shows that loans do not necessarily transform to equality in access to resources.

In conclusion loans provide a channel for enhancing development in water and infrastructure in Mombasa hence boosting economic empowerment; however it is the responsibility of international think tanks to develop guidelines that ensure further considerations in deciding whether to offer loans or not to, independent of just political, economic and financial considerations. The prudence in administration of funds after disbursement should be emphasized to ensure that embezzlement of funds for development is avoided.

#### **4.8.2 Strength and weakness of Grants**

##### **Strength of grants as a source of finance**

Grants are equally important in improving water services provision, their most prevalent strength is that the recipient country has minimal obligation for refunding the money, for example, it enables the Dutch Embassy in Kenya to avoid certain loopholes dominant with loan funded projects. A good case in point is that with grants, the donor country can instil



fiscal discipline, for example, in Mombasa, there is an ongoing court case relating to alleged loss of funds meant for procuring materials and equipment for business units, while this is yet to be concluded, it is clear that this sends a clear message of deterrence for misuse of resources, instils financial discipline among staff working in Mombasa for fear of prosecution due to graft related ills. Due to control in procurement and quality assurance of projects funded is maintained, this ensures that not only are the projects completed on time and as per required levels of quality but also the benefits trickle down to the targeted population faster and avoids plunder by unscrupulous public officials.

Another important strength of grants is that the donor country may be able to assess where most the funds should be diverted to, a case in point is Mombasa Water's VEI – WOP project whereby the project team on evaluating the performance status of the utility, decided to shift focus into capacity building and reduction of Non-Revenue Water. This is a case in point whereby, unlike in loans which are governed by strict contracts and budgets, grants provide for project conception and implementation flexibility depending on progressive assessment of tracked achievements.

In Mombasa, grants have also been effectively used to improve capacity and operational efficiency devoid of patronage and political alignments; this means that needs assessment and meritocracy are applied in determine what is best to be funded by grants. An example is the training programs conducted whereby selection of personnel to be trained is mainly based on the roles and duties of the trainee and not patronage. This is a deviation from other financial mechanisms whereby the authority wields immense power to decide on key issues regarding utilization of funds for capacity building, in some cases appropriate persons have had their opportunities for training reallocated to others for ulterior reasons. This is normally the case whereby personal interest or by external influence take precedence. Grants are able to prevent against such forces.

Grants are also very flexible, for example in Mombasa focus shifted from production of additional water to utility management improvement despite the wish of some powerful quarters.

Lastly grants are a source of bridging the gap between the poor and the rich whereby the minimal rates charged provide development finance without necessarily overburdening the already needy recipients. A case in point is the Water Operators Partnership project, it is a 7.3 million euros fund aiming at increasing access to water from the current about 72% to 90 % by building the efficiency of the water utility, when the project started, the water utility was barely collecting enough to meet its operational costs and salary demands, there were no funds for capital investments or even to buy repair kits for servicing the pipe networks, the advent of the grant has eased part of this burden. The expected increment in the number of people with access to clean water is expected to improve the living standards of low income areas and helps alleviate poverty levels within Mombasa, is therefore acceptable to conclude grants have more benefit than negative effects.

### **Weakness of grants**

The biggest challenge with grants is that they may create a culture of dependency whereby a grant recipient like water utility tends to relax due diligence measures in recovering funds to service its operations; furthermore it may relax proper management of funds due to the fact that there is alternative funding. For example, in Mombasa collection of revenue has deteriorated since the VEI project started. While it is not reasonable to blame the entire effect on the grant, it is a possibility that revenue collection could be low due to the fact that the utility can meet operational costs related to equipment and tools as well as materials directly

from grant funding. This in turn reduces the need for strict cost recovery measures. In other words, grants may lead to deterioration of quality control in case there is lack of accountability or weak frameworks for implementation in the funded organization. This may lead to loss in focus of other funding options like cost recovery.

The other weakness of grants at the international arena is that grants are normally disbursed at the discretion of the donor country and its financial and economic conditions. There have been cases whereby grants have been halted or downscaled because of political differences between countries or because of financial crisis within the donor country. As it is the current grant in Mowassco is subject to review on annual basis based on the Dutch Embassy in Kenya's assessment of local and international bearing in politics and economic conditions. It is therefore not guaranteed to be fully utilized in case any objection occurs. This has normally in some cases lead to slowing down of funded projects or even their halting and hence exacerbating challenges that the target population has to confront with, including incomplete projects, psychological trauma, wasted time and resources. Recipient country may have to divert funds from other projects to complete the stalled projects also.

Grants may also pose a source of suspicion and loss of trust between partners in a grant project, it needs to be very clear why a donor offers grant, this helps clear the aura of suspicion, during the launch of the WOP project there was a bit of suspicion on why VEI wanted to invest in Mombasa without any form of Concessions to claim, though never formally confirmed, there were queries relating to the matter. In addition to this suspicion, they may affect long term relationships between those who receive grants and those who don't; there are no criteria for ensuring that grants are distributed equivalently between sections of a population within Mombasa County. In some cases you find lop-sidedness with some areas receiving a lot of attention while others are left with no funding at all.

Finally the fact that grants are usually managed under donor conditions, resident water utility or organization may have low initiative to spearhead the utilization hence may create little incentive for appreciating capacity building and ownership by the local population for grant funded projects. This is the case in Mombasa, whereby some employees have not yet fully taken it upon themselves to steward the utilization of the VEI grant for the improvement of services. This can also be attributed to the way in which the grant utilization is launched and managed, from experiences in Mombasa, it is important to note that grants when applied needs intensive awareness on water utility staff and divisions so that they are in full understanding of the roles played by donor and the utility, including need for staff to work together to ensure goals of the project are met, this has been partly achieved in Mombasa though from observation, junior staff are still not very much involved in harmonizing grant related activities within their core responsibilities. In conclusion the utilization of grants is heavily reliant on the structures and preparations set for its utility, failure to which the grants leads to a situation where, there is the special purpose vehicle for the grant and the utility in general both working towards a certain goals, but following different avenues. This is a big weakness for grants as it produces less synergy and eventually less productivity, it may as well provide short term benefits, and lack sustainable solutions in water services provision as in some cases, grant projects may be abandoned after the donor staffs evacuates the site.

### **4.8.3 Strength and weakness of Subsidies**

#### **Strength of Subsidies as a source of finance in Mombasa County**

Subsidies in Mombasa target the low income areas in the society, while it is considered noble, economically and financially sensitive to deliver water to the poor at lower rates, it is more so as a result of appreciating that water is a basic human life and no one has a right to deny another this fundamental life support commodity.

However, it is also an appropriate way of avoiding costs of other important water related expenses like reducing the health related expenses of water borne diseases. The provision of water at subsidized rates ensures that low income areas are able to discharge waste well and also exist in hygienic environments hence reducing child mortality. By subsidizing water for low income areas, the water utility is also able to ensure seamless supply to other users who would also be affected if the poor people sabotage water supply assets due to inadequate or unavailable water services. In short, it is a basic human right for the poor and the rich to receive water, by subsidizing water services, there is the prospect of availing water to the poor but also recouping some revenue out of it to finance operations within or outside the low income areas. This in turn, ensures continuity of supply to everyone despite of different financial capabilities.

#### **Weakness of subsidies as a source of finance in Mombasa County**

The subsidies applied in Mombasa have many weakness, one is the fact that there is a weak legal framework to support the enforcement of the subsidy, secondly the water utility is allegedly affected by water kiosk cartels who allegedly have people with immense political sway backing them. As a result the poor people are left at the mercy of these cartels and can do little about it. The management of the subsidy has been politicized and even a court order was once obtained by the cartels preventing the water utility from attempts to streamline the water subsidy's enforcement. The water subsidy in turn partly meets its intended target which is affordable water to the low income residents, according to survey results from the utility managers' and consultants perspective, 72.4 % of them have little confidence that the subsidy prescribed prices are observed, this defeats the purpose of the subsidy. Selling water to the poor at higher prices is not the goal for the subsidy.

Another challenge of the subsidy is that its efficiency is geographically related to the location of the water kiosks, they do not meet the recommended threshold of only being located in low income areas. There are some kiosks located in areas that are not low income areas and hence operating as business entities rather than pro poor intervention mechanisms. In order to sell water at higher prices and increase customer numbers there has been allegations of kiosk owners interfering with the water networks to distract supply to households hence forcing them to buy water from the water kiosks.

To conclude, subsidies should be implemented well but even most important the mechanisms to ensure that they function as intended should be emphasized and enforced even more. The punitive measures for not obeying the regulations should be dire to an extent of deterring abuse. An example is Mombasa County where water related crimes have very lenient penalties which can be easily paid (fines) and an offender is mildly penalised with low fines or released without any form of deterrence measure from committing the same crime in the future.

#### **4.8.4 Strength and weakness of Tariffs**

##### **Strength of Tariffs as a source of finance**

Tariffs have been employed in Mombasa to ensure that the water company meets its obligations; the current volume based tariff has been instrumental in ensuring this is achieved. One of the strength of tariffs as a source of finance to Mombasa County is that it is reliable; every end of the month the company collects the revenue and is able to pay salaries and debtors as well as plan on short term procurement of necessary items for different divisions. Unlike other sources of finance the consistency of tariffs make it the most reliable source though its periodic profitability varies greatly. Tariff enable the company to deliver services more prudently and to respond to customer complaints more aggressively since the company needs the clients to pay up and to do this it must ensure that they are well served. They incentivise prompt service delivery as the company needs revenue stability. The company has 24 hour emergency lines that ensure that customers' complaints are addressed urgently.

In addition to the above, tariffs when in a positive trend of profitability can be used to access credit from local financial institutions, for example the Kenya Power and Lighting Company supplies the water utility power on credit in some occasions to ensure steady supply of water regardless of cash flows as it is sure that the company usually pays at the end of the month. Tariffs can also be used to diversify company products and venture into other industries by a water utility, in Mombasa the company is in the future considering venturing into organic fertilizer production and demineralized water production from its Kipevu water treatment plant, already feasibility is underway. In Mombasa diversification has been a challenge due to the shortage of water, high NRW and irregular payments by some major clients.

Tariffs can also be used to boost customer confidence when reduced downwards due to improved and consistent profitability of the water utility. This increases trust and willingness to pay between clients and the service provider.

Lastly, tariffs are more reliable and therefore can be utilized for financial projections for both capital and operational cases; it is one of the bases for the proposal of the Mowassco strategic plan currently being compiled.

##### **Weakness of tariffs**

The fact that in Mombasa the tariffs are volume based, there are cases where revenue flows have been affected by inadequate water supply in that most higher band consumers are not able to receive water as per their normal consumption and hence pay less. This is one of the reasons why the billing in Mombasa Water is very erratic, during the rehabilitation projects the company billing was significantly affected by shortage of water, also there are cases whereby volume based tariffs do not factor in the potential of a meter not functioning or even reading with errors due to mechanical failure, these leads to estimation of consumption.

In case of very high meter stoppages like in Likoni due to the grit in the borehole water, billing is highly estimated and may in the end lead to overbilling or under billing which is harmful to customer relationships or utility financial health respectively.

Periodic tariffs charges as applied in Mombasa also present challenges whereby customers delay in payments and therefore the cash flow is inconsistent, this is a common trend in Mowassco whereby some major customers accumulate debt and pay it at once, an example is the prison in Shimo La Tewa. This makes it hard for finance division to plan expenditures or mitigate revenue shocks; in turn this affects functions in other departments.

In other cases tariffs principally designed to meet cost recovery may not sufficiently address the ability of the population to pay for water, and hence end up straining some households. It is very difficult to conclude that tariffs are a fair way of billing since the per capita demand is about 120 l/c/day in Mombasa yet most homes survive on less than a dollar per day.

Lastly volume based tariffs do not protect the poor in case of situations whereby the low income share a meter, the overall consumption is high per communally shared meter, thus they are insensitive to poor households when it comes to affordability. In many cases poor people share a single meter and hence pay their water in the higher and expensive bands of the tariff.

## **4.9 To what extent has utilization of financial mechanisms affected services provision and its efficiency?**

### **4.9.1 Influence of loans on efficiency**

The utilization of loans in Mombasa has influenced mainly the efficiencies' of the utility in the following areas;

#### **Technical efficiency;**

In total close to Kshs 4.365 billion from loans has been invested in physical assets rehabilitation only. The technical efficiency of the water utility is among the key sectors that have been influenced; among the positive impact is the acquisition of vehicles for transport, tankers for emergency water supply delivery, rehabilitation of reservoirs, transmission and distribution pipelines. This in turn has had a positive impact since the water utility can be able to save on the marginal cost of supplying water in that less water is lost per cubic meter of water abstracted from the source. In return this has a positive environmental benefit as there is less abstraction from the wells and also less energy consumption and power related costs. This frees revenue for other uses and reduces dependency on government funding and therefore funds can be diverted to other needy uses.

Lastly the GIS system is an important asset management tool for the technical department as it ensures that location of assets , their details such as size and age are well recorded and kept for future reference or replacement. This is crucial as the institutional knowledge of assets in any utility ensure continuity of service and reliability of mandate and responsibility.

#### **Human Resources efficiency;**

Through the financing of loans from AFD, the water utility's organizational structure was reviewed and management processes improved to ensure that it is able to respond to contemporary challenges of water supply provision within Mombasa. The review of the structure is meant to cascade downwards with time and to transform the water utility from operating like a purely public entity into operating like a private entity conforming to the markets demands of competitiveness and quality of service. By recruiting staff from the private sector and retraining existing staff the water utility seeks to improve its human resources efficiency.

The training of staff under the AFD project is crucial; the staffs within the water company have been trained on technical issues regarding leak detection, different metering systems and also on various aspects of water supply management including NRW control and electromagnetic metering systems. The staffs in turn train their colleagues and also increase the institutional knowledge within the company. All of the above activities are geared towards ensuring that the company acquires and maintains competent human resource capacity capable of spearheading it into prosperity and reputable water service provider.

#### **Customer efficiency;**

Significant impacts of loans is that the company has been able to increase customer confidence through adoption of better meters, these meters are more accurate and less susceptible to tampering and mechanical related interference, therefore, they have also helped in reducing NRW for the company. By improving on metering, the company improves its financial chain management, by accurately billing customers with fewer doubts and also by collecting accurate customer information for future planning.

**Financial efficiency;**

The water utility has also been influenced positively by loans as by stabilizing and increasing available water supply to residents, this ensures that more revenue is generated with proper management measures and in return a bigger financial capability for the organization is established. This in return will translate into more revenue for the water utility and therefore more financial stability. This has an effect of enhancing budgetary plans and capital and operational projections which in turn guide the financial controlling process. This further improves financial efficiency in the water utility.

**4.9.2 Influence of Grants on efficiency**

Through the disbursement of grants the water utility was revamped from its downward trend and lack of adequate cash flows to sustain its operational and capital expenditures.

**Technical efficiency;**

The grants have been used to improve technology within the company by first introducing more sophisticated and tamper proof metering systems, this include the introduction of Flodis single jet customer meters and Itron meters as well as Badger electromagnetic meters. This meters are either less susceptible to tampering or are completely tamper proof. The meters further send consumption readings remotely to a base computer at the utility headquarters hence minimizing need for additional personnel for meter management.

**Commercial efficiency;**

In this connection the meters earned the company a lot of revenue by increasing billing out of 17 major customers' accounts by about Kshs 4 million on a monthly basis. There is sufficient evidence that tampering of meters, canvassing and colluding to defraud the utility revenue has been abated. This was impossible when using the old metering systems which were mechanical. In addition to this, customer billing and collection is hinged on reliable and accurate metering supported by downloadable logs from the electromagnetic meters. This kind of metering systems ensures that the commercial efficiency of the water utility is further enhanced. In conclusion, by ensuring more accurate and less problematic metering and billing, disputes with customers are reduced and relationship strengthened.

**HR Efficiency;**

The technical training to the employees as well as training on the job and on soft skills for managers has helped in improving the efficiency of the utility in dealing with challenges and in offering quality services to the clients. Through VEI WOP project there is a robust plan meant to ensure that employees are more responsible to their obligations, this is being conducted through regular monitoring and evaluation of staffs, pilot projects and strategic plan that is yet to be adopted, currently it is still being compiled. These measures will in the long run cover work ethic which eventually is meant to improve human resources efficiency and maintaining it.

**Governance efficiency;**

Through improvement of training, strategic planning, and organizational restructuring the water utility will improve its governance ethic and conduct due to continued focus on accepted governance standards for water utilities. Currently major changes have been effected with recruitment becoming entirely competitive even though with occasional interference from the board and also from other local regional interests, this is normal in Kenya and mostly in public utilities. However the permanent resident project manager is currently working very closely with the County Government of Mombasa , the World Bank

and other stakeholders in the water sector to ensure that governance is improved in the water service provision industry.

#### **Customer efficiency;**

Grants also help in reducing the water losses by supplying the necessary equipment, tools and materials for the repairs of leaks and proper connection of customer meters and hence lead to reduced time lags before addressing customer requests. This in turn is expected to generate a positive feedback from customers due to enhanced confidence on the level of services received and dedication by the company. Moreover, this increases the willingness to pay and therefore strengthen the relationship between customers and clients. The equipping and building of stores within the water utility has enabled the company to be able to more quickly and efficiently address the complaints from customers such that instead of coming to the main office to collect materials, the Business Units can access materials directly from the stores within their locality. This acts as an impetus in improving response by artisans to customer complaints, which implies time saving but also improvement field staff morale. Furthermore it ensures that they are motivated as lack of materials has often been touted as one of the issues that affect the working attitude of field staff.

#### **Financial efficiency;**

By implementing the above measures, the company is able to deliver water more reliably and bill customers more efficiently as well as recoup revenue efficiently. This enables planning; budgeting and procurement are able to complement its efforts in the different sectors including financial controls. In addition, it acts as an improvement in the financial capacity of the company. This will improve the utilities financial controls and capability, more revenue means there is need for more responsibility and also accountability, hence more auditing and improved credit worthiness ratings to lenders.

### **4.9.3 Influence of Subsidies on efficiency**

#### **Customer efficiency;**

Whereas subsidy has helped in improving access of water to the poor in some cases with success, the issues highlighted in previous sections regarding subsidy management and implementation greatly bring into question the influence on utility efficiency. As it is subsidies are meant to ensure that the poor access water, however when this is not achieved then it means there is some level of inefficiency. The presence of alleged water kiosk cartels have also affected subsidy implementation, the company has previously been sued by the Water Kiosks Owners when it tried to streamline the subsidy sector in water service provision. More to that, kiosk owners charge more than recommended and are not properly located meaning poor targeted customer efficiency.

#### **Commercial efficiency;**

According to reviewed data, revenue recouped from subsidized sources is far below expectations and this indicates that the subsidy (kiosk) mechanisms could be a source of revenue loss. But to answer the question to what extent the influence has been, we can conclude that first, subsidy have helped in access of water to the poor though not all low income earners have been served successfully, it is hard to quantify without a detailed survey how many have been accessed and this could not be carried out during this research due to time constraints, secondly, subsidies have affected efficiency of the utility through revenue loss, growth of water cartels and thirdly, the lack of consistency in pricing water as per recommendations and location of water kiosks in non-poor areas has led to poor utility



performance in ensuring low income areas actually get water in a socially and economically responsible manner. The conclusion is that the subsidy defeats its purpose and therefore negatively affects the efficiency of the utility.

#### **Technical efficiency;**

The water kiosks owners are sometimes known to allegedly sabotaging supply by interfering with water flows to individual households so that they can attract customers to their selling points (kiosks). These kinds of actions amount to impeding technical efficiency through acts of vandalism and so affecting the life cycle of physical assets within the water utility, the utility has had cases where the bulk transmission lines have been vandalized and hence affecting water supply to some estates, this is common in West mainland.

#### **4.9.4 Influence of Tariffs on Efficiency**

The utilization of tariffs within Mombasa County has had an influence the performance and delivery of water services within the county. From the interpretation of data collected from Mowassco and the survey conducted there are varying opinions about how tariff has influenced service delivery.

#### **Technical efficiency;**

It has enabled the company to run its operation relatively smoothly. This is because of revenue recouped from tariffs is mostly utilized in financing operations including procurement of materials , equipment, casual labour, transport and hiring heavy earth moving equipment when needed. The revenues also pay technical personnel and buy fast moving items when needed. Through the reliable availability of funds from tariffs, the company can order fittings for emergency cases and repair leaks and bursts faster.

#### **Financial efficiency;**

However by analysing the performance of cost recovery, it can be argued that tariffs could have led to inefficient provision of water supply service, the reason being an increased cost of water and deterioration of utility profitability, hence its efficiency reduce in some sections. In reality tariffs have helped in funding supply of water services, through making access to water possible through the pro-poor projects and minor network expansion and repairs. Though successful, this has not been without increasing costs of service and hence burdening the poor more, the company reviewed its tariffs thrice since 2010, this was mainly as a result difficulties in meeting the cost of operations and production.

Whereas the cost of production has not changed much, tariffs have been reviewed three times upwards, the company has increased NRW (revenue losses) meaning that even with additional water, the company has made significant losses and hence unable to meet its costs efficiently or as expected. Instead of reducing the losses, the company has been forced into tariffs review upwards. It is the interpretation of the research that tariffs have negatively affected service provision as instead of addressing challenges leading to loss of important revenue, the company has opted to review tariffs upwards and hence overburden consumers who mostly already face income challenges. The impact of non-sustainable tariffs is continued increment in cost of water as well as cost of supplying; moreover this leads to lowering of profitability and deterioration of services. The long run effect is a poor financial standing for the water utility. Therefore it is the view of the research that the current tariff structure and its implementation has failed. It has made the company less credit worthy because it has continued to increase due to operational challenges and rising losses. In

addition it is not sensitive to the affordability of water by a majority of the residents who are poor.

### **Commercial efficiency;**

The physical water losses lead to inadequate water supply, poor metering and billing tendencies and hence many dissatisfied customers, this in turn has led to increase in consumers deactivating their accounts, hence loss of customer numbers by about 50%, in addition to the loss of revenue, it has also led to more cases of illegal consumption, more cases of vandalism and hence deterioration of services in general. It is the conclusion of the research that current and past tariffs have not improved service efficiency; they have had a negative effect though they have helped in ensuring continuity of service.

### **Human resources efficiency;**

When compared to other water utilities in Kenya, Mombasa Water is considered to remunerate its employees better than most; this is because of its ability to meet the cost of company of the employees. This is one form of positive contribution to employee satisfaction which expectedly generates dedication to work responsibilities. However, an organization with the kind of challenges facing Mombasa Water will always be as a result of lethargy among some staffs despite the better paying job than most people with similar qualifications in other parts of Kenya. Ethical work conduct translates to individual conduct. The human resources efficiency needs to be enhanced through competitive terms for the employees compared to the private sector for crucial staff who contribute to strategic improvement. Despite the utilities higher pay packages, it still lags behind most private sector companies especially on management staff and this according to the Human Capital department has led to some employee departures and some declines by prospective employees.

## **4.9.5 Overall Influence of efficiency by the combined funding methods**

### **4.9.5.1 Governance Efficiency**

Governance in the water utility is a critical aspect as the strategy of management is guided by its governance norms and therefore the utility's performance aspects and efficiency are as a result of the governance norms.

According to survey results several aspects of governance were reviewed, these included procedures and quality control, mission statement usage in the utility, strategy formulation and usage, director's recruitment, code of conduct and accountability, procurement processes, public relations, professional bodies membership and accountability to environment. In essence most of the projects and programs in the water utility (Mowassco) are as a result of reforms in the water sector initiated by the parent ministry, the reforms are mainly implemented through funding from donors through loans and grants and management of the company's cost recovery and subsidy structures through supervision by the CWSB.

The efficiency in governance of the water utility is partly as a result of influence from the financial interventions. This intervention is mostly conducted at the policy level through support to liberalisation of water services and policies in the sector like formulation of legal frameworks governing water services.

**Table 18 Governance efficiency survey results**

		Procedures and quality control	Mission statement	Strategy	Board of directors recruitment	Code of conduct & internal accountability	Procurement	PR	Pro- bodies	Accountability to environment
N	Valid	31	32	32	32	32	32	32	31	31
	Missing	1	0	0	0	0	0	0	1	1
Mean		2.0968	3.5313	2.5625	3.0938	2.6875	3.5	2.9688	2.8387	2.6129
Median		2	4	2.5	3	2.5	4	3	3	2
Mode		2	5	2	2	2	4	3	3	2
Std. Deviation		0.87005	1.72242	1.66438	1.51038	1.42416	0.95038	1.0312 7	1.1283 3	1.35837
Variance		0.757	2.967	2.77	2.281	2.028	0.903	1.064	1.273	1.845

From the survey there was response to all the questions by all respondents except on procedures and quality control, accountability to environment and membership in professional bodies whereby one respondent did not answer either question. Among the highest scores was usage of mission statement in the company's departments, this shows that most of the employees understand its utilization or need for usage but whether this is the case in actual sense is contentious, of course the research has established serious efficiency challenges from interviews and review of company performance data and from interviews with the utility managers.

The recruitment of Board of Directors is above board though there is a lot of interference from the Director's on management decisions as eluded by several managers interviewed. Procurement within the rating ranked highly with a mean of 3.5 and a standard deviation of 7, this is because the Public Procurement Act in Kenya allows for legal challenges in flawed procurement by bidders but also provides for tough prosecution in case graft is proved to be present. This deters procuring agencies from graft as it is a high risk offence. Other top scorers was Public Relations at 2.9688 and Professional bodies. The company has an active public awareness and complaints receipt system but the follow up is mostly poor according to the General Manager of Business and Customer Service. On strategy formulation, the score is average with a mean of 2.5625, this is evidence corroborating views given by managers and consultants that there is lack of exhaustive involvement of staff in developing the strategic plans.

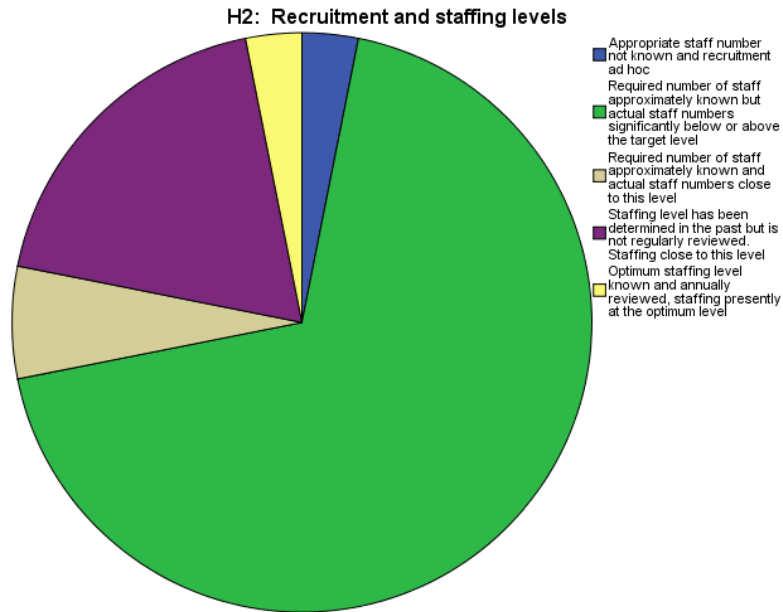
Lastly internal accountability has an above average mean of 2.6875 and accountability to environment has a mean score of 2.6129, the company is answerable to the National Environmental Management Authority (NEMA), and has relatively robust disciplinary committee though its decisions are subject to reversal by the Board of Directors. The company through Water Service Providers Association conducts Benchmarking activities and is a member of the organization (<http://www.vitensevidesinternational.com/media/>). The company is also an active member in Corporate Social Responsibility activities in many functions within Mombasa County. The way the above issues are addressed depends on the ability of the company to finance such activities, for example for procurement to be transparent there must be adequate and reliable finances, the company associations on benchmarking is funded from the company's accounts, same as the need for recruitment of directors competitively as they have to be remunerated commensurately. The formulation of strategy is hinged on financial projections from both tariffs and possibly loans. In conclusion, governance including accountability depends a lot on financial input and therefore affects its efficiency.

#### 4.9.5.2 Human resource efficiency

The company has a Human Resources Policy which defines all processes regarding human capital. The financial mechanisms employed in Mombasa also have affected company operations in that the human capital structure, its utilization in discharging company's mandate and also its cost is affected by financial mechanisms, especially cost recovery, whereby there is pressure to meet the recommended staff connection ratio of 6 per every 1000 connections as well as keep salaries within sustainable ranges. However, the reforms in the human capital section have been as a result of funding from grants and from the multilateral loans that lead to the review of the Human Capital and Administration Division, Engineering and Strategy Division, Business and Customer Service Division and Finance Division. The implementation has also been piece meal because of financial constraints as well as company employee's qualifications and background. However, the survey showed the following results;

		Internal communications	Recruitment and staffing levels	Remuneration levels	Staff training & education programs
N	Valid	32	32	32	32
	Missing	0	0	0	0
Mean		2.4688	2.5	2.5625	2.6563
Median		2	2	3	3
Mode		2	2	3	3
Std. Deviation		0.87931	0.95038	0.91361	0.74528
Variance		0.773	0.903	0.835	0.555

Among the key areas surveyed were internal communications within the company, recruitment and staffing levels, remuneration levels and staff training and education programs. The scores were as follows for the mean of the four issues, internal communications (2.4688), recruitment and staffing levels (2.5), remuneration levels (2.5625) and staff training and education (2.6563). The respondents answered the entire question on Human resources efficiency. From observation, the company has internet connection in all offices and hard copy documentation and communications are also common. However there is an entrenched culture of strict adherence to reporting to the immediate former boss, even when information requested is not private or confidential. Sometimes information requested for use by another department may be difficult to obtain if not sanctioned by the departmental head. On the recruitment of staff, there is a legal process followed by public advertisement for senior staff on contracts, interviews are conducted by the management or by hired human resource agencies, however there are challenges in maintain qualified and skilled staff, casual labour is sometimes advertised or not. According to the a Manager in the Human Capital Division, Mr. Amos Galole, the current salary structure is three years old past its review date and this has led to staff leaving the company as a result of better salaries somewhere else or situations whereby persons interested in joining the company decline after reviewing remuneration offered, mostly because they deemed to be lower than their expectations. However compared to other water utilities in the country, the company pays higher than most. On training most of the respondents gave an above average score which means that they perceive that the training programs meet the skill requirement, however some persons within the staff feel this is not the case, it is almost split in two with either half in support or reject the training appropriateness.



On the issue of staffing levels the company adopted personnel from three different organization after the Water Act 2002, the act created Water Service Providers and therefore different work ethic, organizational culture and company ethics were merged, from observation it is obvious that some staff are not utilized efficiently, however the company cannot retrench them and also has difficulty in reallocating them new roles as the Human Resources policy does not have provision for that, the other challenge might be contrast between the contract used to hire personnel, their job description and the form of justification for giving them different roles as had been agreed upon during initial recruitment. The recruitment and management of human capital is a resource based activity, the remuneration and ability to attract skilled and qualified staffs depends on the company's ability to pay well. The way the company collects its revenue and manages its financial resources affects the way its decisions on the above human resources efficiency indicators perform, for example, the level and quality of training program depends on the training budget allocated, this was alluded by the Human Capital and Administration General Manager, Mr Mathangani Muya, the same case applies with the adoption of efficient communication systems in the company like information technology, GIS and billing soft wares are all support systems for ease of access of information by different persons in the utility. In conclusion, the Human Resources efficiency is one of the biggest challenges for the water utility and one that once solved and improved may affect the other utility efficiency indicators.

#### 4.9.5.3 Customer efficiency

The water utility serves 70,000 customers of which about 32,000 connections are active, meaning the accounts are billed and pay revenues for water supplied, the rest are disconnected accounts and may be the reason for high losses due to illegal consumption.

The Business and Customer Service Section is in charge of attending to client needs for the water utility, it is represented in all the six Business Districts (Business Units) and also has its own staff with commercial and technical capacities, however, if there is need it may seek help from the Engineering and Strategy Division. The research through a survey asked some managers and consultants to evaluate customer efficiency based on their contact with the water utility. All the respondents answered the question and the findings were as below;

**Table 19 Summary of Customer efficiency survey**

		Coverage	Delivery of service	Water quality	Customer communication	Customer Services	Complaints management
N	Valid	32	32	32	32	32	32
	Missing	0	0	0	0	0	0
Mean		2.6563	2	3.7813	2.9375	2.9063	2.5313
Median		3	2	4	3	3	3
Mode		3	3	4.00a 1.4752	3	3	3
Std. Deviation		1.06587	1.016	7	1.10534	1.05828	0.67127
Variance		1.136	1.032	2.176	1.222	1.12	0.451

a. Multiple modes exist. The smallest value is shown

The means for water quality was highest (3.7813), this is so as the company regularly collects samples of water and daily chlorinates its water supply systems, however though it is not common to come across cases of non-portable water, occasionally cases of contamination of water have been reported, this is mainly through vandalized pipes, pipes destroyed by road contractors accidentally or through ‘spaghetti’ pipes linked to transmission pipe network. The survey mean for coverage (2.6563) within Mombasa County represents pipe network cover of about 70 % of total area, the overall pipe network including transmission, distribution and domestic piping up to about 1500 km. Not all house hold have individual connections but some are served through water kiosks, however water supply is in limited capacity as only about 30 % demand is met. On delivery of service with a survey mean score (2.0) mainly assessed through network pressures was lowest, there is intermittent water supply and water rationing is necessary to ensure there is equal access to all areas. The average network pressure in Mombasa is 0.5 Bars for normal periods against the recommended standard of about 1.2-1.5 bars for urban centres. On customer communication with a mean of 2.9375, the company has a customer service desk with at least six attendants permanently on call from 8:00 AM to 5:00 PM during weekdays and about two on Saturdays. However, the communication is mostly one way with minimal reversed calls from company to customer’s, the company also communicates to customers through emails, there is a complaints logging mechanisms but as claimed by the managers from the Business and Customer Service department, there is no mechanism that is in place to ensure that there is a follow up on the complaints and to assess how many complaints are sorted successfully. This had a mean of 2.5313. On customer service, the water utility scored a mean of 2.9063 , this is because there is a possibility for bills payment via mobile money transfer or through physical payments to the cashiers. This is very positive since clients can enquire on bills online and make payments from remote locations of the county. The implementation of all these activities mentioned above need financial resources, the billing software was purchased through a loan funded by AFD, the establishment of seamless billing and collection is based on budgetary allocation for such activities from revenue obtained from tariffs or grants, these includes printing and mailing of customer bills, mobility of meter readers while accessing customer meters and even the expansion of the network to increase coverage depend on the availability of significant amount of funds required, this was also obtained from a loan by the World Bank for the improvement and rehabilitation of the pipe network within Mombasa (Table 10). The procurement of chemicals for water treatment is usually funded from revenue recouped from tariffs, the building of a water quality laboratory and the equipment for conducting tests was

procured from funds from AFD. It is clear that financial mechanisms affect the efficiency with which the company obtains higher customer service efficiency. Therefore in conclusion, the service to customers is being upgraded but there is need for improvement on the way complaints are addressed solved.

#### 4.9.5.4 Financial efficiency

The utilities financing options have been discussed in details in previous sections of this thesis, currently the efficiency of the utilities finance section was assessed by asking managers how they perceive various aspects of the utilities financial conduct and management aspects regarding finance. The survey asked questions regarding the following and got scores as shown.

**Table 20 Summary of Financial efficiency survey**

		Existence of financial operating projections	Existence of capital planning and projections (CAPEX)	Accounting principles and procedures	Financial reporting and monitoring	External Auditing of annual financial records	Credit worthiness	Tariff setting policies and mechanism	Revenue Sufficiency
N	Valid	30	30	30	30	31	29	31	31
	Missing	2	2	2	2	1	3	1	1
Mean		2.7	2.5667	3.3667	3.1333	3.0968	2.2069	3.3871	2.1613
Median		3	2	3.5	3	3	2	3	2
Mode		3	2	4	3	4	2	3	2
Std. Deviation		0.70221	1.04	1.03335	0.86037	1.01176	1.14578	0.80322	1.00322
Variance		0.493	1.082	1.068	0.74	1.024	1.313	0.645	1.006

From the survey tariff setting policies received the highest mean score (3.3871), this is because the company follows laid down guidelines for reviewing tariff, whether there is exhaustive consultations or not, all the stages for review are conducted, however, full cost recovery seems to be the main reason for tariff review and prices, accounting principles and procedures received a mean of 3.3667, the company does have a fully-fledged financial department with accountants and an auditor as well as accounting clerks, it also has kept financial records from since 2007 and reporting on audited accounts is done internally every financial year and to the Kenya National Audit office, on this, the issue got a mean score of 3.1333, however, when asked about external audit and annual financial records again this came close as the reporting and monitoring as they are closely related with a mean score of 3.0968. The company achieved a low mean score on revenue sufficiency (2.1613), credit worthiness (2.2069), financial operations projections (2.7), capital planning and projections (2.5667). The last four issues are the best indicators of the financial health of a company's financial books. Clearly, the company is rated lowly on credit worthiness, this is because according to reliable sources the company owes debtors close to a 1 billion Kenya shillings adopted from previous organizations collapsed into one, and it is a contentious issue yet to be sorted out by multiple government agencies. This means that the company cannot acquire credit in a commercial setting from a local lender, the only possibility for it to acquire funding is through a third party guarantee like the CWSB or the National Government. The company also has had to raise tariffs because of revenue insufficiency thrice; in essence the revenue challenges are due to inefficiencies in other sectors which together contribute to the company's financial health, this include water supply efficiency, billing and collection

inefficiencies. When it comes to projections there is a tool that involves utility assessment of expenditure needs for capital and operational projects, their current and projected costs, inflation, production and demand for water supply and other related factors that may be included in the projection calculus, however, this is not possible considering that the billing is never consistent and neither is the water supply, the cost of operations and budgeting are also not adhered to, a factor raised by the acting Finance Manager, Wincate Musyoka, this is because of a rather passive and need based procurement model characteristic of struggling water utilities. The company applies sound office financial management practices but its success is determined by overall water utility best practices as listed in figure 20. The availability and the way management decisions are made depend on the finance from tariffs, loans and grants as well as subsidies affects all the above decision. This is the reason why the research has reviewed past financial aspects of the company and investments options employed to finally showcase how different mechanisms affect efficiency which in turn affects the financial sustainability and affects the rest of the utility performance indicators in a cyclic state.

#### 4.9.5.4 Commercial efficiency

**Table 21 Summary on commercial efficiency survey**

	Customer Information	Meter reading and billing	Collection efficiency: domestic and industrial	Collection efficiency: public authorities and bonded clients"	Customers metering
N	Valid	31	31	31	31
	Missing	1	1	1	1
Mean		3.0323	2.9355	2.8065	3.0323
Median		3	3	3	3
Mode		3	4	3	3
Std. Deviation		0.91228	0.99785	0.90992	1.16859
Variance		0.832	0.996	0.828	1.366

Commercial efficiency determines whether the water utility is performing in matters regarding addressing customer issues, billing of water and collection of revenue and generally metering which are the company's cash registers. Where companies have this section in a mess, it is highly likely to also find a lot of challenges in the company. From field work in the pilot area, this can be concluded to be one of the areas the company has most difficult challenges, from field reports on pilot studies, there are numerous accounts that are metered and not billed or estimated on low consumption or even some that have been disconnected but continue to consume water illegally. Among the aspects surveyed and achieved the following means customer information (3.0323), Meter reading and billing (2.9355), collection efficiency for public authorities (3.0323) and Customer metering (3.7742). The findings on meter reading refer to the manner in which they are read and not the management, indeed the company uses Hand Held devices to read meters, there is sometimes however unclear data transfer and only the active customer accounts are billed yet some inactive accounts may be consuming water illegally, on collection efficiency indeed mostly the company collects above 80% of the billed volumes, On customer metering, 50 % of customers are metered, the rest are inactive, also there is no meter testing or replacement



procedures. The company however bills and charges all public authorities including police stations. From observations, it is clear that the frame work for meter management is in place although it needs to be strengthened through follow up and monitoring structures, the challenge is the implementation of the meter management, in addition meter replacement is erratic with cases of meters being replaced without any financial or economic considerations to determine their rate of return, also knowledge on exact location of old a new meters is faulty as meters taken from one client for non-payment could be replaced in another clients account. On customer information the water utility has powerful and contemporary software called EDAMS. The software has a database of accounts, names, addresses, physical address, email, telephone number and many more, the software has provisions for linking with GIS system to have spatial customer data but this is yet to be done. From previous sections of the thesis it is shown that the above capabilities for commercial efficiency were financed through mostly loan and grants, an example is on metering improvement strategies like procurement of more accurate meters and reading by hand held gadgets as well as the procurement of the billing software called EDAMS. The efficient billing and collection depends on a well-motivated human capital as well as other contributors to efficiency like mobility enhancing functionalities like motor bikes for meter readers and artisans or transport vehicles for managers, all of which have to be procured from the existing financial mechanisms. The transport section in the company was very well funded by loans whereby 35 motor bikes and four double cabin pick-up trucks were procured. In conclusion, the efficiency in customer service is highly dependent on the different financial mechanisms utilized and the manner in which they are employed to ensure that the goals on commercial efficiency are achieved.

#### 4.9.5.5 Technical efficiency

Technical efficiency relates to how the company manages its physical assets that are mostly in charge of water storage and transmission including safety and efficiency of the operations to ensure minimum interference to customers. Technical efficiency also involves planning and design of new and sustainable capital projects.

**Table 22 Summary of technical efficiency survey**

		Water safety plan	Strategic Asset management	NRW management	Operational efficiency	Maintenance	Water resources management	Drinking water quality monitoring
N	Valid	29	32	32	32	32	32	31
	Missing	3	0	0	0	0	0	1
Mean		2.5517	2.2813	3.2188	2.8125	2.4063	2.625	3.7419
Median		3	2	3	3	2	2.5	4
Mode		3	2	3	3	2	2	4
Std. Deviation		1.02072	0.88843	0.83219	0.99798	0.91084	1.3137	0.81518
Variance		1.042	0.789	0.693	0.996	0.83	1.726	0.665

From survey results a big respondents were assessed on the following critical areas and gave the following scores water safety planning (2.5517), Strategic asset management (2.2813), NRW management monitoring (3.2188), Operational efficiency (2.8125), Maintenance (2.4063), Resources management (2.625) and water quality monitoring (3.7419). indeed, the company does monitor its water quality daily as well as its NRW monthly, on water resources management this may slightly applicable to Mowassco's case since it does not abstract water

directly but has leakages on its network that have been in existence for a long time hence losing a lot of water, in addition high values of NRW translate to additional need for abstraction, this contradicts the values of the respondents, though the question targeted monitoring and not the levels of water loss. On operational efficiency the company monitoring of indicators is done but it is not comprehensive, an example is hours of supply (6 hours) and network pressure logging is not regularly monitored by standard procedures but is based on customer feedback. The network is only metered on production sites inside Mombasa County and not within the network; which is normally referred to as district metering. On maintenance there is limited routine maintenance but mostly in response to emergencies prioritization, in some cases records are kept but used limitedly in meaningful information based decision making about the future operations, the company has no water safety plan documented but has some safety measures including clear guidelines as well as delegated structures on operations, the company has basic knowledge on assets though their current condition is not well known or documented. There are also no clear asset strategic plans tied to current assessed levels of usage of the current assets. In conclusion the technical efficiency of a water utility relies on and is guided by a history of data collection and improvement measures initiated, a process of investment in renewal of assets and a reliable human capital to manage the assets. The processes and work procedures need to be clearly delineated. However, this requires investments which the company has been doing in the recent past by rehabilitating the network under the WASSIP projects, replacement and installation of over 62 bulk distribution valves funded by the World Bank and creation of GIS asset management tool with AFD funding, however, the network is mostly old and prone to leakages, as such there is need for further investment. Including acquisition of a hydraulic model to guide water distribution and planning. In addition the capacity of the staff to address operational efficiency is based on the competency of skill, availability of repair kits, transport and tools and equipment, all of which have to be procured from tariffs, loans or grants, indeed the level of technical efficiency in the company is based on largely the significant financial investment and capacity building currently and in the past that has been done in Mombasa County.

In conclusion it is important to understand that a utility is a system comprising of various actors, mainly the physical and nonphysical assets. They represent a system which is interrelated such that the efficiency of one section has a direct or indirect effect on all the other sections. Furthermore, a financing mechanism may influence directly the efficiency of one division of the utility but the effect generated by the influence eventually cascades to the whole utility's performance. It is therefore important that all the efficiency levels are funded appropriately and appropriately supported positively without bias, for any utility to achieve meaningful progress. The focus on only specific departments may tend to achieve short term impacts with sometimes long term mediocre results and should thus be avoided.

## CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

From the data analysis as well as the research findings the following conclusions can be made on the efficiency of the utility and the influence that finance has had on how water services provision is handled.

The calculation of the average (modified for this research from the IWA water utility efficiency matrix) overall efficiency is from the efficiency indicators mean as per survey findings, they were computed to establish the different levels of efficiency within the water utility efficiency matrix developed by IWA.

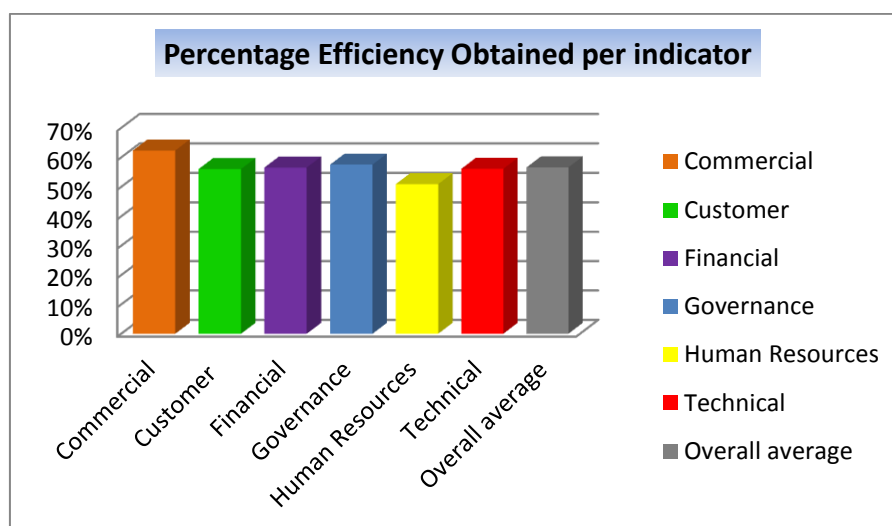


Figure 41 Overall utility efficiency

The efficiency of the utility was calculated as below.

The mean of all the different efficiency indicators were computed based on rating from the survey analysed in SPSS. This was divided by 5 (as five is assumed to be the optimum excellence in terms of utility efficiency for any indicator as per the survey Likert scale). The figures were then multiplied by 100 to obtain the overall utility efficiency %.

### Calculation;

$$\% \text{ Efficiency level of indicator} = \frac{\text{Efficiency mean from Likert scale}}{5} * 100$$

$$\text{And overall average utility efficiency} = \frac{\text{Sum of \% Efficiency level of indicators}}{6}$$

Table 23 Overall Utility Efficiency calculation

Efficiency Indicator	Mean survey efficiency level 1-5 rating of response	(Mean/5)*100
Commercial	3.1161600	62%
Customer	2.8021167	56%
Financial	2.8273500	57%
Governance	2.8769222	58%
Human Resources	2.5469000	51%
Technical	2.8053571	56%
<b>Overall average</b>		<b>57%</b>

From the above results Commercial, Customer, Financial, Governance, Human resources and Technical Department are efficient in the order shown, in terms of policy framework. From the results and the way the indicators are organized it is easy to conclude that the weight of inefficiency is on a particular department. However, a closer look on the indicators will show that the efficiency evaluated in the survey mostly refers to existing legal and company processes and procedures in measuring the indicator, what is missing and has been captured in the review of information from interviews, surveys and review of various consultant reports as well as Mowassco's own records and statistics, is that there are other factors that determine the efficiency apart from laying down clear and documented policies and procedures.

This is the efficient implementation and optimization of policy tools. The company has a relatively well documented and designed procedures yet it seems to perform dismally because it is not exhaustively implemented. Some personnel are also confused on their roles. The average survey utility efficiency is about 57 %, this figure is close to the current average NRW for the last one year which has stood at around 50 %. Indeed this shows that it is possible to calculate efficiency of Mowassco water utility through analysis of certain parameters of performance assessed through a survey and through relating that to utility average NRW for certain duration of time not less than the previous year. Remember the NRW (Figure 20) is usually a product of management decisions touching on all the above mentioned aspects of the efficiency.

In addition to this, the utility performance is a factor of different financial decisions categorized into two, financial decisions regarding operations finance and financial decisions regarding capital finance. It is after these decisions are made and budgeted for that the utility proceeds to implement various capital and operational programs and projects. This programs and projects touch on Customer, Commercial, Financial, Technical, Human Resources and Governance efficiencies. In this same aspect the utility performance is linked to this projects and programs which mean a link to the various financing mechanisms and how they are utilized.

In the case of Mowassco, the water utility has had significant financial investments for capital projects that have improved reliability of water and also some institutional changes on the utility management structures. However, the company has slipped into further losses and financial unsustainability resulting to higher water tariffs, this signifies a failure in the cycle of investment and benefits recouping. This research has shown that the policy guidelines seem to be up to standards but the problem is their implementation. Human resource lies at the lower bottom of the efficiency calculus. This does not mean that only the department is failing but rather the staffs in the company are failing, as the HR policy is not followed diligently, it then translates to accountability and responsibility of staff in discharging their duties. The management of the company is in charge of ensuring processes and procedures are followed, the management of the company should find out better ways of ensuring that this is addressed as it is the genesis of recovery.

The utilization of finance to meet the needs of the residents is relative; depending on finance the resident definitely pay water at higher rates compared to all the other water utilities in Kenya. The level of service is also not consistent as the efficiency indicators are met at less than satisfactory levels. For example, technical efficiency is ranked lowly from the survey as well as from the consultant reports which shows gaps in capacity to effectively plan and execute astute technical procedures like passive operations and maintenance. Another example is on metering, over 50% of connections are not metered while some are metered and billed on estimates, the human resources efficiency is also needful. This leads the

research to the conclusion that the needs of the residents are met to certain extent though they are met in a less than satisfactory manner. This has led to the further engagement of the private sector to try and improve the performance. This includes the using of consultants to help revitalize efficiency and recruiting staff from the private sector, this are some of the reasons listed for market privatisations (unbundling of services by public utilities) to improve quality of services in the World Development Report developed by the World Bank.(World Bank, 1994).

On the extent of strength and weakness of financing mechanisms, it is the conclusion of the research that, loans are suitable for significant capital projects, when employed for rehabilitation projects, proper financial and economic analysis should be done, also loans should be disbursed equitably and mechanisms to ensure that the repayment and benefits are equally fairly distributed. Loans should also be accessed for short term needs like operations projects depending on the credit worthiness of water utilities. There is nothing preventing a water utility in getting a loan to boost its capacity if it can pay similarly to a company in the private sector. On the other hand grants are a superb way for institutional strengthening and reorganization, grants are also powerful tool for avoiding inherent and unfriendly practices in water utilities. This could be corruption or lethargy at work, grants can also be effective tool for technical and knowledge imparting in water utilities. Grants could also be effective tools for further cooperation in business depending on the success they help bring to host utilities.

Having established that, subsidies are an effective tool in addressing social responsibility in water supply services distribution, for example in Mombasa the subsidy policy had been intended to ensure that water is supplied to the low income areas sustainably. However, good intentions with no strong legal framework pose the biggest risk factor to effective subsidy utilization. It is the view of the research that subsidies are only effective when supported by a strong legal framework. Therefore, they can be a useful tool when properly designed, but can also be rendered useless if there is no solid plan for management and implementation as was the case in Mombasa. The implementation should also be strongly backed by law.

Tariffs present the most effective tool for utility sustainability; a utility with reliable revenue stream can plan and manage its financial projections very effectively. The utility can plan on assets management for the future including technological improvements to bolster efficiency. Whereas tariffs are crucial for utilities, they could also be a source of strife if poorly executed and designed; they may also injure sections of consumers, mostly low income earners. The tariffs should always be designed to be mostly focused on sustainable cost recovery and not full cost recovery in case there is low purchasing power. Tariffs should also be designed with potential for optimization including possibilities for reduction to improve affordability. A utility should conduct surveys on affordability and financial strengths of its consumers, it should optimize this bearing in mind environmental costs and benefits and as well as its profitability. The most economic level of tariff should be used and closely monitored to ensure sustained benefits to consumers and the water utility.

In conclusion financing mechanism affect a water utility efficiency by decision on reforms and asset renewal or replacement, but also an extension of financing to ensure tariffs and subsidy work properly needs stewardship in management supervision, without this the benefits tend to be minimal. In Mombasa the institutional policy framework has been improved, the asset rehabilitation has been reinstated to a more reliable level though there is need for more financial investment to meet water supply demands of the residents. However, the extent to which this has influenced efficiency of service delivery is limited because of poor implementation of policies on the ground as well as personnel management and

accountability to work responsibility in some sections of the utility; this has hampered the efficiency of utility despite the investment.

This research concludes that there has been significant change in the way the utility is structured, the attitude, the adoption of modern technology, work procedure recommendations and general processes. The effective implementation of these soft assets and their utilization is what is lacking and therefore causing minimal change in efficiency to be felt, this is why the situation has deteriorated over the years with increasing cost of water to residents and increasing NRW. The influence to utility efficiency is only at organizational level, policy and documented processes; this is not felt on the ground however.

It is recommended that the institution puts in place robust mechanism to ensure all processes and procedures for work are followed to the letter. In case there are challenges, they should be addressed promptly and where disciplinary action is needed it should be taken swiftly but pragmatically to avoid acrimony. Only then will the efficiency of investment be felt in the water utility properly by the residents. Without this additional funding will translate to very little effect on the ground in terms of efficiency in service provision.

The research also recommends more studies into ways in which financing mechanisms can be enhanced further by not just providing physical (physical asset funding) and capacity support (non-physical asset funding) but going an extra step to capture in contract documents assurances for equity distribution of benefits from projects they fund and also develop methods that will compel utilities to implement thoroughly on the ground the investments goals and do so at well-defined quality levels. This could include measurement systems that are incentivized with benefits or penalties tied to the repayable loans values and measured at lowest end of beneficiary.

In addition to this there is need for detailed modelling of financial and economic feasibility of projects, this should be based on utility operational capacity like the demand and supply projections, currently the analysis is based on traditional economic methods like Net Positive Value or Future Positive Value, they do not take into account intricate details of utility operations and dynamics, for example , how will the high pressures in the network affect leakage level after a new project increasing water supply is implemented, what will be the resulting cost of leakage control and what would be the economic level of leakage management or Non-Revenue Water management. It is accepted in water utility industry that some costs of leakage control or water treatment are not economical. Tremelot (2011), suggested lowering of technology to save on costs (Tremelot, 2011). Another example would be, how can metering technologies be mixed to ensure that the utility uses the best metering technology at the most economical costs for different customer needs. This are issues that the utility should take into consideration when developing financial mechanisms to fund various operational and capital programs. Research into developing such models for water utilities linking the finance mechanisms selection criteria to future operational projections at the detailed level mentioned above is proposed as a subject for future research.

## Bibliography

- Abuzeid, F., n.d. Foreign Aid and the "Big Push" Theory: Lessons from Sub-Saharan Africa. *Stanford Journal of International Relations*, XI (1), pp. 16-23. Available at: [http://www.stanford.edu/group/sjir/pdf/Aid\\_11.1.pdf](http://www.stanford.edu/group/sjir/pdf/Aid_11.1.pdf) [Accessed 16/4/2014].
- Arndt, C. and Jones, S., 2009. Aid effectiveness. "*Aid and Growth: Have we Come Full Circle?*", 1 (1), pp. 1-22. Available at: [http://www.wider.unu.edu/publications/working-papers/discussion-papers/2009/en\\_GB/dp2009-05](http://www.wider.unu.edu/publications/working-papers/discussion-papers/2009/en_GB/dp2009-05) [Accessed 6/17/2010].
- Bailey, C., 2007. A guide to qualitative field research. 2. Thousand Oaks California: Pine Forge Press. [Accessed n.d].
- Bhattacharjee, A., 2012. Social science research; principles, methods and practices. 2. Tampa, Florida: University of South Florida. Available at: [http://scholarcommons.usf.edu/cgi/viewcontent.cgi?article=1002&context=oa\\_textbooks](http://scholarcommons.usf.edu/cgi/viewcontent.cgi?article=1002&context=oa_textbooks) [Accessed 8/5/2014].
- Biswas, A., 2008. Integrated water resources management: is it working? *Water Resources Development*, 24 (1), pp. 5-22. [Accessed n.d].
- Bloxham, E., 2011. Corporate governance and sustainability: new and old models of thinking. *Journal for Sustainable Finance*, 1 (1), pp. 77-80. Available at: <http://dx.doi.org/10.3763/jsfi.2010.0003> [Accessed 23/4/2014].
- Boakye, P., 2003. Water pricing and water sector reforms information in Ghana. *Water International*, 28 (1), pp. 11-18. Available at: <http://www.ircwash.org/resources/water-pricing-and-water-sector-reforms-information-study-ghana> [Accessed 25/4/2014].
- Brech, V. and Potrafke, N., 2013. Donor ideology and types of foreign Aid. *Journal of Comparative Economics*, 4314 (1), pp. 2-37. Available at: [www.SSRN.com](http://www.SSRN.com) [Accessed 28/4/2014].
- Brilhante, O., (unpublished) 2014. Theory of management. Lecture notes from managing and financing infrastructure course.
- Chiplunkar, A. et al., 2012. Good practices in urban water management; decoding good practices for a successful future. 1), Philippines: Asian Development Bank, University of Singapore. Available at: [www.adb.org](http://www.adb.org) [Accessed 3/7/2012].
- Cornes, R. and Sandler, T., 1986. The theory of externalities, public goods and club goods. 2. 32 East 57th Street, New York, NY 10022, USA: Cambridge University Press.
- Cowen, T., 1988. The theory of market failure. 1. 4720 Boston way Lanham, MD 20706: George Mason university press.
- Cresswell, J., 2008. The selection of a research design. pp. 1-23. Available at: [www.sagepub.com/upm-data/22780\\_Chapter\\_1.pdf](http://www.sagepub.com/upm-data/22780_Chapter_1.pdf) [Accessed 8/4/2014].

- Estache, A. and Kouassi ., E., 2002. Sector Organization, Governance, and the Inefficiency of African Water Utilities. *Policy Research Working Paper*, 1 (2890), pp. 2-21. Available at: [elibrary.worldbank.org](http://elibrary.worldbank.org) > Policy Research Working Papers [Accessed 22/4/2014].
- Government of Kenya ., 2009. Population and housing census report. 5), Nairobi: Kenya National Bureau of Statistics.
- Hebb, T., 2013. Impact investing and responsible investing: what does it mean? *Journal of Sustainable Finance & Investment*, 3 (2), pp. 71-74. Available at: <http://dx.doi.org/10.1080/20430795.2013.776255> [Accessed 23/4/2014].
- IWA ., 2013. IWA Water Utility Efficiency Assessment Matrix. 1. London: International Water Association. Available at: [www.iwahq.org](http://www.iwahq.org) [Accessed 17/4/2014].
- Jackson, E., 2013. Interrogating the theory of change: evaluating impact investing where it matters most. *Journal of Sustainable Finance & Investment*, 3 (2), pp. 95-110. Available at: <http://dx.doi.org/10.1080/20430795.2013.776257> [Accessed 23/4/2014 at 1:48].
- Komives, K. and Foster, V., 2005. Water, electricity, and the poor who benefits from utility subsidies? 1818 H Street, NW, Washington, DC 20433: World Bank. Available at: [www.worldbank.org](http://www.worldbank.org) [Accessed 27/4/2014].
- Longman , 2004. Longman active study dictionary. 4. Essex: Person Education Limited. Available at: [www.longman.com/dictionaries](http://www.longman.com/dictionaries) .
- Malcolm, F. and et al., 2008. The Manager's Non-Revenue Water Handbook; A Guide to Understanding Water Losses. 1. USA: Ranhill Utilities Berhad. Available at: <http://www.seawun.org/uploads/reports/NRW%20Manager%20Handbook.pdf> [Accessed 11/1/2013].
- Maques, R. and Witte, K. 2007. Towards a benchmarking paradigm in the European public water and sewerage services. 1 (1), pp. 1-15. Available at: <https://www.econ.kuleuven.be/ew/academic/econover/Papers/Benchmarking%20paradigm%2023-03.pdf> [Accessed 1/4/2014].
- Mehta, M., 2013. Meeting the financing challenge for water and sanitation - Incentives to promote reforms, leverage resources, and improve targeting. 1), Washington: World Bank, Water and Sanitation Program. Available at: [http://www.wsp.org/sites/wsp.org/files/publications/46200735636\\_MeetingFinancingChallenge.pdf](http://www.wsp.org/sites/wsp.org/files/publications/46200735636_MeetingFinancingChallenge.pdf) [Accessed 25/4/2014].
- MOWASSCO, 2011. Water Kiosk Policy. 1), Mombasa: Mombasa Water.
- MOWASSCO, 2012. Mombasa Water Tariff Adjustment Proposal. 1), Mombasa: Mombasa Water.
- MOWASSCO, 2014. Strategic Plan; 2014-2018. ( ; 1), Mikindani Street, Mombasa: Mombasa Water.



- Nelson, R., 2013. Multilateral Development Banks: overview and issues for congress. 7), Washington DC: Congressional Research Service. Available at: [www.crs.gov](http://www.crs.gov) [Accessed 17/1/2014].
- Neville, C., 2007. Effective learning services; Introduction to research. 1. Bradford, UK: University of Bradford. Available at: [www.bradford.ac.uk/management/els](http://www.bradford.ac.uk/management/els) [Accessed 8/4/2014].
- Odedokun, M., 2004. Multilateral and Bilateral Loans versus Grants: Issues and Evidence. 1 pp. 1-30. Available at: [modedokun@yahoo.co.uk](mailto:modedokun@yahoo.co.uk) [Accessed 17/1/2014].
- OECD, 2009. Managing Water for All an OECD perspective on pricing and financing. (*The report contains OECD opinion on water pricing and analysis on the issues to consider*; 1), Paris: OECD. Available at: [www.oecd.org](http://www.oecd.org) .
- OECD, 2013. Financing water and sanitation in developing countries; the contribution of foreign aid. ( ; 1), Paris: OECD. Available at: [www.oecd.org/dac/stats/water](http://www.oecd.org/dac/stats/water) [Accessed 5/3/2013].
- Parena, R., 2011. Economics and financing in the water sector. *Water and Health*, 1 (1), Available at: [www.eolss.net/sample-chapters/c03/E2-20A-02-05.pdf](http://www.eolss.net/sample-chapters/c03/E2-20A-02-05.pdf) [Accessed 18/12/2013].
- Poulos, C. et al., 2006. A guide to water and sanitation sector impact evaluation. *Doing Impact Evaluation*, 4 [Accessed 1/14/2008].
- Schleifer, A., 2009. Peter Bauer and the failure of foreign aid. *Cato Journal*, 29 (3), pp. 379-390. [Accessed 11/2/2014].
- Seureca, E., 2013. Metering and leak detection program report. 1), Mombasa: Seureca East Africa, Coast Water Services Board, Mowassco.
- Seureca, E., 2010. KE514E Terms of Reference. 1), Mombasa: Mowassco.
- Shah, A., 2002. Grant Financing of Metropolitan Areas A Review of Principles and Worldwide Practices. *Policy Research Working Paper*, 6002 (1), Available at: <http://econ.worldbank> [Accessed 28/4/2014].
- Stern, et al., 2012. Broadening the range of designs and methods for impact evaluations. ( ; 38), UK: DFID. Available at: <https://www.gov.uk/government/.../design-method-impact-eval.pdf> [Accessed 15/4/2014].
- Stretcher, R. and Johnson, S., 2011. Capital structure: professional management guidance. *Managerial Finance*, 37 (8), pp. 788-804. Available at: [www.emeraldinsight.com/0307-4358.htm](http://www.emeraldinsight.com/0307-4358.htm) [Accessed 25/4/2014].
- Tahal Group & Bhundia Associates, 2013. Water Supply Master Plan for Mombasa and Other Towns. 1 (1), .

- Tremolet, S., 2011. Meeting the Challenge of Financing Water and Sanitation - Tools and approaches. ( ; 1), Paris: OECD. Available at: [www.oecd-ilibrary.org](http://www.oecd-ilibrary.org) [Accessed 27/3/2014].
- WASREB, 2002. Tariff guidelines and model. 1), Nairobi: Water Services Regulatory Board.
- Weber, B. and Alfen, H., 2008. Infrastructure as an asset class; investment strategies, project finance and PPP. 1. s.l.: Wiley.
- Westat, F., 2002. The 2002 User-Friendly Handbook for project evaluation. National science foundation. Available at: <http://www.nsf.gov/pubs/2002/nsf02057/nsf02057.pdf> [Accessed 21/5/2014].
- Whittington, D., 2003. Possible adverse effects of increasing block water tariffs in developing countries. *Economic Development and Cultural Change*, pp. 76-87. Available at: [www.researchgate.net](http://www.researchgate.net) [Accessed 27/4/2014].
- World Bank, 1994. World Development Report;Infrastructure for Development. 978-0-19-520992-1), 200 Madison Avenue, New York, N.Y. 10016: Oxford University Press. Available at: [http://wdronline.worldbank.org/worldbank/a/c.html/world\\_development\\_report\\_1994](http://wdronline.worldbank.org/worldbank/a/c.html/world_development_report_1994) [Accessed 11/7/2012].
- Yin, R., 2003. Case study research; design and methods. *Applied Social Research Method Series*, 5 (2), pp. 3-57.

# Annex 1 Interview guide

## Introduction;

My name is Henry Ndegwa Njuguna and I am a Msc Urban Management and Development student in Erasmus University, Rotterdam.

This interview is conducted in order to establish how different financial mechanisms are effective in improving water supply provision efficiency.

The research is about *the extent to which utilization of subsidies, loans, grants and tariffs influence water services provision efficiency in Mombasa County, Kenya.*

This interview will be treated as private and confidential and it will only be used for research purposes only.

This interview will take one and a half hours to two hours and I seek for your permission if you don't mind?

## Factual Questions

- What is your position in the organization?
- How many years have you worked in the organization?
- Which department or section do you work in? (Only if unsure of respondents section)
- To whom do you report to?

Questions based on indicators;

## Corporate Governance efficiency (All managers)

- i. Are managers fully responsible for all strategic decisions taken by the company?
- ii. What is the level of independence in management decisions? High, medium or low?
- iii. If low or medium, from which quarters is the external influence most?
- iv. How does management ensure that laid down rules and work processes are followed?
- v. How can accountability and openness to the public and stakeholders further be enhanced?
- vi. Which decisions of management are influenced most by availability of finances in your section?

Human resources efficiency

- i. In your section is the company staff utilized efficiently in their current position and qualification? How?
- ii. What is being done to ensure that the staff with proper qualification are hired and maintained?
- iii. What are the main challenges for optimizing staff productivity?
- iv. Does the department conduct employee satisfaction assessment and if so how?

Customer/Commercial efficiency

- i. What would you consider to be the main challenges of the department in offering better services to the customers?
- ii. What more can be invested to better improve the situation?
- iii. How does financial allocation affect the customer services?

- iv. How can accountability and openness to the public and stakeholders further be enhanced?
- v. How would you rate the accuracy of customer information in terms of meter number, physical address and customer details? High medium or low.
- vi. What do you think are the main challenges in billing and collection of revenue?
- vii. How do you think this challenge can be overcome?
- viii. Should the company maintain the water kiosk subsidy for the poor? If yes or no, please explain?
- ix. Do customers understand the tariff clearly? What kind of questions is common from customers regarding the tariff or their water bills?
- x. In your opinion is the current tariff fair to financial capability of residents? What do you think is the main determinant of water usage? Please explain further?
- xi. Does the company have a success rate in completed handling of customer complaints? if yes, what is the basis for its formulation?

#### Technical efficiency (Engineering & Strategy Department)

- i. Is the technical department properly staffed and equipped? What are the main areas that require more investment?
- ii. Do annual strategic plans of the department get implemented if not, why not? Can you elaborate further?
- iii. Do you think that previous financial investments from loans were adequate in improving access to water by residents?
- iv. Do you think that funding on capacity building were effective in improving ability to deal with technical challenges? Would you rate the effectiveness as high, low or medium?
- v. Can you identify major achievements or shortcomings of these styles (loans and grants) as sources of financial investments?
- vi. Is the current allocation of tariff revenue adequate to fund operational needs of the department? How can this be further improved?

#### Financial efficiency

- i. Is there some form of financial projection in your department and is it adhered to in running of the department? If no or yes, please explain?
- ii. How availability financial intervention like has loans (AFD/WB) and grants (WSTF & VEI) affected the department/section performance?
- iii. Do you think subsidized water for the poor like water kiosks is currently functioning as planned? if no or yes, please explain?
- iv. Is the current tariff structure sustainable? If no or yes what do you think are its shortcomings or strength?
- v. Does the company publish its audited accounts? If no what do you think are the reasons for not doing so?
- vi. What budgeting challenges are encountered by your department/section/position?
- vii. How do you deal with this challenges
- viii. Do you think that financial resources are properly managed and spent? If not where do you think losses are common?
- ix. What measures are in place to prevent wastage?

#### Conclusion

- i. If you were asked to mention one thing that can be done to help you improve your productivity to the company, what would that be?

- ii. If you were asked to mention one thing that can be done to help improve your section/department/unit productivity to the company, what would that be?

**Wrap up?**

After the interview notes:

- How the interview went (was interviewee talkative, cooperative, nervous, well-dressed/scruffy, etc.); where the interview took place.
- Any other feelings about the interview (did it open up new avenues of interest?).
- The setting (busy/quiet, many/few other people in the vicinity, new/old buildings, use of computers).

## Annex 2 Utility efficiency survey (source; IWA)

### 1. Governance

Corporate Governance	Enter level which best describes the situation	Efficiency Level				
		1 (poor)	2	3	4	5 (excellent)
G1: Mission statement		None	In relation to some activities	Some departments have documented mission statement	Most departments have documented mission statement	Mission statement at utility level and in all departments
G2: Strategy		None	In relation to some activities	Some departments have documented strategy, updated regularly & implemented	Most departments have documented strategy, updated regularly & implemented	Ongoing Strategic Planning, documented, updated regularly & implemented
G3: Board of directors & selection of chairperson		No criteria of appointment; BoD and chairperson are designated by government (local or national)	BoD and its chairperson appointed following subjective criteria	BoD appointed following clear and transparent criteria; Government designates the chairperson	BoD appointed following clear and transparent criteria; BoD proposes candidate(s) chairperson to government	BoD appointed following clear and transparent criteria; BoD selects its chairperson
G4: Code of conduct & internal accountability		No code of conduct. No clear definition of roles, responsibilities and accountabilities	Well defined roles, responsibilities and accountabilities for some positions only	Well defined roles, responsibilities and accountabilities for key positions only	Well defined roles, responsibilities and accountabilities, no written Code of Conduct	Documented Code of Conduct & well defined roles, responsibilities and accountabilities include performance targets
G5: Procedures and quality control		No documented QC procedures	Documented QC procedures in relation to some activities, regularly audited and updated	Some departments have documented QC procedures, regularly audited and updated	Most departments have documented QC procedures, regularly audited and updated	Documented QC procedures at utility level and in all departments, regularly audited and updated
G6: Procurement		No ceilings and no written procedures for procurement	Existence of ceilings but no written procedures for procurement	Existence of ceilings; Procurement procedures subject to interpretation	Existence of ceilings; Clear transparent procurement procedures using Cost Based Selection	Existence of ceilings; Clear transparent procurement procedures using Quality & Cost Based Selection (QCBS)
G7: Public relations		No dedicated PR person, no web site, no communication tools & policy	Some PR actions are taken but without any formalized policy and no established tools	PR actions do exist on a permanent basis, with web site, but no policy is in place	PR tools and actions exist, including web site, and are regularly activated and updated	PR recognized as a full process, web site, communication tools and formalized policy are in place
G8: Professional bodies		No participation in any professional society or in professional events	Few case by case participations to events organized by professional bodies	Membership in professional bodies and attendance to professional events but no regular participation	Membership in professional bodies and regular attendance to professional events	Active role in national and international professional bodies and full participation in professional events
G9: Accountability to environment		No accountability to environment	Irregular monitoring of impact of environment	Regular monitoring of impact on environment	Regular monitoring of impact on environment and list of actions to improve	Short and long term strategy to improve impact on environment and GHG emissions and monitoring tools

## 2. Human resources efficiency

Human Resources	Enter level which best describes the situation	Efficiency Level				
		1 (poor)	2	3	4	5 (excellent)
<b>H1: Internal communications</b>		No regular systematic information flow top down or bottom up	Minimal, irregular information top down only	Regular information top down, limited possibilities to give feedback. Business documents are openly shared.	Adequate internal communications, including regular staff information events, communications in both directions encouraged	Excellent internal communications, including: regular newsletter, regular staff information events, transparency even in the case of bad news, communications in both directions encouraged
<b>H2: Recruitment and staffing levels</b>		Appropriate staff number not known and recruitment ad hoc	Required number of staff approximately known but actual staff numbers significantly below or above the target level	Required number of staff approximately known and actual staff numbers close to this level	Staffing level has been determined in the past but is not regularly reviewed. Staffing close to this level	Optimum staffing level known and annually reviewed, staffing presently at the optimum level
<b>H3: Remuneration levels</b>		Remuneration levels very low, impossible to attract qualified personnel	Remuneration levels low, but high enough to attract professionals because of the lack of other opportunities in the region	Levels are in accordance with similar positions in the water industry and related business	Better than average packages, significant interest if job opportunities but limited incentive to stay until retirement	Attractive packages, significant interest if job opportunities are announced, no incentive to leave the utility for financial reasons
<b>H4: Staff training &amp; education programs</b>		No staff training or education and no related budget	Basic training for some functions provided, mostly on-the-job training	Limited staff training and capacity building, availability of a minimal education plan	Actively managed staff training and capacity building, availability of an education plan, staff encouraged to make own suggestions	Actively managed staff training and capacity building, comprehensive and budgeted education plan, staff encouraged to make own suggestions, participation in third party courses encouraged and paid for, participation in conferences possible

### 3. Customer efficiency

Accountability towards customers	Enter level which best describes the situation	Efficiency Level				
		1 (poor)	2	3	4	5 (excellent)
<b>A1: Coverage</b>		Coverage is limited to dense urban area	Coverage is poor in peri-urban areas	Coverage is not full and part of the population has no easy access to water	Coverage is not full but access is provided to most of the population	Coverage is full on territory
<b>A2: Delivery of service</b>		Inadequate water pressure is chronic, or hours of supply are limited	Inadequate water pressure is chronic in several areas, supply is not 24/7	Inadequate water pressure is chronic in some of the service area, or there are frequent service disruptions	Mostly demand driven level of service; but service disruption objectives are not met	Demand driven level of service to agreed targets; 24/7 supply
<b>A3: Water quality</b>		Water quality is permanently poor and not complying with regulations	Water quality is poor most of the time although OK in some areas and at some periods	Chemical and bacteriological quality of water is irregular with many non compliances with regulation	Chemical and bacteriological quality of water is good but not always complying with regulation	Chemical and bacteriological quality of water is high and complying with regulations
<b>A4: Customer communication</b>		Only communication is the bill. No staff and no strategy for customer communication. No information for customers prior to supply interruptions.	Occasional public awareness campaigns or customer communications. No systematic information for customers prior to supply interruptions.	Occasional public awareness campaigns. Systematic information for customers prior to supply interruptions.	Budgeted and staffed customer communication service. Systematic information of customers via a range of media prior to supply interruptions.	Budgeted and staffed communication service as part of an external relations department. Systematic information of customers via a range of media prior to supply interruptions. Follow up surveys to check effectiveness
<b>A5: Customer Services</b>		Bills payment at the utility premises only. No call centre.	Bills payment at the utility premises only. Basic call centre but no systematic recording of calls.	Convenient ways for bills payment. Call centre records calls but can not provide real time information.	Convenient ways for bills payment. Simple application for connection procedures. Convenient communication methods to change customer information. Call centre records calls and is able to provide real time information.	Convenient ways for bills payment. Simple application for connection procedures. Convenient communication methods to change customer information. Call centre records calls and is able to provide real time information. Regular customer satisfaction surveys with performance targets
<b>A6: Complaints management</b>		Complaints not recorded and irregular follow-up, often very long complaint resolution duration, no prioritization of complaints	Basic complaints recording, long complaints resolution times, no prioritization	Complaint logging system in place, prioritization and follow up in place	Complaint logging system in place, standard complaints resolution times set and actual achievement monitored, complaints resolved within the target time	Complaint logging system in place, standard complaints resolution times set and actual achievement monitored, complaints resolved within the target time, ombudsman



#### 4. Financial efficiency

Financial	Enter level which best describes the situation	Efficiency Level				
		1 (poor)	2	3	4	5 (excellent)
<b>F1: Existence of financial operating projections</b>		The utility does not have its own financial operating budgets and projections	The utility has its own annual budget, but insufficiently detailed, or not balanced between expenditures and revenues	Balanced and detailed budget for coming year with no longer term projections	Balanced and detailed financial projections and budget for three years	Balanced and detailed financial projections and budget meeting the mid term business plan and utility strategy
<b>F2: Existence of capital planning and projections (CAPEX)</b>		The utility does no capital planning	Utility does limited capital planning for less than five years.	Utility does longer term capital planning, beyond five years, to include new assets and upgrades.	Utility does long term capital planning and budgeting but has not identified sources of funds.	Utility does long term capital planning and budgeting with identification of sources of funds.
<b>F3: Accounting principles and procedures</b>		Principles not documented	Principles exist but are not followed	Principles exist and are followed but do not comply with legal requirements	Accounting procedures comply with legal requirements and meet documented good practice.	Accounting procedures comply with legal requirements and meet documented good practice. Balance sheets are available.
<b>F4: Financial reporting and monitoring</b>		No periodic reporting	In process of developing reporting and monitoring	Monthly or Quarterly reporting, not detailed	Quarterly detailed reporting and monitoring. Annual report	Monthly detailed reporting and monitoring. Public annual report.
<b>F5: External Auditing of annual financial records</b>		No external auditing	Annual external audit by an administrative body	Annual external audit by a local independent audit firm	Annual external audit by a national independent audit firm with significant qualifications	Annual external audit by an independent, internationally recognized audit firm
<b>F6: Credit worthiness</b>		Utility has no rating or no access to credit	Utility has access to local and limited credit under its owner's guarantee	Utility has access to limited international credit under its owner's guarantee or to local credit	Utility has access to limited international credit without owner's guarantees	Utility has an investment grade credit rating and has access to Banks and competitive offers
<b>F7: Tariff setting policies and mechanism</b>		Political tariff totally disconnected from the actual water cost	Insufficient tariff set by the local or national government mainly based on political considerations	Tariff increases estimated by the utility and subject to government approval	Legal framework and formula for regular tariff reset, subject to government approval	Legal framework and automatic formula for regular tariff reset meeting the actual water cost
<b>F8: Revenue Sufficiency</b>		Revenues less than 75% of operating costs	Revenues cover at least 75% of operating costs	Revenues cover operating costs	Revenues cover operating costs and significant capital costs-or- Revenues cover operating costs and debt service	Full Cost Recovery - or - Revenues cover operating costs, debt service, and capital repair and replacement

## 5. Commercial efficiency

Commercial	Enter level which best describes the situation	Efficiency Level				
		1 (poor)	2	3	4	5 (excellent)
<b>C1: Customer Information</b>		Paper customer files, not updated	Computerized customers database, not updated	Computerized customers database, regularly updated	Computerized customers database, Internal quality control system	Computerized customers database, Internal quality control system. Total control of customers database evolution. Customer Relationship Management
<b>C2: Meter reading and billing</b>		Manual meter reading and data transfer Lack of clear operational and control procedures and therefore potential for a significant level of mistakes. Uncertain whether all customers are billed.	Manual meter reading and data transfer Basic operational and control procedures. Uncertain whether all customers are billed.	Manual meter reading and data transfer Clear operational and control procedures. Uncertain whether all customers are billed.	Meter reading with handheld devices, automatic data transfer Clear operational and control procedures. > 99% of all customers billed	Automatic Meter Reading (AMR) Clear operational and control procedures. > 99% of all customers billed
<b>C3: Collection efficiency: domestic and industrial clients</b>		% of billed amount collected unknown collection period unknown	< 80% of bills actually collected average collection period > 60 days	80-90% of bills actually collected average collection period 31-60 days months	90-99% of bills actually collected average collection period 31-60 days	> 99 % of bills are actually collected average collection period < 30 days
<b>C4: Collection efficiency: public authorities and bonded clients</b>		Public authorities and bonded clients do not pay water bills.	Only some public authorities and bonded clients do pay water bills.	Most public authorities and bonded clients do pay water bills, not necessarily on schedule. No action plan in place to enforce payment.	Most public authorities and bonded clients do pay water bills on schedule. No action plan in place to enforce payment.	All public authorities and bonded clients do pay water bills on schedule. Action plan with specific measures in place to enforce payment
<b>C5: Customers metering</b>		no metering	Limited metering	All industrial clients are metered; not all domestic customers are metered. No metering of public administrations.	All customers are metered. No regular testing and calibration of meters. No scheduled meter replacement	All customers are metered. Regular testing and calibration of meters. Scheduled meter replacement

## 6. Technical efficiency

Technical	Enter level which best describes the situation	Efficiency Level				
		1 (poor)	2	3	4	5 (excellent)
<b>T1: Water safety plan</b>		No water safety plan.	Water safety plan defined but not implemented	Water safety plan partially implemented	Water safety plan defined and implemented	Water safety plan implemented, regularly audited and reviewed
<b>T2: Strategic Asset management</b>		Lack of clear knowledge of assets and no record keeping.	Basic record of all infrastructure, not updated	Updated and comprehensive record of all infrastructure.	Updated and comprehensive record of all infrastructure. Risks of critical failures identified	Strategic asset management plan: existing and implemented, including evaluation of the risk of failure and lifecycle costing
<b>T3: NRW management</b>		No monitoring of NRW indicators. No NRW management strategy.	% NRW monitored No Water Balance available. No NRW management strategy.	% NRW monitored No Water Balance available. Some actions are undertaken to reduce commercial or physical losses but without NRW management strategy.	IWA Water Balance available Some actions are undertaken to reduce commercial or physical losses but without NRW management strategy.	IWA Water Balance available and regularly updated Physical and commercial losses performance indicators monitored Regular NRW reduction activities as per a comprehensive NRW management strategy. Sufficient budget for NRW management
<b>T4: Operational efficiency</b>		No operational efficiency monitoring.	Some operational efficiency indicators are occasionally monitored.	Monitoring of some operational efficiency indicators but not comprehensive.	Monthly and comprehensive monitoring of operational efficiency indicators. Some actions are implemented to improve the operational efficiency.	Comprehensive performance monitoring & review with an efficiency improvement strategy and action plan in place and followed.
<b>T5: Maintenance</b>		No maintenance other than breakdown maintenance, poor records	Some limited routine maintenance and basic record keeping	All essential plant has routine maintenance and records of maintenance and breakdowns	Breakdowns and maintenance are regularly reviewed to reduce failures and optimize maintenance	Detailed maintenance plans are maintained based on criticality with condition monitoring where appropriate
<b>T6: Water resources management</b>		No water resources plan	Identification of water resource issues and shortfalls, but no coherent plan to resolve	Long term master plan existing; budget not available and/or assumptions not tested	Long term plan existing and monitored. Some funding or resource shortfalls	Long term master plan existing and regularly updated; related investments included in budget and financial planning
<b>T7: Drinking water quality monitoring</b>		No water quality sampling and testing.	Occasional sampling and testing . Water quality regularly does not meet applicable legislation.	Regular sampling and testing program. Water quality regularly does not meet applicable legislation.	Regular sampling and testing program. Water quality always meets applicable legislation requirements.	Regular sampling and testing program. Water quality always meets applicable legislation and WHO requirements.

## Annex 3; Financial utilization survey

### 1. Utilization of loans

		UTILIZATION MEASUREMENT				
	Enter level which best describes the situation					
		Suitability level			Excellent	
LOANS UTILIZATION - INFRASTRUCTURE DEVELOPMENT	Average ranking	1	2	3	4	5
Adequacy of available financial resources		Resources are never adequate to meet project demands	Resources seldom meet their intended usage	Resources meet project demands half of the time	Resources usually meet project demands	Resources allocated always meet project demands
Responsiveness to investment needs		Resources are never available on time	Resources are seldom available on time sometimes	Resources are available half of the time	Usually resources are available on time	Resources are always available on time
Prudence in management and accountability		There is never monitoring of expenditure or auditing during project progress	There is rarely expenditure monitoring and auditing while projects are on progress	Expenditure monitoring and auditing is done half of the times during project	The expenditure monitoring and auditing is usually done during project progress	The expenditure monitoring and auditing is always done during project progress
Needs sensitivity		There is never needs assessment before resources are allocated	There is seldom stakeholder consultations before financing of activities or projects	Half the time, there is stakeholder consultations before finances are allocated to various uses	There is usually stakeholder consultations conducted before finances are allocated to uses	There is always stakeholder consultations conducted before finances are allocated to uses
Reliability of funding source		The sources of finance are never able to provide money when needed to	The sources of finance seldom provide money when needed to	The sources of finance provide money when needed to half the time	The sources of finance usually provide money when needed to	The sources of finance always provide money when needed to

## 2. Utilization of Grants

INDICATOR MEASURED	Enter level which best describes the situation	UTILIZATION MEASUREMENT				
		SUITABILITY LEVEL				
						Excellent
GRANTS UTILIZATION		1	2	3	4	5
Staff training requirements met from allocated funding		Resources are never allocated based on the training requirement needs	Resources are rarely allocated based on the training requirement needs	Resources are half the time allocated based on the training requirement needs	Resources are usually allocated based on the training requirement needs	Resources are always allocated based on the training requirement needs
Review of organization structure		The organization structure is harmonized and personnel positions based on review recommendations	The organization structure rarely harmonized and personnel positions based on review recommendations	The organization structure halfly harmonized and personnel positions based on review recommendations	The organization structure usually harmonized and personnel positions based on review recommendations	The organization structure always harmonized and personnel positions based on review recommendations
Training and skill mix compatibility		Personnel are never trained based on the professional background	Personnel are rarely trained based on the professional background	Personnel are half the time trained based on their professional background	Personnel are usually trained based on their professional background	Personnel are always trained based on their professional background
Improvement of operational and skill capacity		After training there is never noted change in employees application of skills aquired in training in his/her work responsibilties	After training there is rarely noted change in employees application of skills aquired in training in his/her work responsibilties	After training there is half the time noted change in employees application of skills aquired in training in his/her work responsibilties	After training there is usually noted change in employees application of skills aquired in training in his/her work responsibilties	After training there is always noted change in employees application of skills aquired in training in his/her work responsibilties
Engagement of staff in development of company strategic plans		The company never involves employees deeply in development of strategic documents	The company rarely involves employees deeply in development of strategic documents	The company half the time involves employees deeply in development of strategic documents	The company never involves employees deeply in development of strategic documents	The company never involves employees deeply in development of strategic documents

### 3. Utilization of Subsidies

INDICATOR BEING MEASURED	Enter level which best describes the situation	UTILIZATION MEASUREMENT				
		Suitability level				Excellent
UTILIZATION OF SUBSIDIES	Average ranking	1	2	3	4	5
Consistency of water prices in low income areas		The recommended price of Kshs 2/= per 20 liter can of water is never used by kiosk owners in low income areas	The recommended price of Kshs 2/- per 20 liter can of water is rarely used by kiosk owners in low income areas	The recommended price of Kshs 2/- per 20 liter can of water is half of the time used by kiosk owners in low income areas	The recommended price of Kshs 2/- per 20 liter can of water is usually used by kiosk owners in low income areas	The recommended price of Kshs 2/- per 20 liter can of water is always used by kiosk owners in low income areas
The revenue collected from subsidized sources		The revenue collected from kiosks is never as per expectations of the company	The revenue collected from kiosks sources is rarely as per expectation of the company	The revenue collected from kiosks sources is half the time as per expectation of the company	The revenue collected from kiosks sources is usually as per expectation of the company	The revenue collected from kiosks sources is always as per expectation of the company
Location of water kiosks		Water kiosks are never located in a manner that focuses on needs of the poor residents	Water kiosks are rarely located in a manner that focuses on needs of the poor residents	Water kiosks are half the time located in a manner that focuses on needs of the poor residents	Water kiosks are usually located in a manner that focuses on needs of the poor residents	Water kiosks are always located in a manner that focuses on needs of the poor residents
Investment to meet pro poor water supply needs		The company never implements policies and strategies on pro poor water supply	The company rarely implements policies and strategies on pro poor water supply	The company half the time implements policies and strategies on pro poor water supply	The company usually implements policies and strategies on pro poor water supply	The company always implements policies and strategies on pro poor water supply
Prudence in management of subsidized financial interventions		The kiosks are never operated as per the existing kiosk policy of the company	The kiosks are rarely operated as per the existing kiosk policy of the company	The kiosks are half the time operated as per the existing kiosk policy of the company	The kiosks are usually operated as per the existing kiosk policy of the company	The kiosks are always operated as per the existing kiosk policy of the company
Average score of Grants funding out of five						

#### 4. Utilization of Tariffs

INDICATOR MEASURED	Enter level which best describes the situation	UTILIZATION MEASUREMENT				
		Excellent				
TARIFF UTILIZATION	Average ranking	1	2	3	4	5
Cost recovery		The current tariff never meets the operation and maintenance costs	The current tariff rarely meets the operation and maintenance costs	The current tariff half the time meets the operation and maintenance costs	The current tariff usually meets the operation and maintenance costs	The current tariff always meets the operation and maintenance costs
Equity and fairness		In your opinion, the tariff structures never meets the consumers financial capability (rich and poor) in a fair manner	In your opinion, the tariff structures rarely meets the consumers financial capability (rich and poor) in a fair manner	In your opinion, the tariff structures half the time meets the consumers financial capability (rich and poor) in a fair manner	In your opinion, the tariff structures usually meets the consumers financial capability (rich and poor) in a fair manner	In your opinion, the tariff structures always meets the consumers financial capability (rich and poor) in a fair manner
Resources conservation		The tariff structure never acts as deterrent to wasteful consumption of water	The tariff structure rarely acts as deterrent to wasteful consumption of water	The tariff structure half the time acts as deterrent to wasteful consumption of water	The tariff structure usually acts as deterrent to wasteful consumption of water	The tariff structure always acts as deterrent to wasteful consumption of water
Acceptability		The stakeholders are never given audience in determining tariff price for water/tariff structure	The stakeholders are rarely given audience in determining tariff price for water/tariff structure	The stakeholders are half the time given audience in determining tariff price for water/tariff structure	The stakeholders are usually given audience in determining tariff price for water/tariff structure	The stakeholders are always given audience in determining tariff price for water/tariff structure
Simplicity and transparency		The tariff structure and prices are never transparent and simple	The tariff structure and prices are rarely transparent simple	The tariff structure and prices are half the time transparent simple	The tariff structure and prices are usually transparent simple	The tariff structure and prices are always transparent simple

**Annex 4 MOWASSCO net profit June 2007 – June 2014**

